City of Chicago

O2017-86

Office of the City Clerk

Document Tracking Sheet

Meeting Date:	2/22/2017
Sponsor(s):	Misc. Transmittal
Type:	Ordinance
Title:	Installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, landscaping, outdoor elevator, stormwater detention, water main, sanitary sewer and right-of-way improvements regarding Riverline Development (Special Assessment Docket No. 58837/Warrant No. 62530)
Committee(s) Assignment:	Committee on Transportation and Public Way

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December 16, 2016

2017 JAN -3 PM 12:04
OFFICE OF THE
CITY CLERK

RECEIVED
#2

VIA E-MAIL AND MESSENGER DELIVERY
William Higgins, City Planner V
Chicago Department of Transportation
Division of Project Development
30 North LaSalle Street, Suite 500
Chicago, Illinois 60602
william.higgins@cityofchicago.org

Re: Publication of Ordinance Providing For The Installation Of Riverwalk, Children's Playground, Dog Park, Plaza, Amphitheater, Trail System, Landscaping, Outdoor Elevator, Stormwater Detention, Water Main, Sanitary Sewer, And Right-Of-Way Improvements In Regard To The Riverline Development [Special Assessment Docket No. 58837/Warrant No. 62530], Including The Exhibits Thereto (the "Ordinance")

Mr. Higgins:

We have assembled the Ordinance. The Ordinance was recommended for approval by the City of Chicago Board of Local Improvements on December 8, 2016. Two (2) copies of the Ordinance are being delivered to you by messenger, as the Plans and Specifications in Exhibit "G" thereto are hundreds of pages in length. With regard to the Ordinance:

1. It must be published by the City Clerk, and the publication must take place at least ten (10) days before the City Council approves the Ordinance.

2. Deliver one (1) copy of the Ordinance to the City Clerk for publication in the usual way.

3. Have the City Clerk insert the date of publication on the "Front of Pamphlet" that is included with the Ordinance.

4. After publication, please confirm with Tom Bayer and me that the Ordinance has been published, and the date on which the publication occurred.

Please call or write with any questions.

Very truly yours,

KLEIN, THORPE & JENKINS, LTD.

Gregory T. Smith

Enclosures (only via messenger delivery)

cc: Michael Gaynor, City of Chicago Law Department (via e-mail; w/o encls.)
Elizabeth Whitaker, City of Chicago Law Department (via e-mail; w/o encls.)
Thomas P. Bayer, Klein, Thorpe & Jenkins (via e-mail; w/o encls.)

Volume 1 of 2

AN ORDINANCE PROVIDING FOR THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT

(SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530)

PAMPHLET

FRONT OF PAMPHLET

AN ORDINANCE PROVIDING FOR THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT
[SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530]

Published in pamphlet form this ___ day of _____, 2016.

AN ORDINANCE PROVIDING FOR THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT
[SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530]

BE IT ORDAINED by the City Council of the City of Chicago, Cook County, Illinois (the "City Council"), as follows, pursuant to the City of Chicago's home rule powers, as provided by Article VII, Section 6, of the Illinois Constitution:

SECTION 1: The City Council finds as follows:

A. The City of Chicago (the "City") is a home rule municipality pursuant to Article VII, Section 6(a) of the Illinois Constitution and, in addition, has the powers granted to it pursuant to 65 ILCS 5/1-1-1, *et seq.*

B. The Board of Local Improvements of the City met on November 16, 2016 and passed a First Resolution relative to Special Assessment Docket No. 58837/Warrant No. 62530 (sometimes referred to herein as the "Special Assessment"), a copy of which is attached hereto as Exhibit "A" and made a part hereof (the "First Resolution").

C. On December 8, 2016 the Board of Local Improvements of the City held a public hearing, pursuant to proper notice, relative to Special Assessment Docket No. 58837/Warrant No. 62530. At the conclusion of said public hearing, the Board of Local Improvements of the City adopted a Second Resolution, a copy of which is attached hereto as Exhibit "B" and made a part hereof (the "Second Resolution"), and approved a Recommendation relative to said Special Assessment, a copy of which is attached hereto as Exhibit "C" and made a part hereof (the "Recommendation"), recommending that the City proceed with the local improvements covered by said Special Assessment and directing that this Ordinance be prepared, to be submitted to the City Council, relative to said Special Assessment. A copy of the notice of the public hearing, that

was sent to each taxpayer of record within the proposed area of said Special Assessment, is attached hereto as Exhibit "D" and made part hereof.

D. That the property proposed for the Special Assessment Docket No. 58837/Warrant No. 62530 assessment area is within the boundaries of the City of Chicago, Cook County, Illinois.

E. That it is in the best interests of the citizens of the City and the owners of the property located within the proposed Special Assessment Docket No. 58837/Warrant No. 62530 assessment area to construct the local improvements referenced below and to impose a special assessment for the same, all pursuant to 65 ILCS 5/9-2-1, *et seq.* and 50 ILCS 460/1, *et seq.*, as modified by the City pursuant to its home rule authority.

F. That this Ordinance has been considered by the City Council, and was published in pamphlet form at the City Hall in the manner utilized for publication of ordinances at least ten (10) days before any action was taken hereon, as required by 65 ILCS 5/9-2-13.

SECTION 2: That based on the foregoing, local improvements shall be constructed in the City consisting of the excavation for and construction of all public infrastructure and public improvements required for the development of the area generally bounded by Harrison Street, Wells Street, Roosevelt Road and the Chicago River, as more specifically depicted on the map attached to the Estimate of Cost, as updated, amended and approved by the Board of Local Improvements of the City at its December 8, 2016 meeting and public hearing, to correct a scrivener's error in the legal description for an "Acquired Property," as defined in Section 6 below, attached hereto as Exhibit "E" and made part hereof (the "Estimate of Cost"), other than those being paid for outside of the special assessment process directly by the developer, including riverwalk, children's playground, dog park, plaza, amphitheater, trail system, landscaping, outdoor elevator, stormwater detention, water main, sanitary sewer, and right-of-

way improvements, all of which are to be publicly owned (together the "Riverline Development"). The said improvements shall be constructed in and on public property, streets, right-of-ways and easements, and shall include site excavation and grading, construction of a river walk along portions of the frontage of the Chicago River from Harrison Street to Roosevelt Road with elevator and stair access to Roosevelt Road, a children's playground, a dog park, bio-swales reusing rain water and providing stormwater detention, a public plaza, an amphitheater, a trail system, the naturalistic reconstruction of the Chicago River edge, water main, sanitary sewer, and traffic signal, streetlight, sidewalk, roadway, and streetscaping improvements, all of which are to be publicly owned; including all tools, machinery and equipment and all materials and labor necessary to complete the improvements and place them in operation, all as more fully described in the Estimate of Cost (Exhibit "E").

SECTION 3: The property that shall be subject to the special assessment provided for by this Ordinance is as legally described in Exhibit "F" attached hereto and made part hereof.

SECTION 4: All materials of every kind and character to be used in the construction of these improvements will be of first-class quality, suitable for the purpose for which they are to be used, and subject to the inspection and approval of the City. All work shall be constructed in a workmanlike manner. The quantities and types of materials to be used are as set forth in the plans and specifications for the project, attached hereto as Exhibit "G" and made part hereof, and the Estimate of Cost (Exhibit "E").

All construction methods and materials used in construction of the improvements herein provided for shall conform with the requirements of the Standard Specifications for Road and Bridge Construction, issued by the State of Illinois Department of Transportation, adopted April 1, 2016, and the most recent edition of the Standard Specifications for Water and Sewer Main Construction in Illinois, published by the Illinois Society of Professional Engineers, copies of

which are on file with the City Clerk in the City, both as supplemented and amended by the requirements of the various departments of the City.

SECTION 5: The Recommendation of the Board of Local Improvements of the City (Exhibit "C"), the Estimate of Cost (Exhibit "E"), and the plans and specifications (Exhibit "G"), all hereto attached and incorporated herein by reference, be and the same are hereby approved.

SECTION 6: That said improvement shall be made and the cost thereof, which is estimated to be $91,734,332.00, shall be paid for by the imposition of a special assessment on the property described in Exhibit "F," in accordance with 65 ILCS 5/9-2-1, *et seq.*, as supplemented by the Special Assessment Supplemental Bond and Procedures Act, 50 ILCS 460/1, *et seq.*, which the City hereby specifically elects to be applicable to this Special Assessment, as further supplemented by Section 2-102-075 of the Chicago Municipal Code, and in accordance with the City's home rule authority pursuant to Article VII, Section 6 of the Illinois Constitution, which prohibits the General Assembly from denying or limiting the City's power to make local improvements by special assessment. The City is authorized to acquire fee simple title to the properties on which the public improvements, that are contemplated as part of the Special Assessment, will be constructed, as set forth in the Estimate of Cost (Exhibit "E") (together the "Acquired Properties" and individually an "Acquired Property"). The City's cost to acquire fee simple title to the Acquired Properties, in the amount of $17,621,107.00 is set forth in, and is included as part of, the Estimate of Cost (Exhibit "E"), pursuant to the City's home rule powers, as provided for by Article VII, Section 6 of the Illinois Constitution. The City and the owner of the Riverline Development have agreed upon the property acquisition price for the Acquired Properties based on the owner's actual and documented property acquisition costs as verified by the City, with the owner's actual property acquisition costs having been found by the City to have been reasonable, and equal to or less than the current market value of the Acquired

Properties. In addition, in accordance with 65 ILCS 5/9-2-1, *et seq.*, as supplemented by the Special Assessment Supplemental Bond and Procedures Act, 50 ILCS 460/1, *et seq.*, as further supplemented by Section 2-102-075 of the Chicago Municipal Code, and in accordance with the City's home rule authority pursuant to Article VII, Section 6 of the Illinois Constitution, and the Estimate of Cost (Exhibit "E"), an amount not exceeding $2,889,628.00 is hereby provided to apply towards the payment of all lawful costs and expenses incurred in making, levying and collecting the assessment for said public improvements; an amount not exceeding $13,751,760 is hereby provided to pay capitalized interest; an amount not exceeding $5,500,704.00 is hereby provided as an additional deficiency reserve for the payment of interest on or principal of bonds when due in the event of nonpayment of any assessments; an amount not exceeding $8,005,120.00 is hereby provided for debt service reserve; and an amount not exceeding $2,259,990.00 is hereby provided for bond discount.

SECTION 7: The aggregate amount herein ordered to be assessed and each individual assessment shall be divided into sixty (60) semi-annual installments, coming due not more than thirty-one (31) years after the date on which the judgment order of final confirmation is entered in the Circuit Court of Cook County, Illinois, which shall bear interest at the maximum rate of nine percent (9%) per annum until paid, subject to reduction upon issuance of the special assessment bonds, so as to track the interest rate on the special assessment bonds, all in the manner and in accordance with the provisions of 65 ILCS 5/9-2-1, *et seq.*, as supplemented by the provisions of 50 ILCS 460/1, *et seq.*, Section 2-102-075 of the Chicago Municipal Code, and the City's home rule authority pursuant to Article VII, Section 6 of the Illinois Constitution.

SECTION 8: For the purposes of anticipating the collection of the installments of said assessment for said improvement, bonds shall be issued payable out of said installments, bearing interest at a maximum rate of not more than the greater of nine percent (9%) per annum, seventy

percent (70%) of the Prime Commercial Rate or the maximum rate authorized by the Bond Authorization Act (30 ILCS 305/0.01, *et seq.*), and signed (original or facsimile) by the Mayor of the City and attested (original or facsimile signature) by the City Clerk, or the Deputy City Clerk, under the corporate seal of the City. The bonds shall be issued in accordance with, and shall in all respects conform to, the provisions of 65 ILCS 5/9-2-1, *et seq.*, as supplemented by 50 ILCS 460/1, *et seq.*, Section 2-102-075 of the Chicago Municipal Code, and the City's home rule authority pursuant to Article VII, Section 6 of the Illinois Constitution.

SECTION 9: Pursuant to 65 ILCS 5/9-2-43, Andrea Yao, President of the Board of Local Improvements for the City, is designated as the person to file a petition in the Circuit Court of Cook County, Illinois, as provided by law in the name of the City, praying that steps may be taken to levy a special assessment for said improvement in accordance with the provisions of this Ordinance and in the manner prescribed by law.

SECTION 10: This Ordinance, having been previously published in pamphlet form in accordance with law, shall be in full force and effect from and after its adoption and approval.

EXHIBIT "A"

FIRST RESOLUTION OF THE BOARD OF LOCAL IMPROVEMENTS OF THE CITY OF CHICAGO, COOK COUNTY, ILLINOIS

(attached)

FIRST RESOLUTION OF THE BOARD OF LOCAL IMPROVEMENTS OF THE CITY OF CHICAGO, COOK COUNTY, ILLINOIS REGARDING THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT
[SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530]

BE IT RESOLVED by the Board of Local Improvements of the **CITY OF CHICAGO**, Cook County, Illinois (the "Board") that there be considered the construction of a local improvement consisting of the installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, landscaping, outdoor elevator, stormwater detention, water main, sanitary sewer and right-of-way improvements, all of which are to be publicly owned, in relation to the Riverline Development, which is generally bounded by Harrison Street, Wells Street, Roosevelt Road and the Chicago River, all as more fully described and indicated in the Estimate of Cost dated November 15, 2016, which is attached hereto and made part hereof as Exhibit "1", and incorporated herein by reference as if it were fully set forth herein (the "Estimate of Cost"), and signed by **WILLIAM B. LOFTUS, P.E.**, of **SPACECO, INC.**, engineer for the Board. Said Estimate of Cost is hereby approved. The entire improvement shall be constructed in and upon public property, streets, right-of-ways and easements in the **CITY OF CHICAGO**, using all new materials of the best quality, and in the best workmanlike manner, subject to the approval of, and acceptance by, the Board.

BE IT FURTHER RESOLVED that this Board fixes December 8, 2016, at the hour of 1:30 p.m. at 30 North LaSalle Street, Second Floor, Conference Rooms D and E, Chicago, Illinois, as the time and place for public consideration of the said proposed improvements.

BE IT FURTHER RESOLVED that the notice of the time and place of such public consideration be prepared and mailed in the manner provided by law.

BE IT FURTHER RESOLVED that this Resolution be at once transcribed into the records of this Board.

ADOPTED by the Board of Local Improvements of the **CITY OF CHICAGO,** Cook County, Illinois, this 16th day of November, 2016, pursuant to a roll call vote as follows:

AYES: Members Connolly, McKinnie, Higgins and Yao

NAYS: None

ABSENT: Member Coleman

APPROVED by me this 16th day of November, 2016.

Andrea Yao
President of
the Board of Local Improvements

ATTEST:

William Higgins
Secretary for
the Board of Local Improvements

EXHIBIT "1"

Estimate of Cost

(attached)

CITY OF CHICAGO
SPECIAL ASSESSMENT
(RIVERLINE PUBLIC IMPROVEMENTS)

ESTIMATE OF COST TO THE BOARD OF LOCAL IMPROVEMENTS FOR THE ACQUISITION, ENGINEERING AND CONSTRUCTION OF IMPROVEMENTS, INCLUDING STREETS AND PUBLIC OPEN SPACES FOR THE RIVERLINE DEVELOPMENT (BOUNDED BY WELLS STREET, HARRISON STREET, ROOSEVELT ROAD AND THE SOUTH BRANCH OF THE CHICAGO RIVER), FUTHER DESCRIBED IN THE RESOLUTION TO WHICH THIS ESTIMATE IS ATTACHED.

City of Chicago, Cook County, Illinois

November 15, 2016

To the Board of Local Improvements of
the City of Chicago, Illinois

Board Members:

I hereby submit an estimate of the cost for the previously described public improvements consisting of the acquisition of land for public improvements and open spaces, and the construction of the public improvements. The said public improvements include: improvements to Wells Street, Harrison Street, Roosevelt Road, Taylor Street and Polk Street; the installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, outdoor elevator, storm water detention, water main and sanitary sewer improvements; miscellaneous right-of-way items; and all tools, machinery, equipment, material and labor necessary to complete the improvements and place them in operation, with the specific anticipated unit amounts being set forth as follows:

Riverline

Engineer's Estimate of Costs

Sub-project: Land Acquisition
Date: November 15, 2016

Riverline
Fee Simple Open Space Allocation of Land Value
Relative to the Public Improvements

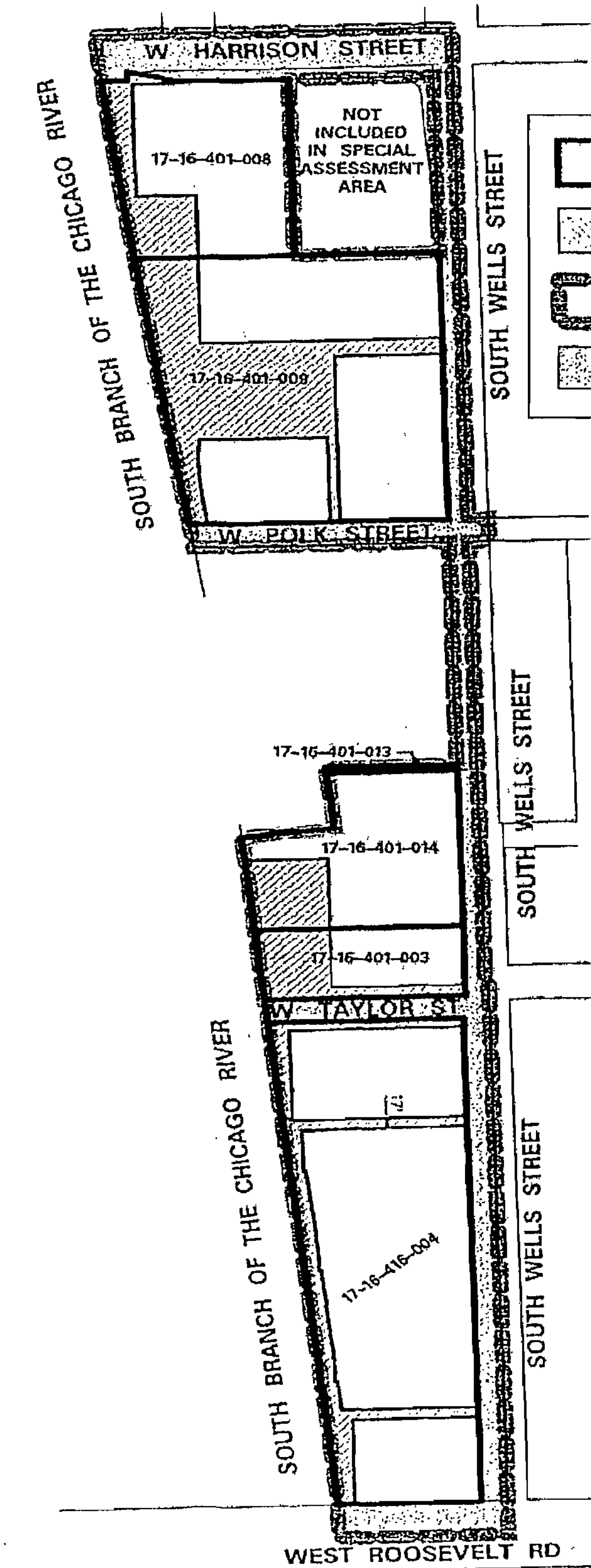
PIN	Fee Simple Land Area to be conveyed to the City in Sq. Ft., for the Public Improvements Construction	Property Owner's Purchase Price Per Sq. Ft.	Total $ for the Acquisition	Legal Description of Acquisition Area
17-16-401-008-0000	18,778	142.58	2,677,404	**See Appendix A for legal description of Fee Simple Land Area to be conveyed to the City by PIN number.**
17-16-401-009-0000	69,085	116.21	8,028,291	
17-16-401-014-0000	14,622	99.96	1,461,672	
17-16-401-003-0000	16,981	121.32	2,060,149	
17-16-416-004-0000	32,870	103.24	3,393,591	
Grand Total	**152,336**		**17,621,107**	

The property owners and the City having agreed upon the property acquisition price, based on the property owners' actual and documented property acquisition costs as verified by the City relative to the public lands fee simple property interest to be conveyed to the City; with the property owners' actual property acquisition costs having been found by the City to have been reasonable, and equal to or less than the current market value of the property in question.

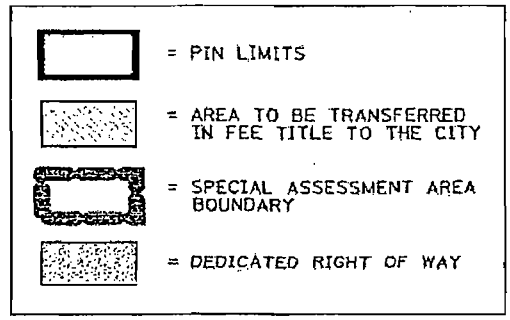
The property owners have agreed to convey the public lands property interest to the City as part of the special assessment proceeding, without the need for an eminent domain proceeding.

Refer to the following page for the depiction of the special assessment area.

BREAKDOWN OF RIVERLINE SPECIAL ASSESSEMENT AREA



LEGEND



PIN	Description	Sq. Ft.	Acres
17-16-401-008	Fee Simple Acquisition Area	18,778	0.431
	Remainder	62,940	1.445
	Total	81,718	1.876
17-16-401-009	Fee Simple Acquisition Area	69,085	1.586
	Remainder	131,934	3.029
	Total	201,019	4.615
17-16-401-013	Fee Simple Acquisition Area	0	0.000
	Remainder	1,931	0.044
	Total	1,931	0.044
17-16-401-014	Fee Simple Acquisition Area	14,622	0.336
	Remainder	60,981	1.400
	Total	75,603	1.736
17-16-401-003	Fee Simple Acquisition Area	16,981	0.390
	Remainder	20,910	0.480
	Total	37,891	0.870
17-16-416-004	Fee Simple Acquisition Area	32,870	0.755
	Remainder	181,944	4.177
	Total	214,814	4.932

REVISIONS:

N

SCALE: 1" = 200'

SPACECO INC.

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

9575 W. Higgins Road, Suite 700,
Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

DATE: 11/8/2016

JOB NO: 8749

FILENAME: 8749EXH-ASSESS

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

ITEM	QNTY	UNIT		PRICE		AMOUNT
A. Demolition & Debris Removal						
1. Remove Trees	158	trees	$	1,300	per tree	$205,400
2. Removal of Curbs	2,832	lf	$	4.00	per lf	$11,328
3. Pavement Removal - Full Depth	1,881	sy	$	18.00	per sy	$33,858
Contingency for A. Demolition & Debris Removal				10%		$25,059
	A. Demolition & Debris Removal				Sub-Total =	$275,645
B. Soil Erosion Sediment Control						
1. Erosion Control	13	acres	$	5,750	per acre	$73,600
Contingency for B. Soil Erosion Sediment Control				10%		$7,360
	B. Soil Erosion Sediment Control				Sub-Total =	$80,960
C. Earthwork Improvements						
1. Strip / Stockpile	7,834	cy	$	8.50	per cy	$66,589
2. Perform 3 Applications of Weed Control on Stockpile	3	apl	$	2,750	per apl	$8,250
3. Export Excess Soil	22,024	cy	$	15.00	per cy	$330,360
4. Premium to Haul-off Excess	22,024	cy	$	40.00	per cy	$880,960
5. Cut / Fill	16,581	cy	$	20.00	per cy	$331,620
6. Fill	2,597	cy	$	25.00	per cy	$64,925
7. Polk Street Cut / Fill	1	ls	$	25,000	per ls	$25,000
8. Rough Grade	62,811	sy	$	2.75	per sy	$172,730
9. Allowance to Locally Grout the Abandoned Water Main	1	allow	$	300,000	per allow	$300,000
10. Fountain Equipment Room Excavation	1,198	cy	$	35.00	per sy	$41,922
11. Fountain Equipment Room Backfill	775	cy	$	30.00	per sy	$23,240
12. Fountain Equipment Room Haul Off	423	cy	$	40.00	per sy	$16,924
13. Import 12-inch Gravel for Building Pads G, J and Townhouses	6,371	cy	$	30.00	per cy	$191,139
14. Excavate Retaining Walls @ Sidewalks (4/S3.01)	2,020	cy	$	30.00	per cy	$60,597
15. Backfill Retaining Walls @ Sidewalks	1,531	cy	$	25.00	per cy	$38,287
Replace and/or Repair River Edge Retaining wall or Stabilize River 16. Bank	1,430	lf	$	3,483	per lf	$4,980,690
Contingency for C. Earthwork Improvements				10%		$255,254
Contingency for River Edge Work				20%		$996,138
	C. Earthwork Improvements				Sub-Total =	$8,784,627
D. Drainage Improvements						
1. Polk Street Storm Pipe	25	lf	$	150.00	per lf	$3,750
2. Polk Street Storm Pipe Connection	1	ea	$	10,000	per ea	$10,000
3. Wet Well & Associated Improvements						
4. Wet Well with Pump	1	ea	$	40,000	per ea	$40,000
5. 3-inch DIP Force Main	188	lf	$	125.00	per lf	$23,500
6. 3-ft Diameter Outlet Structure	1	ea	$	6,000	per ea	$6,000
7. Excavation and Backfill for Pipe and Structures	1	ls		12500	per ls	$12,500
Contingency for D. Drainage Improvements				10%		$9,575
	D. Drainage Improvements				Sub-Total =	$105,325
E. Roadway Improvements						
1. Asphalt Paving	472	sy	$	60.00	Per sy	$28,320
2. CA-6 Subbase	in above					
3. Mill and Overlay	11,996	sy	$	18.00	Per sy	$215,928
4. Curbs and Gutters	2,625	lf	$	32.00	per lf	$84,000
5. Concrete Paving into Bldg Parking	379	sy	$	80.00	Per sy	$30,320
6. Traffic Signal	2	ls	$	250,000	per ls	$500,000
7. Signage and Striping	2	ls	$	21,000	per ls	$42,000
8. 4-inch Asphalt Paving at Polk	764	sy	$	45.00	Per sy	$34,380

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

ITEM	QNTY	UNIT	PRICE		AMOUNT
9. 9-inch conc base at Polk	764	sy	$ 80.00	Per sy	$61,120
10. CA-6 Subbase at Polk	764	sy	$ 15.00	Per sy	$11,460
11. Conc Gutter at Polk	553	lf	$ 32.00	per lf	$17,696
Contingency for E. Roadway Improvements			10%		$102,522
		E. Roadway Improvements		Sub-Total =	$1,127,746
F. Water Supply and Treatment Facilities					
Contingency for F. Water Supply and Treatment Facilities			10%		$0
		F. Water Supply and Treatment Facilities		Sub-Total =	$0
G. Water Main Improvements					
1. New Main Loop in Polk Street; 8" D.I. Pipe	515	lf	$ 225.00	per lf	$115,875
2. New Valve & Vault for Hot Tap to New Loop Polk Street	2	ea	$ 7,500	per ea	$15,000
3. Chlorination, Testing for New Hot Taps at Loop in Polk Street	2	ea			Incl'd Above
4. New Fire Hydrants along North Side of Polk Street	3	ea	$ 7,500	per ea	$22,500
5. Water from New Main for Fountains and Irrigation; incldS Pipe, Chlorination, Testing	765	lf	$ 160	per lf	$122,400
6. Water Valve Vault for Fountains North Site	1	ls	$ 25,000	per ls	$25,000
7. Relocation of City Water Main in Wells Street	1	ls	$ 47,880	per ls	$47,880
8. Adjust two (2) fire hydrants on Wells Street	1	ls	$ 48,650	per ls	$48,650
9. Water Feature #2 Water Supply Scope:					
10. Pump Station to Water Feature	1	ea	$ 35,000	per ea	$35,000
11. Outlet Control Structure	1	ea	$ 30,000	per ea	$30,000
12. Outlet Baffle, Lid, & Grate	1	ls	$ 20,000	per ls	$20,000
13. Vortex Manhole Structure	1	ea	$ 30,000	per ea	$30,000
14. Vortex Outfall Pipe	1	ls	$ 10,000	per ls	$10,000
15. Vortex Manhole Lids & Grates	1	ls	$ 15,000	per ls	$15,000
16. Weir Structure(s)	3	ea	$ 12,000	per ea	$36,000
17. Force Main - 4" Ductile Iron Pipe	390	lf	$ 125.00	per lf	$48,750
18. Excavation and Backfill for Pipe and Structures	1	ls	$ 25,000	per ls	$25,000
19. Water Valve Vault for Fountains and Irrigation for South Site	1	ls	$ 25,000	per ls	$25,000
20. Water Feature #5 Scope					
21. Force Main - 3" Ductile Iron Pipe	190	lf	$ 125.00	per lf	$23,750
22. Excavation and Backfill for Force Main Pipe	1	ls	$ 10,000	per ls	$10,000
Contingency for G. Water Main Improvements			10%		$70,581
		G. Water Main Improvements		Sub-Total =	$776,386
H. Wastewater Treatment Facilities					
1.					
Contingency for H. Wastewater Treatment Facilities			10%		$0
		H. Wastewater Treatment Facilities		Sub-Total =	$0
I. Sanitary Sewer Improvements					
1. Sanitary Sewer Service Main (30" Diam.) in Polk St	290	lf	$ 225.00	per lf	$65,250
2. Sanitary Sewer Manholes in Polk Street	2	ea	$ 6,000	per ea	$12,000
3. Connect to Existing San Sewer MH and grout	1	ea	$ 5,000	per ea	$5,000
4. Sanitary Sewer Clean-out	3	ea	$ 2,500	per ea	$7,500
5. 8-inch ESVCP Sanitary Sewer from Fountain	325	lf	$ 180.00	per lf	$58,500
6. Excavation and Backfill for Pipe and Structures	1	ls	$ 22,500	per ls	$22,500
7. Street Pavement and Base Removal and Restoration	1	ls	$ 15,000	per ls	$15,000
Contingency for I. Sanitary Sewer Improvements			10%		$18,575
		I. Sanitary Sewer Improvements		Sub-Total =	$204,325

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

	ITEM	QNTY	UNIT	PRICE		AMOUNT
	J. Landscaping Improvements					
1.	**Site Concrete**					
2.	Retaining Wall at Polk St.	91	cy	$ 1,000	per cy	$91,000
3.	Seat Wall at Amphitheater - Concrete Bench; includes: Ready Mix, Rebar, Formwork, Excav. & BF	725	lf	$ 500.00	per lf	$362,500
4.	Concrete Weir	8	ea	$ 4,500	per ea	$36,000
5.	Concrete Wall	50	lf	$ 540.00	per lf	$27,000
6.	Raised Concrete Walk	734	sf	$ 103.65	per sf	$76,079
7.	Concrete for Bridge	2	ea	$ 20,000	per ea	$40,000
8.	Foundations & Structure for Decorative Retaining Walls	129	lf	$ 2,000	per lf	$258,000
9.	Concrete Stairs adjacent to Bldg D	61	sf	$ 103.65	per sf	$6,323
10.	Concrete Retaining Walls @ Sidewalks (4/S3.01)	488	cy	$ 750.00	per cy	$366,319
11.	Fountain Equipment Room	816	sf			
12.	Fountain Equipment Room SOG	816	sf	$ 12.00	per sf	$9,792
13.	Fountain Equipment Room Walls	63	cy	$ 1,250	per sf	$78,333
14.	Fountain Equipment Room Roof	816	sf	$ 35.00	per sf	$28,560
15.	Pedestrian Paving Aggregate Base	1,133	ton	$ 40.00	per ton	$45,304
16.	Pedestrian Paving Concrete, Standard Color	5,199	sy	$ 82.00	per sy	$426,318
17.	Pedestrian Paving Concrete, Exposed Aggregate	900	sy	$ 108.00	per sy	$97,200
18.	On-grade Walkway Slab w/Exposed Aggregate	2,098	sy	$ 108.00	per sy	$226,608
19.	On-grade Walkway System Walls	14.0	cy	$ 575.00	per cy	$8,027
20.	On-grade Walkway Aggregate Base	525	ton	$ 40.00	per ton	$20,982
21.	On-grade Walkway Rebar	15,107	lb	$ 2.15	per lb	$32,480
22.	**Elevated Walkway**					
23.	Elevated Walkway Composite Wood Deck,2X8 PT Joist, Shims	7,709	sf	$ 50.00	per sf	$385,450
24.	Wood Piles at Elevated Boardwalk Piers	107	ea	$ 1,450	per ea	$155,150
25.	Concrete Piers at Elevated Bridges	18	ea	$ 4,500	per ea	$81,000
26.	Elevated Bridges Precast Concrete Planks	1,260	sf	$ 30.00	per sf	$37,800
27.	Elevated Bridges Concrete Topping w/Exposed Aggregate	1,260	sf	$ 12.00	per sf	$15,120
28.	**Site Pavers**					
29.	Unit Pavers - Retail Plaza	4,259	sf	$ 50.00	per sf	$212,950
30.	Unit Paver w/ Torpedo Sand Setting-bed	1,242	sf	$ 30.00	per sf	$37,260
31.	**Topsoil**					
32.	Import 30-inch Upland Topsoil	11,176	cy	$ 77.00	per cy	$860,552
33.	Import 18-inch Wetland Topsoil	1,732	cy	$ 80.00	per cy	$138,560
34.	Import 24-inch River-edge Soil	1,383	cy	$ 100.00	per cy	$138,330
35.	Import 12-inch Lawn Soil	160	cy	$ 100.00	per cy	$16,000
36.	Import 12-inch Topsoill for Building Pads A, B, C, E and F	5,544	cy	$ 70.00	per cy	$388,046
37.	Import 12-inch Cobblestone Bed beneath Elevated Boardwalk	47	cy	$ 150.00	per cy	$7,000
38.	**Landscaping**					
39.	Trees (including those adjacent to Bldg. D & to River City)	303	ea	$ 2,038	per ea	$617,514
40.	Shrubs	2,038	ea	$ 63.50	per ea	$129,413
41.	Mulch	782	cy	$ 52.00	per cy	$40,664
42.	Plugs	108,079	ea	$ 4.40	per ea	$475,548
43.	Perennials	33,832	ea	$ 18.50	per ea	$625,892
44.	Tree Permits	1	ls	$ 58,975	per ls	$58,975
45.	Stewardship	3	yr	$ 24,000	per yr	$72,000
46	Monitoring	3	yr	$ 9,000	per yr	$27,000
47.	Hydroseeding Native Grass for Bldg Pads A, B, C, E and F	16,631	sy	$ 3.00	per sy	$49,892
48.	Amphitheater Steps	1,400	sf	$ 105.00	per sf	$147,000
49.	5x5 Tree Grate	31	ea	$ 2,500	per ea	$77,500
50.	Perforated Pipe, Sched. 35	834	lf	$ 50.00	per lf	$41,700
51.	Boulders	231	ea	$ 1,000	per ea	$231,000
52.	Boulder Steps	34	ea	$ 1,000	per ea	$34,000
53.	Boulder Spillway	33	ea	$ 1,000	per ea	$33,000
54.	Trash Receptacles	24	ea	$ 2,500	per ea	$60,000
55.	Bike Racks	14	ea	$ 2,000	per ea	$28,000
56.	Inflatable Movie Screen	1	ea	$ 3,500	per ea	$3,500
57.	Rubber Play Area	1,702	sf	$ 40 00	per sf	$68,080
58.	Bird Houses	15	ea	$ 2,000	per ea	$30,000
59.	Log Bench	2	ea	$ 5,000	per ea	$10,000
60	Log Treads	10	ea	$ 3,500	per ea	$35,000
61	Log Steps	61	ea	$ 500.00	per ea	$30,500
62.	Log Play Elements	24	ea	$ 3,500	per ea	$84,000
63.	Dog Park Slab	1,061	sf	$ 9.00	per sf	$9,549

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

ITEM	QNTY	UNIT	PRICE		AMOUNT
64. Wetland Area PVC Liner w/Geofab	18,767	sf	$ 2.50	per sf	$46,918
65. Wetland Pumps	4	ea	$ 2,500	per ea	$10,000
66. **Water Features**					
67. "Entry Natural" Water Feature #1 - beneath Corten Bridges	1	allow	$ 75,000	per allow	$75,000
68. Concrete Walls and Base; Coatings, Lighting, and Power for Water Feature #1	1	allow	$ 100,000	per allow	$100,000
69. "Wetlands" Water Feature #2 - East of Bldg B	1	allow	$ 75,000	per allow	$75,000
70. Playground "Stream" Water Feature #3	1	allow	$ 300,000	per allow	$300,000
71 "Wetlands" Water Feature #4 - East of Bldg F	1	allow	$ 75,000	per allow	$75,000
72. "Amphitheater" Water Feature #5 - Near River, East of Bldg F	1	allow	$ 75,000	per allow	$75,000
73. "Wetlands" Water Feature #5 - South of Bldg G	1	allow	$ 75,000	per allow	$75,000
74. "Water Table Fountain" Allowance at Plaza Area between Bldgs C & D	1	allow	$ 90,000	per allow	$90,000
75. "Courtyard Fountain" Allowance near Bldg F	1	allow	$ 180,000	per allow	$180,000
76. "Archimedes Screw Fountain" Allowance between Bldgs B, D, & E	1	allow	$ 15,000	per allow	$15,000
77. Fountain Allowance between Bldgs B, D, & E (see price for Boulders above)	1	allow	$ 300,000	per allow	$300,000
78. **Misc. Metals**					
79. Dog Park Fence and Gates	51	lf	$ 85.00	per lf	$4,335
80. Handrail	Incl. Below	lf	$ 450.00	per lf	$0
81. Guardrail	4,080	lf	$ 450.00	per lf	$1,836,000
82. Planter Rail	1,372	lf	$ 75.00	per lf	$102,900
83. North Riverwalk Custom Curved Bench w/Back	147	lf	$ 750.00	per lf	$110,250
84. Parcel F Custom Curved Bench Backless	35	lf	$ 600.00	per lf	$20,700
85. Plaza Bench 1 Custom Curved Bench Backless	33	lf	$ 600.00	per lf	$19,800
86. Plaza Bench 2 and 3 Custom Bench Backless	59	lf	$ 500.00	per lf	$29,375
87. Polk Street Dog Run Custom Bench Backless	28	lf	$ 500.00	per lf	$14,000
88. Polk Street Planter Custom Bench Backless	37	lf	$ 600.00	per lf	$22,200
89. Lounge F1d	6	ea	$ 7,500	per ea	$45,000
90. Lounge F1c	11	ea	$ 7,500	per ea	$82,500
91. High Back Chair F1b	8	ea	$ 4,000	per ea	$32,000
92. Backless Bench F1a	4	ea	$ 2,500	per ea	$10,000
93. Corten Walls	129	lf	$ 775.00	per lf	$99,975
94. Corten Bridge Walkway and Structure	2	ea	$ 100,000	per ea	$200,000
95. Monumental Stairs	261	sf	$ 250.00	per sf	$65,250
96. Monumental Stairs Railings	1	ls	$ 15,000	per ls	$15,000
97. Boardwalk Steps	76	sf	$ 103.65	per sf	$7,877
98. Pipe Bollards	8	ea	$ 225.00	per ea	$1,800
99. Screen Fence	298	lf	$ 30.00	per lf	$8,940
100. Trench Drain	264	lf	$ 150.00	per lf	$39,600
101. Culverts Under Bldg Townhouses					N.I.C.
102. **Irrigation**					
103. Irrigation	1	ls	$ 200,000	per ls	$200,000
104. Irrigation Booster	6	ea	$ 2,500	per ea	$15,000
105. Irrigation Drainage System	1	ls	$ 8,000	per ls	$8,000
106. **Site Electric**					
107. 20" BOLLARD	24	SA	$ 342.00	per ea	$8,208
108. 32" BOLLARD	131	SA1	$ 435.00	per ea	$56,985
109. DRIVE/WALK OVER LIGHT	0	SB	$ 1,276	per lf	NIC
110. Flexible LED	309	SC	$ 130.00	per ea	$40,170
111. VARIOUS SIZES LINEAR LED	20	SD	$ 1,276	per ea	$25,520
112. RECESSED STAIR PUCK LIGHT	6	SE	$ 367.00	per ea	$2,202
113. LED ROPE	2205	SF	$ 130.39	per lf	$287,510
114. CONTINUOUS LED LINEAR	78	SG	$ 350.00	per lf	$27,300
115 LUMENRAIL HANDRAIL	1	SH		per ea	NIC
116. ARCLINE LED	78	SJ	$ 890.99	per ea	$69,497
117 SUSPENSION LIGHT CABLE STRING	3	SK	$ 416.00	per ea	$1,248
118. SUSPENSION LIGHT CABLE POLE	2	ea	$ 3,500	per ea	$7,000
119 SK FIXTURE	20	SK2	$ 475.00	per ea	$9,500
120 SK FIXTURE	9	SK3	$ 588.00	per ea	$5,292
121 PLAYGROUND POLE	5	SL	$ 2,500	per ea	$12,500
122 IMAGE PROJECTOR ON PLAYGROUND POLE	10	SL1	$ 3,500	per ea	$35,000
123 LUMINARE FOR PLAYGROUND POLE	10	SL2	$ 1,796	per ea	$17,960
124. THEATRE DRIVEWAY POLE	4	SM	$ 2,500	per ea	$10,000
125 LUMINIARE FOR THEATRE DRIVEWAY POLE	4	SM1	$ 1,318	per ea	$5,272
126 POLK STREET POLE	3	SS	$ 2,500	per ea	$7,500

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

ITEM	QNTY	UNIT		PRICE		AMOUNT
127. LUMINIARE FOR POLK STREET POLE	6	SS1	$	1,318	per ea	$7,908
128. MOVIES IN THE PARK POLE	8	SN	$	2,500	per ea	$20,000
129. LUMINIARE FOR MOVIES IN THE PARK POLE	20	SL2	$	1,796	per ea	$35,920
130. 4' RUN OF LINEAR LED	2	SP	$	1,742	per ea	$3,484
131. INGROUND LED	108	SQ	$	194.00	per ea	$20,952
132. RECESSED SLOT LED	1	SR	$	622.00	per ea	$622
133. Branch power and wiring to lighting	1		$	600,000	per ls	$600,000
134. LIGHTING CONTROL ALLOWANCE	1		$	35,000	per allow	$35,000
135. Lot fountain power to control panels	1		$	50,000	per ls	$50,000
136. Weather proof GFCI receptacles	8		$	750.00	per ea	$6,000
137. Power to Wayfinding signs	6		$	1,200	per ea	$7,200
138. Power to elevator	1		$	7,500	per ls	$7,500
139. Power to portable cinema screen	1		$	1,500	per ls	$1,500
140. Service and power distribution	3		$	50,000	per ea	$150,000
141. **Other**						
142. Drinking Fountains	3	ea	$	7,500	per ea	$22,500
143. Fountain Equipment Room Waterproofing	2,636	sf	$	8.00	per sf	$21,088
144. Custom Overhead Shade Structure	2	ls	$	22,500	per ls	$45,000
145. General Signage Allowance	1	allow	$	50,000	per allow	$50,000
146. Wayfinding Signage Allowance	1	allow	$	150,000	per allow	$150,000
147. Kayak Boat Launch and Stairs	1	ls	$	25,000	per ls	$25,000
148. Exterior Elevator at Roosevelt Road Allowance	1	allow	$	1,000,000	per allow	$1,000,000
149. Steel Stair at Roosevelt Road	1	ls	$	100,000	per ls	$100,000
Contingency for J. Landscaping Improvements				10%		$1,512,553
	J. Landscaping Improvements				Sub-Total =	$16,638,080
K. Roadway Electric Improvements						
1. ComEd Feeder Allowance for Open Site Electrical Load	1	allow	$	50,000	per allow	$50,000
2. Adjust Manhole F&G	2	ea	$	500.00	per ea	$1,000
3. Electrical MH Vault	2	ea	$	18,000	per ea	$36,000
4. Conduit	6,305	lf	$	15.00	per lf	$94,575
5. Street Light Fixtures	16	ea	$	15,000	per ea	$240,000
6. Polk St Lighting	3	ea	$	15,000	per ea	$45,000
Contingency for K. Roadway Electric Improvements				10%		$46,658
	K. Roadway Electric Improvements				Sub-Total =	$513,233
L. Soil Erosion Maintenance						
1. Erosion Control Maintenance	12	acres	$	1,500	per acre	$18,000
Contingency for L. Soil Erosion Maintenance				10%		$1,800
	L. Soil Erosion Maintenance				Sub-Total =	$19,800
				SUBTOTAL =		$28,526,126
		10%		CONTINGENCY=		Included above
					SUBTOTAL=	$28,526,126
General Conditions @7%						$1,996,829
Insurance @ 1 142%						$348,572
Fee @ 3%						$926,146
Permits						
					TOTAL =	$31,797,673

Riverline

Engineer's Estimate of Costs: Summary

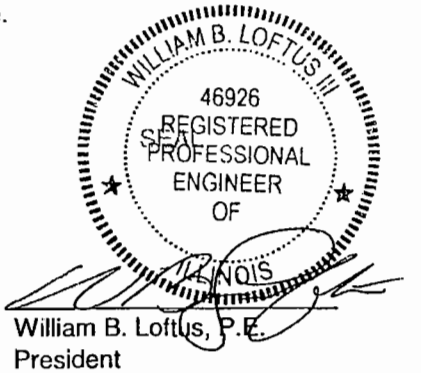
November 15, 2016

Description	Assessment Amount	Total	Notes
LAND ACQUISITION COSTS			
Land Acquisition	$ 17,621,107	$ 17,621,107	See attached breakdown
TOTAL LAND ACQ. COSTS	**$ 17,621,107**	**$ 17,621,107**	
CONSTRUCTION COSTS			
A. Demolition & Debris Removal	$ 275,645	$ 275,645	See attached breakdown
B. Soil Erosion Sediment Control	$ 80,960	$ 80,960	See attached breakdown
C. Earthwork Improvements	$ 8,784,627	$ 8,784,627	See attached breakdown
D. Drainage Improvements	$ 105,325	$ 105,325	See attached breakdown
E. Roadway Improvements	$ 1,127,746	$ 1,127,746	See attached breakdown
F Water Supply and Treatment Facilities	$ -	$ -	See attached breakdown
G. Water Main Improvements	$ 776,386	$ 776,386	See attached breakdown
H. Wastewater Treatment Facilities	$ -	$ -	See attached breakdown
I. Sanitary Sewer Improvements	$ 204,325	$ 204,325	See attached breakdown
J. Landscaping Improvements	$ 16,638,080	$ 16,638,080	See attached breakdown
K. Roadway Electric Improvements	$ 513,233	$ 513,233	See attached breakdown
L. Soil Erosion Maintenance	$ 19,800	$ 19,800	See attached breakdown
Subtotal	$ 28,526,127	$ 28,526,127	
General Conditions	$ 1,996,829	$ 1,996,829	
GC Builder's Risk Insurance	$ 348,572	$ 348,572	
GC Fee	$ 926,146	$ 926,146	
Subtotal	$ 3,271,547	$ 3,271,547	
Tests, Surveys, Legal and Studies	$ 1,013,371	$ 1,013,371	Includes geotech, environmental, material testing, etc.
Owner furnished items	$ 286,000	$ 286,000	Includes wayfinding signage
General Liability Insurance	$ 749,066	$ 749,066	Includes GL and environmental insurance
Project Management	$ 2,825,101	$ 2,825,101	
Permits	$ 649,743	$ 649,743	Includes building and utility permits and expeditor
Landscape establishment costs	$ 385,000	$ 385,000	
Subtotal	$ 5,908,281	$ 5,908,281	
TOTAL CONSTRUCTION COSTS	**$ 37,705,955**	**$ 37,705,955**	
Engineering costs			
Architectural fees	$ 2,042,150	$ 2,042,150	Includes architecture and landscape architecture
Engineering fees	$ 1,957,918	$ 1,957,918	Includes civil, structural, electrical, etc.
TOTAL ENGINEERING COSTS	**$ 4,000,068**	**$ 4,000,068**	
OTHER COSTS			
Making, Levying, Collecting	$ 2,889,628	$ 2,889,628	
Reserve for Deficiency	$ 5,500,704	$ 5,500,704	
Debt Service Reserve	$ 8,005,120	$ 8,005,120	
Capitalized Interest[1]	$ 13,751,760	$ 13,751,760	
Bond Discount	$ 2,259,990	$ 2,259,990	
TOTAL OTHER COSTS	**$ 32,407,202**	**$ 32,407,202**	
TOTAL PROJECT COST	**$ 91,734,332**	**$ 91,734,332**	

[1]Capitalized through the completion of construction (6/1/19) plus six months.

The foregoing estimate is our opinion of the probable costs, based on preliminary engineering plans, including land acquisition, all labor and materials required for the construction of the above described improvements. Please also note that while portions of this estimate were prepared by other persons, I hereby certify that, to the best of my knowledge and in my opinion, the above estimate does not exceed the probable cost of the proposed improvement and the lawful expenses attending the same.

Dated this 15th day of November, 2016.



William B. Loftus, P.E.
President
Spaceco, Inc.
9575 W. Higgins Road, Suite 700
Rosemont, IL, 60018
Engineer to the Board of Local Improvements

APPENDIX A
Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 1 (PIN 17-16-401-008)

THAT PART OF BLOCKS 87 AND 88 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 393.51 FEET TO THE DOCK LINE OF THE NEW CHANNEL OF THE SOUTH BRANCH OF CHICAGO RIVER, AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 10 DEGREES 00 MINUTES 52 SECONDS WEST, ALONG SAID EAST DOCK LINE, BEING A LINE WHICH IS 200.00 FEET EASTERLY FROM AND PARALLEL WITH THE EAST LINES OF LOTS 15, 17 AND 18 IN RAILROAD COMPANY'S RESUBDIVISION OF PART OF SCHOOL SECTION ADDITION TO CHICAGO, THE PLAT OF WHICH WAS RECORDED MARCH 29, 1924 AS DOCUMENT 8339751, A DISTANCE OF 319.25 FEET; THENCE NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, A DISTANCE OF 154.95 TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET, SAID POINT ALSO BEING THE POINT OF BEGINNING,
THENCE CONTINUING NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, ALONG SAID EAST DOCK LINE, A DISTANCE OF 101.08 FEET; THENCE NORTH 08 DEGREES 48 MINUTES 21 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, 211.68 FEET TO A POINT 15.58 FEET SOUTH OF THE SOUTH LINE OF WEST HARRISON STREET; THENCE NORTH 88 DEGREES 28 MINUTES 50 SECONDS EAST, ALONG A LINE PARALLEL WITH THE SOUTH LINE OF WEST HARRISON STREET, 39.05 FEET; THENCE NORTH 01 DEGREES 42 MINUTES 00 SECONDS WEST, 15.58 FEET TO A POINT ON SAID SOUTH LINE OF WEST HARRISON STREET, ALSO BEING THE NORTH LINE OF BLOCK 88; THENCE SOUTH 77 DEGREES 30 MINUTES 08 SECONDS EAST, ALONG SOUTH LINE OF WEST HARRISON STREET, 69.93 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, 5.94 FEET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, 60.50 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 195.00 FEET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 89.90 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 107.59 FEET TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, ALONG SAID LAST DESCRIBED LINE, 94.97 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 18,778 SQUARE FEET OR 0.431 ACRES, MORE OR LESS.

APPENDIX A
Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 2 (PIN 17-16-401-009)

THAT PART OF BLOCKS 87 AND 88 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 165.00 FEET TO A POINT ON A LINE 165.00 FEET WEST OF AND PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, SAID POINT ALSO BEING A POINT OF BEGINNING;

THENCE CONTINUING SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF WEST POLK STREET, 14.67 FEET; THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 147.50 FEET TO A POINT ON A LINE 147.50 FEET NORTH AND PARALLEL WITH THE NORTH LINE OF SAID WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG SAID PARALLEL LINE, 193.90 FEET; THENCE SOUTHERLY 7.90 FEET, ALONG THE ARC OF A NON-TANGENT CIRCLE TO THE RIGHT, HAVING A RADIUS OF 100.00 FEET AND WHOSE CHORD BEARS SOUTH 07 DEGREES 16 MINUTES 04 SECONDS WEST, 7.89 FEET TO A POINT OF TANGENCY; THENCE SOUTH 09 DEGREES 31 MINUTES 48 SECONDS WEST, 5.29 FEET TO A POINT OF CURVATURE; THENCE SOUTHERLY 26.65 FEET, ALONG THE ARC OF A TANGENT CIRCLE TO THE LEFT, HAVING A RADIUS OF 100.00 FEET AND WHOSE CHORD BEARS SOUTH 01 DEGREES 53 MINUTES 40 SECONDS WEST, 26.57 FEET TO A POINT OF TANGENCY; THENCE SOUTH 05 DEGREES 44 MINUTES 28 SECONDS EAST, 19.03 FEET TO A POINT OF CURVATURE; THENCE SOUTHERLY 89.66 FEET, ALONG THE ARC OF A TANGENT CIRCLE TO THE LEFT, HAVING A RADIUS OF 1000.00 FEET AND WHOSE CHORD BEARS SOUTH 08 DEGREES 18 MINUTES 36 SECONDS EAST, 89.63 FEET TO A POINT ON THE NORTH LINE OF SAID WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG SAID NORTH LINE, 27.96 FEET TO THE DOCK LINE OF THE NEW CHANNEL OF THE SOUTH BRANCH OF CHICAGO RIVER, AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 10 DEGREES 00 MINUTES 52 SECONDS WEST, ALONG SAID EAST DOCK LINE, BEING A LINE WHICH IS 200.00 FEET EASTERLY FROM AND PARALLEL WITH THE EAST LINES OF LOTS 15, 17 AND 18 IN RAILROAD COMPANY'S RESUBDIVISION OF PART OF SCHOOL SECTION ADDITION TO CHICAGO, THE PLAT OF WHICH WAS RECORDED MARCH 29, 1924 AS DOCUMENT 8339751, A DISTANCE OF 319.25 FEET; THENCE NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, A DISTANCE OF 154.95 TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, ALONG SAID LAST DESCRIBED LINE, 94.97 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 150.50 FEET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 367.83 FEET TO A POINT ON THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG SAID WEST LINE, 28.29 FEET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 165.00 FEET TO A POINT ON A LINE 165.00 FEET WEST OF AND PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG SAID PARALLEL LINE, 290 72 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 69,085 SQUARE FEET OR 1.586 ACRES, MORE OR LESS.

APPENDIX A
Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 3 (PIN 17-16-416-004)

A TRACT OF LAND, LYING EASTERLY OF AND ADJOINING THE EASTERLY BOUNDARY OF THE NEW CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, SAID TRACT OF LAND COMPRISED OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF THE CHICAGO RIVER (ABANDONED), TOGETHER WITH SUNDRY LOTS AND BLOCKS IN SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE WEST LINE RELOCATED SOUTH WELLS STREET PER DOCUMENT NUMBER 0021366616 AND THE SOUTH LINE OF WEST TAYLOR STREET, SAID POINT OF INTERSECTION ALSO BEING 801.61 FEET WEST OF THE WEST LINE OF SOUTH CLARK ST, AS WIDENED; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE OF SOUTH WELLS STREET, 14.00 FEET TO A LINE 14.00 FEET SOUTH OF AND PARALLEL WITH SAID SOUTH LINE OF TAYLOR STREET; THENCE SOUTH 88 DEGREES 29 MINUTES 49 SECONDS WEST, ALONG SAID PARALLEL LINE, 263.39 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 157.23 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 263.39 FEET TO A POINT ON THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 17.00 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 250.00 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 71.57 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 4.01 FEET; THENCE SOUTH 07 DEGREES 10 MINUTES 50 SECONDS EAST, 140.41 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 34.42 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 3.29 FEET; THENCE SOUTH 07 DEGREES 09 MINUTES 40 SECONDS EAST, 153.66 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 44.23 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 4.26 FEET; THENCE SOUTH 07 DEGREES 10 MINUTES 05 SECONDS EAST, 49.09 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO WEST LINE OF SOUTH WELLS STREET, 205.54 FEET TO THE WEST LINE OF SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 18.00 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 189.32 FEET; THENCE SOUTH 01 DEGREES 37 MINUTES 42 SECONDS EAST, 146.15 FEET TO A LINE 33.00 FEET NORTH OF PARALLEL WITH SAID SOUTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 16; THENCE SOUTH 88 DEGREES 28 MINUTES 26 SECONDS WEST, ALONG SAID PARALLEL LINE, 26.03 FEET TO THE EASTERLY BOUNDARY LINE OF THE NEW CHANNEL OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 01 DEGREES 43 MINUTES 01 SECONDS WEST, ALONG SAID EASTERLY BOUNDARY OF THE SOUTH BRANCH OF THE CHICAGO RIVER, 9.95 FEET TO A POINT 1016.57 FEET WEST OF THE WEST LINE OF SOUTH CLARK STREET, AS WIDENED; THENCE NORTH 07 DEGREES 04 MINUTES 08 SECONDS WEST, CONTINUING ALONG SAID EASTERLY BOUNDARY LINE OF THE SOUTH BRANCH OF CHICAGO RIVER, 837.98 FEET TO A POINT ON THE SOUTH LINE OF SAID WEST TAYLOR STREET; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS EAST, ALONG SAID SOUTH LINE, 294.44 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 32,870 SQUARE FEET OR 0.755 ACRES, MORE OR LESS.

APPENDIX A
Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 4 (PIN 17-16-401-014)

THAT PART OF BLOCKS 85 AND 86 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16. TOWNSHIP 39 NORTH; RANGE 14. EAST OF THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 AFORESAID WITH THE SOUTH LINE OF WEST POLK STREET; THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE SOUTH LINE OF WEST POLK STREET, 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG THE WEST LINE OF SOUTH WELLS STREET AFORESAID. 388.14 FEET TO THE POINT OF BEGINNING OF THE PARCEL HEREIN DESCRIBED; THENCE SOUTH 88 DEGREES 21 MINUTES 27 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED LINE, 199.78 FEET TO A POINT ON A LINE DRAWN 1.51 FEET (AS MEASURED PERPENDICULARLY) EAST OF AND PARALLEL WITH THE EASTERLY LINE OF A 20 FOOT PERMANENT ACCESS EASEMENT PER CIRCUIT COURT OF COOK COUNTY CASE NO. 76L 11684 ENTERED JULY 1, 1977; THENCE SOUTH 7 DEGREES 01 MINUTES 11 SECONDS EAST, ALONG SAID PARALLEL LINE, 108.05 FEET; THENCE SOUTH 82 DEGREES 58 MINUTES 49 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED LINE, 141.50 FEET TO A POINT ON THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE SOUTH 7 DEGREES 02 MINUTES 37 SECONDS EAST, ALONG SAID EAST LINE, 41.41 FEET TO THE POINT OF BEGINNING;

THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 124.98 FEET; THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 123.51 FEET; THENCE SOUTH 88 DEGREES 29 MINUTES 17 SECONDS WEST, 113.08 FEET TO A POINT ON THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE NORTH 7 DEGREES 02 MINUTES 37 SECONDS WEST, ALONG SAID EAST LINE, 123.58 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 14,622 SQUARE FEET OR 0.336 ACRES, MORE OR LESS.

APPENDIX A
Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 5 (PIN 17-16-401-003)

THAT PART OF BLOCKS 85 AND 86 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16. TOWNSHIP 39 NORTH; RANGE 14. EAST OF THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 AFORESAID, AND THE SOUTH LINE OF WEST POLK STREET, BEING ALSO THE NORTH LINE OF BLOCK 86, AFORESAID;
THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST ALONG THE SOUTH LINE OF WEST POLK STREET 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG THE WEST LINE OF SOUTH WELLS STREET AFORESAID, 777.46 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG SAID WEST LINE, 19.00 FEET, TO A POINT ON THE-NORTH LINE OF WEST TAYLOR STREET, BEING ALSO THE SOUTH LINE OF BLOCK 85, AFORESAID; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS WEST; ALONG SAID NORTH LINE OF WEST TAYLOR STREET, 303.53 FEET TO THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE NORTH 7 DEGREES 02 MINUTES 52 SECONDS WEST ALONG THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AFORESAID, 123.05 FEET; THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 113.08 FEET; THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 103.50 FEET TO A POINT ON A LINE 19.00 FEET NORTH OF AN PARALLEL WITH THE NORTH LINE OF SAID WEST TAYLOR STREET; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS EAST, ALONG SAID PARALLEL LINE, 202.00 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 16,981 SQUARE FEET OR 0.390 ACRES, MORE OR LESS.

EXHIBIT "B"

SECOND RESOLUTION OF THE BOARD OF LOCAL IMPROVEMENTS OF THE CITY OF CHICAGO, COOK COUNTY, ILLINOIS

(attached)

SECOND RESOLUTION OF THE BOARD OF LOCAL IMPROVEMENTS OF THE CITY OF CHICAGO, COOK COUNTY, ILLINOIS REGARDING THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT
[SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530]

BE IT RESOLVED by the Board of Local Improvements of the **CITY OF CHICAGO**, Cook County, Illinois (the "Board"), that a public hearing was held by the Board on the 8th day of December, 2016, on the question of the necessity of the proposed improvements consisting of the installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, landscaping, outdoor elevator, stormwater detention, water main, sanitary sewer, and right-of-way improvements, all of which are to be publicly owned, in regard to the Riverline Development; and all appurtenant work, including all labor and materials, complete in place, all as described in the First Resolution adopted by this Board on November 16, 2016, and the Estimate of Cost of said improvements, as updated, amended and revised by the Engineer for the Board on the 8th day of December, 2016, to correct a scrivener's error in the legal description for a parcel to be acquired by the City as part of the Special Assessment, as attached hereto as Exhibit "1" and made a part hereof (the "Estimate of Cost"). All persons interested in said proposed improvements who desired to be heard were heard, and no sufficient reason or objection was given or made to the proposed improvements, and based on the proof submitted to the Board, the Board finds that good and sufficient notices of said public hearing were given and mailed as required by law.

BE IT FURTHER RESOLVED by the Board that said Estimate of Cost, as updated, amended and revised by the Engineer for the Board on the 8th day of December, 2016, to correct a scrivener's error in the legal description for a parcel to be acquired by the City as part of the Special Assessment, is hereby approved.

BE IT FURTHER RESOLVED that it is, therefore, recommended by the Board that the Estimate of Cost be approved, and that the **CITY OF CHICAGO** proceed with such improvements in accordance with the plans and Estimate of Cost, and that the Board transmit to the governing body of the **CITY OF CHICAGO** its recommendation that the proposed improvement be made, together with an Ordinance therefor, as prescribed by law, and the Board hereby approves the proposed draft of an Ordinance attached hereto as Exhibit "2," and made a part hereof, providing for such improvements.

ADOPTED by the Board of Local Improvements of the **CITY OF CHICAGO**, Cook County, Illinois, this 8th day of December, 2016, pursuant to a roll call vote as follows:

AYES: 4: Yao, McKinnie, Connolly, and Higgins

NAYS: 0

ABSENT: 1 Coleman

APPROVED by me this 8th day of December, 2016.

Andrea Yao
President of
the Board of Local Improvements

ATTEST:

William Higgins
Secretary for the Board
of Local Improvements

EXHIBIT "1"

Estimate of Cost

(attached)

CITY OF CHICAGO
SPECIAL ASSESSMENT
(RIVERLINE PUBLIC IMPROVEMENTS)

ESTIMATE OF COST TO THE BOARD OF LOCAL IMPROVEMENTS FOR THE ACQUISITION, ENGINEERING AND CONSTRUCTION OF IMPROVEMENTS, INCLUDING STREETS AND PUBLIC OPEN SPACES FOR THE RIVERLINE DEVELOPMENT (BOUNDED BY WELLS STREET, HARRISON STREET, ROOSEVELT ROAD AND THE SOUTH BRANCH OF THE CHICAGO RIVER), FUTHER DESCRIBED IN THE RESOLUTION TO WHICH THIS ESTIMATE IS ATTACHED.

City of Chicago, Cook County, Illinois

November 15, 2016 [As revised on December 8, 2016, per the direction of, and as approved by, the Board of Local Improvements, to correct a scrivener's error in the legal description for Open Space Fee Simple Parcel 4 (PIN 17-16-401-014) in Appendix A.]

To the Board of Local Improvements of
the City of Chicago, Illinois

Board Members:

I hereby submit an estimate of the cost for the previously described public improvements consisting of the acquisition of land for public improvements and open spaces, and the construction of the public improvements. The said public improvements include: improvements to Wells Street, Harrison Street, Roosevelt Road, Taylor Street and Polk Street; the installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, outdoor elevator, storm water detention, water main and sanitary sewer improvements; miscellaneous right-of-way items; and all tools, machinery, equipment, material and labor necessary to complete the improvements and place them in operation, with the specific anticipated unit amounts being set forth as follows:

Riverline

Engineer's Estimate of Costs

Sub-project: Land Acquisition
Date: November 15, 2016

Riverline
Fee Simple Open Space Allocation of Land Value
Relative to the Public Improvements

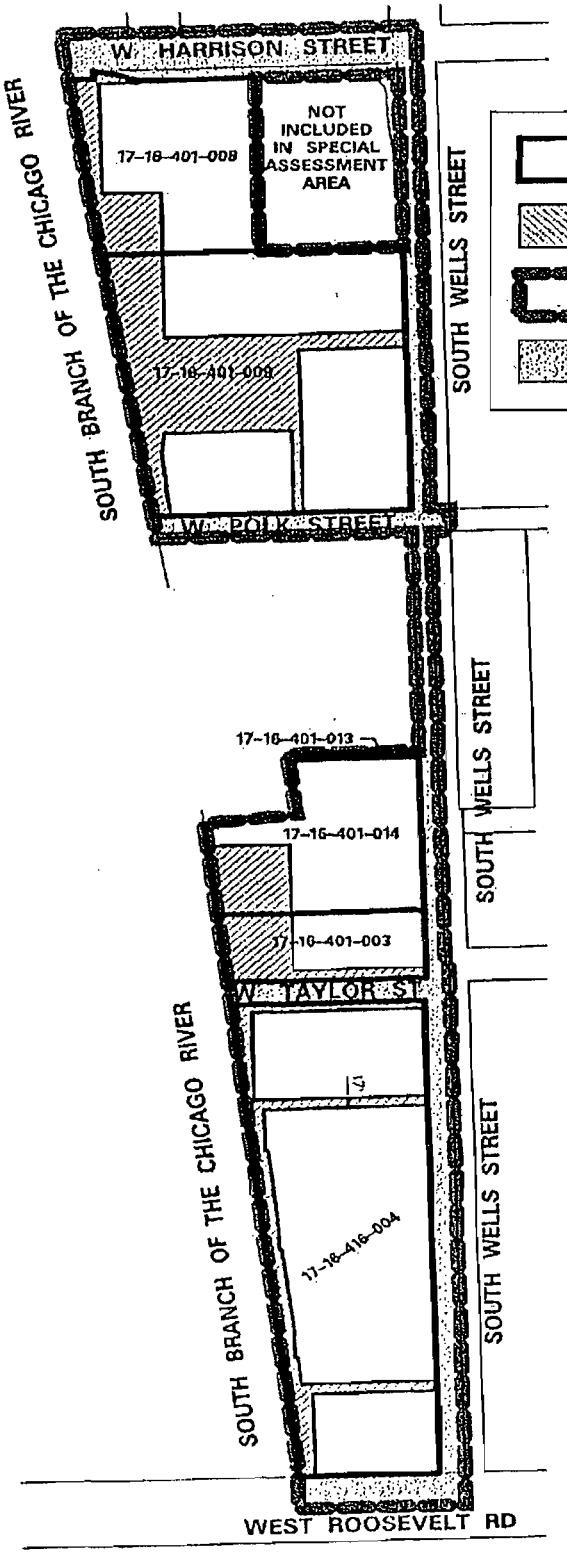
PIN	Fee Simple Land Area to be conveyed to the City in Sq. Ft., for the Public Improvements Construction	Property Owner's Purchase Price Per Sq. Ft.	Total $ for the Acquisition	Legal Description of Acquisition Area
17-16-401-008-0000	18,778	142.58	2,677,404	**See Appendix A for legal description of Fee Simple Land Area to be conveyed to the City by PIN number.**
17-16-401-009-0000	69,085	116.21	8,028,291	
17-16-401-014-0000	14,622	99.96	1,461,672	
17-16-401-003-0000	16,981	121.32	2,060,149	
17-16-416-004-0000	32,870	103.24	3,393,591	
Grand Total	**152,336**		**17,621,107**	

The property owners and the City having agreed upon the property acquisition price, based on the property owners' actual and documented property acquisition costs as verified by the City relative to the public lands fee simple property interest to be conveyed to the City; with the property owners' actual property acquisition costs having been found by the City to have been reasonable, and equal to or less than the current market value of the property in question.

The property owners have agreed to convey the public lands property interest to the City as part of the special assessment proceeding, without the need for an eminent domain proceeding.

Refer to the following page for the depiction of the special assessment area.

BREAKDOWN OF RIVERLINE SPECIAL ASSESSMENT AREA



PIN	Description	Sq. Ft.	Acres
17-16-401-008	Fee Simple Acquisition Area	18,778	0.431
	Remainder	62,940	1.445
	Total	81,718	1.876
17-16-401-009	Fee Simple Acquisition Area	69,085	1.586
	Remainder	131,934	3.029
	Total	201,019	4.615
17-16-401-013	Fee Simple Acquisition Area	0	0.000
	Remainder	1,931	0.044
	Total	1,931	0.044
17-16-401-014	Fee Simple Acquisition Area	14,622	0.336
	Remainder	60,981	1.400
	Total	75,603	1.736
17-16-401-003	Fee Simple Acquisition Area	16,981	0.390
	Remainder	20,910	0.480
	Total	37,891	0.870
17-16-416-004	Fee Simple Acquisition Area	32,870	0.755
	Remainder	181,944	4.177
	Total	214,814	4.932

REVISIONS:

N

SCALE: 1" = 200'

SPACECO INC.

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

9575 W. Higgins Road, Suite 700,
Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

DATE: 11/8/2016

JOB NO: 8749

FILENAME: 8749EXH-ASSESS

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

ITEM	QNTY	UNIT		PRICE		AMOUNT
A. Demolition & Debris Removal						
1. Remove Trees	158	trees	$	1,300	per tree	$205,400
2. Removal of Curbs	2,832	lf	$	4.00	per lf	$11,328
3. Pavement Removal - Full Depth	1,881	sy	$	18.00	per sy	$33,858
Contingency for A. Demolition & Debris Removal				10%		$25,059
	A. Demolition & Debris Removal				Sub-Total =	$275,645
B. Soil Erosion Sediment Control						
1. Erosion Control	13	acres	$	5,750	per acre	$73,600
Contingency for B. Soil Erosion Sediment Control				10%		$7,360
	B. Soil Erosion Sediment Control				Sub-Total =	$80,960
C. Earthwork Improvements						
1. Strip / Stockpile	7,834	cy	$	8.50	per cy	$66,589
2. Perform 3 Applications of Weed Control on Stockpile	3	apl	$	2,750	per apl	$8,250
3. Export Excess Soil	22,024	cy	$	15.00	per cy	$330,360
4. Premium to Haul-off Excess	22,024	cy	$	40.00	per cy	$880,960
5. Cut / Fill	16,581	cy	$	20.00	per cy	$331,620
6. Fill	2,597	cy	$	25.00	per cy	$64,925
7. Polk Street Cut / Fill	1	ls	$	25,000	per ls	$25,000
8. Rough Grade	62,811	sy	$	2.75	per sy	$172,730
9. Allowance to Locally Grout the Abandoned Water Main	1	allow	$	300,000	per allow	$300,000
10. Fountain Equipment Room Excavation	1,198	cy	$	35.00	per sy	$41,922
11. Fountain Equipment Room Backfill	775	cy	$	30.00	per sy	$23,240
12. Fountain Equipment Room Haul Off	423	cy	$	40.00	per sy	$16,924
13. Import 12-inch Gravel for Building Pads G, J and Townhouses	6,371	cy	$	30.00	per cy	$191,139
14. Excavate Retaining Walls @ Sidewalks (4/S3.01)	2,020	cy	$	30.00	per cy	$60,597
15. Backfill Retaining Walls @ Sidewalks	1,531	cy	$	25.00	per cy	$38,287
Replace and/or Repair River Edge Retaining wall or Stabilize River 16. Bank	1,430	lf	$	3,483	per lf	$4,980,690
Contingency for C. Earthwork Improvements				10%		$255,254
Contingency for River Edge Work				20%		$996,138
	C. Earthwork Improvements				Sub-Total =	$8,784,627
D. Drainage Improvements						
1. Polk Street Storm Pipe	25	lf	$	150.00	per lf	$3,750
2. Polk Street Storm Pipe Connection	1	ea	$	10,000	per ea	$10,000
3. Wet Well & Associated Improvements						
4. Wet Well with Pump	1	ea	$	40,000	per ea	$40,000
5 3-inch DIP Force Main	188	lf	$	125 00	per lf	$23,500
6. 3-ft Diameter Outlet Structure	1	ea	$	6,000	per ea	$6,000
7. Excavation and Backfill for Pipe and Structures	1	ls		12500	per ls	$12,500
Contingency for D. Drainage Improvements				10%		$9,575
	D. Drainage Improvements				Sub-Total =	$105,325
E. Roadway Improvements						
1. Asphalt Paving	472	sy	$	60.00	Per sy	$28,320
2 CA-6 Subbase	in above					
3. Mill and Overlay	11,996	sy	$	18.00	Per sy	$215,928
4 Curbs and Gutters	2,625	lf	$	32.00	per lf	$84,000
5. Concrete Paving into Bldg Parking	379	sy	$	80.00	Per sy	$30,320
6. Traffic Signal	2	ls	$	250,000	per ls	$500,000
7 Signage and Striping	2	ls	$	21,000	per ls	$42,000
8. 4-inch Asphalt Paving at Polk	764	sy	$	45.00	Per sy	$34,380

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

	ITEM	QNTY	UNIT	PRICE		AMOUNT
9.	9-inch conc base at Polk	764	sy	$ 80.00	Per sy	$61,120
10	CA-6 Subbase at Polk	764	sy	$ 15.00	Per sy	$11,460
11	Conc Gutter at Polk	553	lf	$ 32.00	per lf	$17,696
	Contingency for E. Roadway Improvements			10%		$102,522
		E. Roadway Improvements			Sub-Total =	$1,127,746
	F. Water Supply and Treatment Facilities					
	Contingency for F. Water Supply and Treatment Facilities			10%		$0
		F. Water Supply and Treatment Facilities			Sub-Total =	$0
	G. Water Main Improvements					
1.	New Main Loop in Polk Street; 8" D.I. Pipe	515	lf	$ 225.00	per lf	$115,875
2.	New Valve & Vault for Hot Tap to New Loop Polk Street	2	ea	$ 7,500	per ea	$15,000
3.	Chlorination, Testing for New Hot Taps at Loop in Polk Street	2	ea			Incl'd Above
4.	New Fire Hydrants along North Side of Polk Street	3	ea	$ 7,500	per ea	$22,500
5.	Water from New Main for Fountains and Irrigation; Incldes Pipe, Chlorination, Testing	765	lf	$ 160	per lf	$122,400
6.	Water Valve Vault for Fountains North Site	1	ls	$ 25,000	per ls	$25,000
7	Relocation of City Water Main in Wells Street	1	ls	$ 47,880	per ls	$47,880
8.	Adjust two (2) fire hydrants on Wells Street	1	ls	$ 48,650	per ls	$48,650
9.	Water Feature #2 Water Supply Scope:					
10.	Pump Station to Water Feature	1	ea	$ 35,000	per ea	$35,000
11.	Outlet Control Structure	1	ea	$ 30,000	per ea	$30,000
12.	Outlet Baffle, Lid, & Grate	1	ls	$ 20,000	per ls	$20,000
13.	Vortex Manhole Structure	1	ea	$ 30,000	per ea	$30,000
14.	Vortex Outfall Pipe	1	ls	$ 10,000	per ls	$10,000
15.	Vortex Manhole Lids & Grates	1	ls	$ 15,000	per ls	$15,000
16.	Weir Structure(s)	3	ea	$ 12,000	per ea	$36,000
17.	Force Main - 4" Ductile Iron Pipe	390	lf	$ 125.00	per lf	$48,750
18.	Excavation and Backfill for Pipe and Structures	1	ls	$ 25,000	per ls	$25,000
19.	Water Valve Vault for Fountains and Irrigation for South Site	1	ls	$ 25,000	per ls	$25,000
20.	Water Feature #5 Scope					
21	Force Main - 3" Ductile Iron Pipe	190	lf	$ 125.00	per lf	$23,750
22.	Excavation and Backfill for Force Main Pipe	1	ls	$ 10,000	per ls	$10,000
	Contingency for G. Water Main Improvements			10%		$70,581
		G. Water Main Improvements			Sub-Total =	$776,386
	H. Wastewater Treatment Facilities					
1.						
	Contingency for H. Wastewater Treatment Facilities			10%		$0
		H. Wastewater Treatment Facilities			Sub-Total =	$0
	I. Sanitary Sewer Improvements					
1	Sanitary Sewer Service Main (30" Diam) in Polk St	290	lf	$ 225.00	per lf	$65,250
2	Sanitary Sewer Manholes in Polk Street	2	ea	$ 6,000	per ea	$12,000
3	Connect to Existing San Sewer MH and grout	1	ea	$ 5,000	per ea	$5,000
4.	Sanitary Sewer Cleen-out	3	ea	$ 2,500	per ea	$7,500
5.	8-inch ESVCP Sanitary Sewer from Fountain	325	lf	$ 180.00	per lf	$58,500
6	Excavation and Backfill for Pipe and Structures	1	ls	$ 22,500	per ls	$22,500
7.	Street Pavement and Base Removal and Restoration	1	ls	$ 15,000	per ls	$15,000
	Contingency for I. Sanitary Sewer Improvements			10%		$18,575
		I. Sanitary Sewer Improvements			Sub-Total =	$204,325

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

	ITEM	QNTY	UNIT		PRICE		AMOUNT
	J. Landscaping Improvements						
1.	**Site Concrete**						
2.	Retaining Wall at Polk St.	91	cy	$	1,000	per cy	$91,000
3.	Seat Wall at Amphitheater - Concrete Bench; Includes: Ready Mix, Rebar, Formwork, Excav. & BF	725	lf	$	500.00	per lf	$362,500
4.	Concrete Weir	8	ea	$	4,500	per ea	$36,000
5.	Concrete Wall	50	lf	$	540.00	per lf	$27,000
6.	Raised Concrete Walk	734	sf	$	103.65	per sf	$76,079
7.	Concrete for Bridge	2	ea	$	20,000	per ea	$40,000
8.	Foundations & Structure for Decorative Retaining Walls	129	lf	$	2,000	per lf	$258,000
9.	Concrete Stairs adjacent to Bldg D	61	sf	$	103.65	per sf	$6,323
10.	Concrete Retaining Walls @ Sidewalks (4/S3.01)	488	cy	$	750.00	per cy	$366,319
11.	Fountain Equipment Room	816	sf				
12.	Fountain Equipment Room SOG	816	sf	$	12.00	per sf	$9,792
13.	Fountain Equipment Room Walls	63	cy	$	1,250	per sf	$78,333
14.	Fountain Equipment Room Roof	816	sf	$	35.00	per sf	$28,560
15.	Pedestrian Paving Aggregate Base	1,133	ton	$	40.00	per ton	$45,304
16.	Pedestrian Paving Concrete, Standard Color	5,199	sy	$	82.00	per sy	$426,318
17.	Pedestrian Paving Concrete, Exposed Aggregate	900	sy	$	108.00	per sy	$97,200
18.	On-grade Walkway Slab w/Exposed Aggregate	2,098	sy	$	108.00	per sy	$226,608
19.	On-grade Walkway System Walls	14.0	cy	$	575.00	per cy	$8,027
20.	On-grade Walkway Aggregate Base	525	ton	$	40.00	per ton	$20,982
21.	On-grade Walkway Rebar	15,107	lb	$	2.15	per lb	$32,480
22.	**Elevated Walkway**						
23.	Elevated Walkway Composite Wood Deck,2X8 PT Joist, Shims	7,709	sf	$	50.00	per sf	$385,450
24.	Wood Piles at Elevated Boardwalk Piers	107	ea	$	1,450	per ea	$155,150
25.	Concrete Piers at Elevated Bridges	18	ea	$	4,500	per ea	$81,000
26.	Elevated Bridges Precast Concrete Planks	1,260	sf	$	30.00	per sf	$37,800
27.	Elevated Bridges Concrete Topping w/Exposed Aggregate	1,260	sf	$	12.00	per sf	$15,120
28.	**Site Pavers**						
29.	Unit Pavers - Retail Plaza	4,259	sf	$	50.00	per sf	$212,950
30.	Unit Paver w/ Torpedo Sand Setting-bed	1,242	sf	$	30.00	per sf	$37,260
31.	**Topsoil**						
32.	Import 30-inch Upland Topsoil	11,176	cy	$	77.00	per cy	$860,552
33.	Import 18-inch Wetland Topsoil	1,732	cy	$	80.00	per cy	$138,560
34.	Import 24-inch River-edge Soil	1,383	cy	$	100.00	per cy	$138,330
35.	Import 12-inch Lawn Soil	160	cy	$	100.00	per cy	$16,000
36.	Import 12-inch Topsoill for Building Pads A, B, C, E and F	5,544	cy	$	70.00	per cy	$388,046
37.	Import 12-inch Cobblestone Bed beneath Elevated Boardwalk	47	cy	$	150.00	per cy	$7,000
38.	**Landscaping**						
39.	Trees (including those adjacent to Bldg. D & to River City)	303	ea	$	2,038	per ea	$617,514
40.	Shrubs	2,038	ea	$	63.50	per ea	$129,413
41.	Mulch	782	cy	$	52.00	per cy	$40,664
42.	Plugs	108,079	ea	$	4.40	per ea	$475,548
43.	Perennials	33,832	ea	$	18.50	per ea	$625,892
44.	Tree Permits	1	ls	$	58,975	per ls	$58,975
45.	Stewardship	3	yr	$	24,000	per yr	$72,000
46.	Monitoring	3	yr	$	9,000	per yr	$27,000
47.	Hydroseeding Native Grass for Bldg Pads A, B, C, E and F	16,631	sy	$	3.00	per sy	$49,892
48.	Amphitheater Steps	1,400	sf	$	105.00	per sf	$147,000
49.	5x5 Tree Grate	31	ea	$	2,500	per ea	$77,500
50.	Perforated Pipe, Sched. 35	834	lf	$	50.00	per lf	$41,700
51.	Boulders	231	ea	$	1,000	per ea	$231,000
52.	Boulder Steps	34	ea	$	1,000	per ea	$34,000
53.	Boulder Spillway	33	ea	$	1,000	per ea	$33,000
54.	Trash Receptacles	24	ea	$	2,500	per ea	$60,000
55.	Bike Racks	14	ea	$	2,000	per ea	$28,000
56.	Inflatable Movie Screen	1	ea	$	3,500	per ea	$3,500
57.	Rubber Play Area	1,702	sf	$	40.00	per sf	$68,080
58	Bird Houses	15	ea	$	2,000	per ea	$30,000
59.	Log Bench	2	ea	$	5,000	per ea	$10,000
60.	Log Treads	10	ea	$	3,500	per ea	$35,000
61	Log Steps	61	ea	$	500.00	per ea	$30,500
62.	Log Play Elements	24	ea	$	3,500	per ea	$84,000
63	Dog Park Slab	1,061	sf	$	9.00	per sf	$9,549

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

	ITEM	QNTY	UNIT		PRICE		AMOUNT
64.	Wetland Area PVC Liner w/Geofab	18,767	sf	$	2.50	per sf	$46,918
65.	Wetland Pumps	4	ea	$	2,500	per ea	$10,000
66.	**Water Features**						
67.	"Entry Natural" Water Feature #1 - beneath Corten Bridges	1	allow	$	75,000	per allow	$75,000
68.	Concrete Walls and Base; Coatings, Lighting, and Power for Water Feature #1	1	allow	$	100,000	per allow	$100,000
69.	"Wetlands" Water Feature #2 - East of Bldg B	1	allow	$	75,000	per allow	$75,000
70.	Playground "Stream" Water Feature #3	1	allow	$	300,000	per allow	$300,000
71.	"Wetlands" Water Feature #4 - East of Bldg F	1	allow	$	75,000	per allow	$75,000
72.	"Amphitheator" Water Feature #5 - Near River, East of Bldg F	1	allow	$	75,000	per allow	$75,000
73.	"Wetlands" Water Feature #5 - South of Bldg G	1	allow	$	75,000	per allow	$75,000
74.	"Water Table Fountain" Allowance at Plaza Area between Bldgs C & D	1	allow	$	90,000	per allow	$90,000
75.	"Courtyard Fountain" Allowance near Bldg F	1	allow	$	180,000	per allow	$180,000
76.	"Archimedes Screw Fountain" Allowance between Bldgs B, D, & E	1	allow	$	15,000	per allow	$15,000
77.	Fountain Allowance between Bldgs B, D, & E (see price for Boulders above)	1	allow	$	300,000	per allow	$300,000
78.	**Misc. Metals**						
79.	Dog Park Fence and Gates	51	lf	$	85.00	per lf	$4,335
80.	Handrail	Incl. Below	lf	$	450.00	per lf	$0
81.	Guardrail	4,080	lf	$	450.00	per lf	$1,836,000
82.	Planter Rail	1,372	lf	$	75.00	per lf	$102,900
83.	North Riverwalk Custom Curved Bench w/Back	147	lf	$	750.00	per lf	$110,250
84.	Parcel F Custom Curved Bench Backless	35	lf	$	600.00	per lf	$20,700
85.	Plaza Bench 1 Custom Curved Bench Backless	33	lf	$	600.00	per lf	$19,800
86.	Plaza Bench 2 and 3 Custom Bench Backless	59	lf	$	500.00	per lf	$29,375
87.	Polk Street Dog Run Custom Bench Backless	28	lf	$	500.00	per lf	$14,000
88.	Polk Street Planter Custom Bench Backless	37	lf	$	600.00	per lf	$22,200
89.	Lounge F1d	6	ea	$	7,500	per ea	$45,000
90.	Lounge F1c	11	ea	$	7,500	per ea	$82,500
91.	High Back Chair F1b	8	ea	$	4,000	per ea	$32,000
92.	Backless Bench F1a	4	ea	$	2,500	per ea	$10,000
93.	Corten Walls	129	lf	$	775.00	per lf	$99,975
94.	Corten Bridge Walkway and Structure	2	ea	$	100,000	per ea	$200,000
95.	Monumental Stairs	261	sf	$	250.00	per sf	$65,250
96.	Monumental Stairs Railings	1	ls	$	15,000	per ls	$15,000
97.	Boardwalk Steps	76	sf	$	103.65	per sf	$7,877
98.	Pipe Bollards	8	ea	$	225.00	per ea	$1,800
99.	Screen Fence	298	lf	$	30.00	per lf	$8,940
100.	Trench Drain	264	lf	$	150.00	per lf	$39,600
101.	Culverts Under Bldg Townhouses						N.I.C.
102.	**Irrigation**						
103.	Irrigation	1	ls	$	200,000	per ls	$200,000
104.	Irrigation Booster	6	ea	$	2,500	per ea	$15,000
105	Irrigation Drainage System	1	ls	$	8,000	per ls	$8,000
106.	**Site Electric**						
107.	20" BOLLARD	24	SA	$	342.00	per ea	$8,208
108.	32" BOLLARD	131	SA1	$	435.00	per ea	$56,985
109.	DRIVE/WALK OVER LIGHT	0	SB	$	1,276	per lf	NIC
110.	Flexible LED	309	SC	$	130.00	per ea	$40,170
111.	VARIOUS SIZES LINEAR LED	20	SD	$	1,276	per ea	$25,520
112	RECESSED STAIR PUCK LIGHT	6	SE	$	367.00	per ea	$2,202
113.	LED ROPE	2205	SF	$	130.39	per lf	$287,510
114.	CONTINUOUS LED LINEAR	78	SG	$	350.00	per lf	$27,300
115.	LUMENRAIL HANDRAIL	1	SH			per ea	NIC
116.	ARCLINE LED	78	SJ	$	890.99	per ea	$69,497
117.	SUSPENSION LIGHT CABLE STRING	3	SK	$	416.00	per ea	$1,248
118.	SUSPENSION LIGHT CABLE POLE	2	ea	$	3,500	per ea	$7,000
119.	SK FIXTURE	20	SK2	$	475.00	per ea	$9,500
120	SK FIXTURE	9	SK3	$	588.00	per ea	$5,292
121.	PLAYGROUND POLE	5	SL	$	2,500	per ea	$12,500
122	IMAGE PROJECTOR ON PLAYGROUND POLE	10	SL1	$	3,500	per ea	$35,000
123.	LUMINARE FOR PLAYGROUND POLE	10	SL2	$	1,796	per ea	$17,960
124.	THEATRE DRIVEWAY POLE	4	SM	$	2,500	per ea	$10,000
125.	LUMINIARE FOR THEATRE DRIVEWAY POLE	4	SM1	$	1,318	per ea	$5,272
126	POLK STREET POLE	3	SS	$	2,500	per ea	$7,500

Riverline

Engineer's Estimate of Costs: Details

November 15, 2016

ITEM	QNTY	UNIT		PRICE		AMOUNT
127. LUMINIARE FOR POLK STREET POLE	6	SS1	$	1,318	per ea	$7,908
128. MOVIES IN THE PARK POLE	8	SN	$	2,500	per ea	$20,000
129. LUMINIARE FOR MOVIES IN THE PARK POLE	20	SL2	$	1,796	per ea	$35,920
130. 4' RUN OF LINEAR LED	2	SP	$	1,742	per ea	$3,484
131. INGROUND LED	108	SQ	$	194.00	per ea	$20,952
132. RECESSED SLOT LED	1	SR	$	622.00	per ea	$622
133. Branch power and wiring to lighting	1		$	600,000	per ls	$600,000
134. LIGHTING CONTROL ALLOWANCE	1		$	35,000	per allow	$35,000
135. Lot fountain power to control panels	1		$	50,000	per ls	$50,000
136. Weather proof GFCI receptacles	8		$	750.00	per ea	$6,000
137. Power to Wayfinding signs	6		$	1,200	per ea	$7,200
138. Power to elevator	1		$	7,500	per ls	$7,500
139. Power to portable cinema screen	1		$	1,500	per ls	$1,500
140. Service and power distribution	3		$	50,000	per ea	$150,000
141. Other						
142. Drinking Fountains	3	ea	$	7,500	per ea	$22,500
143. Fountain Equipment Room Waterproofing	2,636	sf	$	8.00	per sf	$21,088
144. Custom Overhead Shade Structure	2	ls	$	22,500	per ls	$45,000
145. General Signage Allowance	1	allow	$	50,000	per allow	$50,000
146. Wayfinding Signage Allowance	1	allow	$	150,000	per allow	$150,000
147. Kayak Boat Launch and Stairs	1	ls	$	25,000	per ls	$25,000
148. Exterior Elevator at Roosevelt Road Allowance	1	allow	$	1,000,000	per allow	$1,000,000
149. Steel Stair at Roosevelt Road	1	ls	$	100,000	per ls	$100,000
Contingency for J. Landscaping Improvements				10%		$1,512,553
	J. Landscaping Improvements				Sub-Total =	$16,638,080
K. Roadway Electric Improvements						
1. ComEd Feeder Allowance for Open Site Electrical Load	1	allow	$	50,000	per allow	$50,000
2. Adjust Manhole F&G	2	ea	$	500.00	per ea	$1,000
3. Electrical MH Vault	2	ea	$	18,000	per ea	$36,000
4. Conduit	6,305	lf	$	15.00	per lf	$94,575
5. Street Light Fixtures	16	ea	$	15,000	per ea	$240,000
6. Polk St Lighting	3	ea	$	15,000	per ea	$45,000
Contingency for K Roadway Electric Improvements				10%		$46,658
	K. Roadway Electric Improvements				Sub-Total =	$513,233
L. Soil Erosion Maintenance						
1. Erosion Control Maintenance	12	acres	$	1,500	per acre	$18,000
Contingency for L. Soil Erosion Maintenance				10%		$1,800
	L. Soil Erosion Maintenance				Sub-Total =	$19,800
				SUBTOTAL =		$28,526,126
		10%		CONTINGENCY=		Included above
					SUBTOTAL=	**$28,526,126**
General Conditions @7%						$1,996,829
Insurance @ 1.142%						$348,572
Fee @ 3%						$926,146
Permits						
					TOTAL =	**$31,797,673**

Riverline

Engineer's Estimate of Costs: Summary

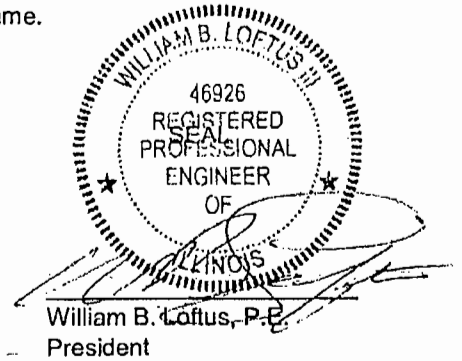
November 15, 2016

Description	Assessment Amount	Total	Notes
LAND ACQUISITION COSTS			
Land Acquisition	$ 17,621,107	$ 17,621,107	See attached breakdown
TOTAL LAND ACQ. COSTS	**$ 17,621,107**	**$ 17,621,107**	
CONSTRUCTION COSTS			
A. Demolition & Debris Removal	$ 275,645	$ 275,645	See attached breakdown
B. Soil Erosion Sediment Control	$ 80,960	$ 80,960	See attached breakdown
C. Earthwork Improvements	$ 8,784,627	$ 8,784,627	See attached breakdown
D. Drainage Improvements	$ 105,325	$ 105,325	See attached breakdown
E. Roadway Improvements	$ 1,127,746	$ 1,127,746	See attached breakdown
F. Water Supply and Treatment Facilities	$ -	$ -	See attached breakdown
G. Water Main Improvements	$ 776,386	$ 776,386	See attached breakdown
H. Wastewater Treatment Facilities	$ -	$ -	See attached breakdown
I. Sanitary Sewer Improvements	$ 204,325	$ 204,325	See attached breakdown
J. Landscaping Improvements	$ 16,638,080	$ 16,638,080	See attached breakdown
K. Roadway Electric Improvements	$ 513,233	$ 513,233	See attached breakdown
L. Soil Erosion Maintenance	$ 19,800	$ 19,800	See attached breakdown
Subtotal	$ 28,526,127	$ 28,526,127	
General Conditions	$ 1,996,829	$ 1,996,829	
GC Builder's Risk Insurance	$ 348,572	$ 348,572	
GC Fee	$ 926,146	$ 926,146	
Subtotal	$ 3,271,547	$ 3,271,547	
Tests, Surveys, Legal and Studies	$ 1,013,371	$ 1,013,371	Includes geotech, environmental, material testing, etc.
Owner furnished items	$ 286,000	$ 286,000	Includes wayfinding signage
General Liability Insurance	$ 749,066	$ 749,066	Includes GL and environmental insurance
Project Management	$ 2,825,101	$ 2,825,101	
Permits	$ 649,743	$ 649,743	Includes building and utility permits and expeditor
Landscape establishment costs	$ 385,000	$ 385,000	
Subtotal	$ 5,908,281	$ 5,908,281	
TOTAL CONSTRUCTION COSTS	**$ 37,705,955**	**$ 37,705,955**	
Engineering costs			
Architectural fees	$ 2,042,150	$ 2,042,150	Includes architecture and landscape architecture
Engineering fees	$ 1,957,918	$ 1,957,918	Includes civil, structural, electrical, etc.
TOTAL ENGINEERING COSTS	**$ 4,000,068**	**$ 4,000,068**	
OTHER COSTS			
Making, Levying, Collecting	$ 2,889,628	$ 2,889,628	
Reserve for Deficiency	$ 5,500,704	$ 5,500,704	
Debt Service Reserve	$ 8,005,120	$ 8,005,120	
Capitalized Interest[1]	$ 13,751,760	$ 13,751,760	
Bond Discount	$ 2,259,990	$ 2,259,990	
TOTAL OTHER COSTS	**$ 32,407,202**	**$ 32,407,202**	
TOTAL PROJECT COST	**$ 91,734,332**	**$ 91,734,332**	

[1]Capitalized through the completion of construction (6/1/19) plus six months.

The foregoing estimate is our opinion of the probable costs, based on preliminary engineering plans, including land acquisition, all labor and materials required for the construction of the above described improvements. Please also note that while portions of this estimate were prepared by other persons, I hereby certify that, to the best of my knowledge and in my opinion, the above estimate does not exceed the probable cost of the proposed improvement and the lawful expenses attending the same.

Dated this 6th day of December 2016.



William B. Loftus, P.E.
President
Spaceco, Inc.
9575 W. Higgins Road, Suite 700
Rosemont, IL, 60018
Engineer to the Board of Local Improvements

APPENDIX A

Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 1 (PIN 17-16-401-008)

THAT PART OF BLOCKS 87 AND 88 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 393.51 FEET TO THE DOCK LINE OF THE NEW CHANNEL OF THE SOUTH BRANCH OF CHICAGO RIVER, AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 10 DEGREES 00 MINUTES 52 SECONDS WEST, ALONG SAID EAST DOCK LINE, BEING A LINE WHICH IS 200.00 FEET EASTERLY FROM AND PARALLEL WITH THE EAST LINES OF LOTS 15, 17 AND 18 IN RAILROAD COMPANY'S RESUBDIVISION OF PART OF SCHOOL SECTION ADDITION TO CHICAGO, THE PLAT OF WHICH WAS RECORDED MARCH 29, 1924 AS DOCUMENT 8339751, A DISTANCE OF 319.25 FEET; THENCE NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, A DISTANCE OF 154.95 TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET, SAID POINT ALSO BEING THE POINT OF BEGINNING,
THENCE CONTINUING NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, ALONG SAID EAST DOCK LINE, A DISTANCE OF 101.08 FEET; THENCE NORTH 08 DEGREES 48 MINUTES 21 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, 211.68 FEET TO A POINT 15.58 FEET SOUTH OF THE SOUTH LINE OF WEST HARRISON STREET; THENCE NORTH 88 DEGREES 28 MINUTES 50 SECONDS EAST, ALONG A LINE PARALLEL WITH THE SOUTH LINE OF WEST HARRISON STREET, 39.05 FEET; THENCE NORTH 01 DEGREES 42 MINUTES 00 SECONDS WEST, 15.58 FEET TO A POINT ON SAID SOUTH LINE OF WEST HARRISON STREET, ALSO BEING THE NORTH LINE OF BLOCK 88; THENCE SOUTH 77 DEGREES 30 MINUTES 08 SECONDS EAST, ALONG SOUTH LINE OF WEST HARRISON STREET, 69.93 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, 5.94 FEET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, 60.50 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 195.00 FEET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 89.90 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 107.59 FEET TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, ALONG SAID LAST DESCRIBED LINE, 94.97 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 18,778 SQUARE FEET OR 0.431 ACRES, MORE OR LESS.

APPENDIX A

Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 2 (PIN 17-16-401-009)

THAT PART OF BLOCKS 87 AND 88 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 165.00 FEET TO A POINT ON A LINE 165.00 FEET WEST OF AND PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, SAID POINT ALSO BEING A POINT OF BEGINNING; THENCE CONTINUING SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF WEST POLK STREET, 14.67 FEET; THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 147.50 FEET TO A POINT ON A LINE 147.50 FEET NORTH AND PARALLEL WITH THE NORTH LINE OF SAID WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG SAID PARALLEL LINE, 193.90 FEET; THENCE SOUTHERLY 7.90 FEET, ALONG THE ARC OF A NON-TANGENT CIRCLE TO THE RIGHT, HAVING A RADIUS OF 100.00 FEET AND WHOSE CHORD BEARS SOUTH 07 DEGREES 16 MINUTES 04 SECONDS WEST, 7.89 FEET TO A POINT OF TANGENCY; THENCE SOUTH 09 DEGREES 31 MINUTES 48 SECONDS WEST, 5.29 FEET TO A POINT OF CURVATURE; THENCE SOUTHERLY 26.65 FEET, ALONG THE ARC OF A TANGENT CIRCLE TO THE LEFT, HAVING A RADIUS OF 100.00 FEET AND WHOSE CHORD BEARS SOUTH 01 DEGREES 53 MINUTES 40 SECONDS WEST, 26.57 FEET TO A POINT OF TANGENCY; THENCE SOUTH 05 DEGREES 44 MINUTES 28 SECONDS EAST, 19.03 FEET TO A POINT OF CURVATURE; THENCE SOUTHERLY 89.66 FEET, ALONG THE ARC OF A TANGENT CIRCLE TO THE LEFT, HAVING A RADIUS OF 1000.00 FEET AND WHOSE CHORD BEARS SOUTH 08 DEGREES 18 MINUTES 36 SECONDS EAST, 89.63 FEET TO A POINT ON THE NORTH LINE OF SAID WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG SAID NORTH LINE, 27.96 FEET TO THE DOCK LINE OF THE NEW CHANNEL OF THE SOUTH BRANCH OF CHICAGO RIVER, AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 10 DEGREES 00 MINUTES 52 SECONDS WEST, ALONG SAID EAST DOCK LINE, BEING A LINE WHICH IS 200.00 FEET EASTERLY FROM AND PARALLEL WITH THE EAST LINES OF LOTS 15, 17 AND 18 IN RAILROAD COMPANY'S RESUBDIVISION OF PART OF SCHOOL SECTION ADDITION TO CHICAGO, THE PLAT OF WHICH WAS RECORDED MARCH 29, 1924 AS DOCUMENT 8339751, A DISTANCE OF 319.25 FEET; THENCE NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, A DISTANCE OF 154.95 TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, ALONG SAID LAST DESCRIBED LINE, 94.97 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 150.50 FEET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 367.83 FEET TO A POINT ON THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG SAID WEST LINE, 28.29 FEET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 165.00 FEET TO A POINT ON A LINE 165.00 FEET WEST OF AND PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG SAID PARALLEL LINE, 290.72 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 69,085 SQUARE FEET OR 1.586 ACRES, MORE OR LESS.

APPENDIX A

Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 3 (PIN 17-16-416-004)

A TRACT OF LAND, LYING EASTERLY OF AND ADJOINING THE EASTERLY BOUNDARY OF THE NEW CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, SAID TRACT OF LAND COMPRISED OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF THE CHICAGO RIVER (ABANDONED), TOGETHER WITH SUNDRY LOTS AND BLOCKS IN SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE WEST LINE RELOCATED SOUTH WELLS STREET PER DOCUMENT NUMBER 0021366616 AND THE SOUTH LINE OF WEST TAYLOR STREET, SAID POINT OF INTERSECTION ALSO BEING 801.61 FEET WEST OF THE WEST LINE OF SOUTH CLARK ST, AS WIDENED; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE OF SOUTH WELLS STREET, 14.00 FEET TO A LINE 14.00 FEET SOUTH OF AND PARALLEL WITH SAID SOUTH LINE OF TAYLOR STREET; THENCE SOUTH 88 DEGREES 29 MINUTES 49 SECONDS WEST, ALONG SAID PARALLEL LINE, 263.39 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 157.23 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 263.39 FEET TO A POINT ON THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 17.00 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 250.00 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 71.57 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 4.01 FEET; THENCE SOUTH 07 DEGREES 10 MINUTES 50 SECONDS EAST, 140.41 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 34.42 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 3.29 FEET; THENCE SOUTH 07 DEGREES 09 MINUTES 40 SECONDS EAST, 153.66 FEET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET, 44.23 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 4.26 FEET; THENCE SOUTH 07 DEGREES 10 MINUTES 05 SECONDS EAST, 49.09 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO WEST LINE OF SOUTH WELLS STREET, 205.54 FEET TO THE WEST LINE OF SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 18.00 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 189.32 FEET; THENCE SOUTH 01 DEGREES 37 MINUTES 42 SECONDS EAST, 146.15 FEET TO A LINE 33.00 FEET NORTH OF PARALLEL WITH SAID SOUTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 16; THENCE SOUTH 88 DEGREES 28 MINUTES 26 SECONDS WEST, ALONG SAID PARALLEL LINE, 26.03 FEET TO THE EASTERLY BOUNDARY LINE OF THE NEW CHANNEL OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 01 DEGREES 43 MINUTES 01 SECONDS WEST, ALONG SAID EASTERLY BOUNDARY OF THE SOUTH BRANCH OF THE CHICAGO RIVER, 9.95 FEET TO A POINT 1016.57 FEET WEST OF THE WEST LINE OF SOUTH CLARK STREET, AS WIDENED; THENCE NORTH 07 DEGREES 04 MINUTES 08 SECONDS WEST, CONTINUING ALONG SAID EASTERLY BOUNDARY LINE OF THE SOUTH BRANCH OF CHICAGO RIVER, 837.98 FEET TO A POINT ON THE SOUTH LINE OF SAID WEST TAYLOR STREET; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS EAST, ALONG SAID SOUTH LINE, 294.44 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 32,870 SQUARE FEET OR 0.755 ACRES, MORE OR LESS.

APPENDIX A

Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 4 (PIN 17-16-401-014)

THAT PART OF BLOCKS 85 AND 86 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16. TOWNSHIP 39 NORTH; RANGE 14. EAST OF THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 AFORESAID WITH THE SOUTH LINE OF WEST POLK STREET; THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE SOUTH LINE OF WEST POLK STREET, 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG THE WEST LINE OF SOUTH WELLS STREET AFORESAID. 388.14 FEET TO THE POINT OF BEGINNING OF THE PARCEL HEREIN DESCRIBED; THENCE SOUTH 88 DEGREES 21 MINUTES 27 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED LINE, 199.78 FEET TO A POINT ON A LINE DRAWN 1.51 FEET (AS MEASURED PERPENDICULARLY) EAST OF AND PARALLEL WITH THE EASTERLY LINE OF A 20 FOOT PERMANENT ACCESS EASEMENT PER CIRCUIT COURT OF COOK COUNTY CASE NO. 76L 11684 ENTERED JULY 1, 1977; THENCE SOUTH 7 DEGREES 01 MINUTES 11 SECONDS EAST, ALONG SAID PARALLEL LINE, 108.05 FEET; THENCE SOUTH 82 DEGREES 58 MINUTES 49 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED LINE, 141.50 FEET TO A POINT ON THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE SOUTH 7 DEGREES 02 MINUTES 37 SECONDS EAST, ALONG SAID EAST LINE, 41.41 FEET TO THE POINT OF BEGINNING;

THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 124.68 FEET; THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 123.00 FEET; THENCE SOUTH 88 DEGREES 29 MINUTES 17 SECONDS WEST, 113.08 FEET TO A POINT ON THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE NORTH 7 DEGREES 02 MINUTES 37 SECONDS WEST, ALONG SAID EAST LINE, 123.58 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 14,622 SQUARE FEET OR 0.336 ACRES, MORE OR LESS.

APPENDIX A

Riverline Special Assessment District
Description of Open Space Area Per PIN Number

OPEN SPACE FEE SIMPLE PARCEL 5 (PIN 17-16-401-003)

THAT PART OF BLOCKS 85 AND 86 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16. TOWNSHIP 39 NORTH; RANGE 14. EAST OF THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 AFORESAID, AND THE SOUTH LINE OF WEST POLK STREET, BEING ALSO THE NORTH LINE OF BLOCK 86, AFORESAID;
THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST ALONG THE SOUTH LINE OF WEST POLK STREET 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG THE WEST LINE OF SOUTH WELLS STREET AFORESAID, 777.46 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG SAID WEST LINE, 19.00 FEET, TO A POINT ON THE-NORTH LINE OF WEST TAYLOR STREET, BEING ALSO THE SOUTH LINE OF BLOCK 85, AFORESAID; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS WEST; ALONG SAID NORTH LINE OF WEST TAYLOR STREET, 303.53 FEET TO THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE NORTH 7 DEGREES 02 MINUTES 52 SECONDS WEST ALONG THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AFORESAID, 123.05 FEET; THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 113.08 FEET; THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 103.50 FEET TO A POINT ON A LINE 19.00 FEET NORTH OF AN PARALLEL WITH THE NORTH LINE OF SAID WEST TAYLOR STREET; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS EAST, ALONG SAID PARALLEL LINE, 202.00 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 16,981 SQUARE FEET OR 0.390 ACRES, MORE OR LESS.

EXHIBIT "2"

Ordinance

(see Ordinance to which the Second Resolution is attached)

EXHIBIT "C"

RECOMMENDATION OF THE BOARD OF LOCAL IMPROVEMENTS OF THE CITY OF CHICAGO, COOK COUNTY, ILLINOIS

(attached)

RECOMMENDATION OF THE BOARD OF LOCAL IMPROVEMENTS OF THE CITY OF CHICAGO, COOK COUNTY, ILLINOIS AS TO THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT [SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530]

TO: The City Council of the City of Chicago, Cook County, Illinois

The Board of Local Improvements heretofore appointed and now serving in that capacity herewith submits a draft of an Ordinance for the installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, landscaping, outdoor elevator, stormwater detention, water main, sanitary sewer, and right-of-way improvements, all of which are to be publicly owned, in regard to the Riverline Development; all as described in the accompanying Ordinance attached hereto as Exhibit "1" and made a part hereof.

We submit herewith an Estimate of Cost thereof by the Engineer for the Board of Local Improvements, as updated, amended and revised by the Engineer for the Board on the 8th day of December, 2016, to correct a scrivener's error in the legal description for a parcel to be acquired by the City as part of the Special Assessment, which updated, amended and revised Estimate of Cost was approved by the Board of Local Improvements at its meeting and public hearing on the 8th day of December, 2016, a copy of which is attached hereto as Exhibit "2" and made a part hereof.

We recommend the passage of the said Ordinance and the making of the said improvements, the costs thereof to be paid for by special assessment.

DATED this 8th day of December, 2016.

BOARD OF LOCAL IMPROVEMENTS

Andrea Yao, President

Edward T. McKinnie, Sr., Vice President

Paul Connolly, Assistant Secretary

Linford Coleman, Member

ATTEST:

William Higgins, Superintendent of Special Assessments
and Secretary for the Board of Local Improvements

EXHIBIT "1"

Ordinance

(see Ordinance to which the Recommendation is attached)

EXHIBIT "2"

Estimate of Cost

(see Exhibit "1" to Exhibit "B" to the Ordinance to which the Recommendation is attached)

EXHIBIT "D"

NOTICE TO EACH TAXPAYER OF RECORD WITHIN THE PROPOSED AREA OF THE SPECIAL ASSESSMENT

(attached)

NOTICE OF TIME AND PLACE OF PUBLIC HEARING FOR THE CITY OF CHICAGO SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530

The Board of Local Improvements of the City of Chicago, Cook County, Illinois, has adopted a First Resolution for a local improvement to be made by special assessment against property benefitted in the City of Chicago, Cook County, Illinois, consisting of the installation of riverwalk, children's playground, dog park, plaza, amphitheater, trail system, landscaping, outdoor elevator, stormwater detention, water main, sanitary sewer, and right-of-way improvements, all of which are to be publicly owned, relative to the Riverline Development, which is generally bounded by Harrison Street, Wells Street, Roosevelt Road, and the Chicago River, and all appurtenant work, including all labor and materials, complete in place.

Said project is further described and indicated on the Estimate of Cost, attached hereto and made a part hereof, signed by WILLIAM B. LOFTUS, P.E., of SPACECO, INC., Engineer for the Board of Local Improvements of the City of Chicago.

Notice is hereby given that the Board of Local Improvements of the City of Chicago has fixed the 8th day of December, at the hour of 1:30 p.m., at 30 North LaSalle Street, Second Floor, Conference Rooms D and E, Chicago, Illinois, as the time and place for public consideration of this improvement; that the extent, nature, kind, character and Estimate of Cost of said improvement may be changed by the Board of Local Improvements at the public hearing, or if upon such hearing the Board of Local Improvements shall deem said improvement desirable, a Second Resolution therefor will be adopted, a Recommendation in relation thereto will be approved, and an Ordinance thereupon prepared and submitted to the City Council of the City of Chicago in accordance with the law.

DATED this 1st day of December, 2016.

William Higgins, Superintendent
of Special Assessments and Secretary for
the Board of Local Improvements
City of Chicago
Cook County, Illinois

ESTIMATE OF COST

(see Exhibit "1" to Exhibit "A" to the Ordinance to which the Notice is attached)

EXHIBIT "E"

ESTIMATE OF COST

(see Exhibit "1" to Exhibit "B" to the Ordinance)

EXHIBIT "F"

LEGAL DESCRIPTIONS OF THE PROPERTY PROPOSED TO BE SUBJECT TO THE SPECIAL ASSESSMENT

(attached)

PIN: Pt. 17-16-401-003-0000

THAT PART OF BLOCK 85 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16. TOWNSHIP 39 NORTH; RANGE 14. EAST OF THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 IN THE SCHOOL SECTION ADDITION TO CHICAGO, AND THE SOUTH LINE OF WEST POLK STREET, BEING ALSO THE NORTH LINE OF BLOCK 86, AFORESAID; THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST ALONG THE SOUTH LINE OF WEST POLK STREET 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG THE WEST LINE OF SOUTH WELLS STREET AFORESAID, 673.94 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST, ALONG THE WEST LINE OF SOUTH WELLS STREET, 103.53 FEET TO A POINT ON A LINE 19.00 FEET NORTH OF AN PARALLEL WITH THE NORTH LINE OF WEST TAYLOR STREET; THENCE SOUTH 88 DEGREES 29 MINUTES 49 SECONDS WEST, ALONG SAID PARALLEL LINE, 202.00 FEET; THENCE NORTH 01 DEGREES 39 MINUTES 28 SECONDS WEST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 103.50 FEET; THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 202.00 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 20,910 SQUARE FEET OR 0.480 ACRES, MORE OR LESS.

PIN: Pt. 17-16-401-008-0000

THAT PART OF BLOCKS 87 AND 88 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 393.51 FEET TO THE DOCK LINE OF THE NEW CHANNEL OF THE SOUTH BRANCH OF CHICAGO RIVER, AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 10 DEGREES 00 MINUTES 52 SECONDS WEST, ALONG SAID EAST DOCK LINE, BEING A LINE WHICH IS 200.00 FEET EASTERLY FROM AND PARALLEL WITH THE EAST LINES OF LOTS 15, 17 AND 18 IN RAILROAD COMPANY'S RESUBDIVISION OF PART OF SCHOOL SECTION

ADDITION TO CHICAGO, THE PLAT OF WHICH WAS RECORDED MARCH 29, 1924 AS DOCUMENT 8339751, A DISTANCE OF 319.25 FEET; THENCE NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, A DISTANCE OF 154.95 TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, ALONG SAID LAST DESCRIBED LINE, 242.80 FEET TO THE POINT OF BEGINNING,

THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 107.59 FEET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 89.90 FEET; THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 195.00 FEET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 60.50 FEET; THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 5.94 FEET TO A POINT ON THE SOUTH LINE OF WEST HARRISON STREET, ALSO BEING THE NORTH LINE OF BLOCK 88; THENCE SOUTH 77 DEGREES 30 MINUTES 08 SECONDS EAST, ALONG THE LAST DESCRIBED LINE, 8.51 FEET; THENCE NORTH 88 DEGREES 28 MINUTES 50 SECONDS EAST, ALONG THE SOUTH LINE OF SAID WEST HARRISON STREET, ALSO BEING THE NORTH LINE OF SAID BLOCK 88, A DISTANCE OF 168.98 FEET TO A POINT 230.00 FEET WEST OF THE NORTHEAST CORNER OF BLOCK 88 (AS MEASURED ALONG THE NORTH LINE THEREOF); THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, 306.26 FEET TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, ALONG A LINE PARALLEL WITH THE WEST LINE OF SOUTH WELLS STREET, 147.83 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 62,940 SQUARE FEET OR 1.445 ACRES, MORE OR LESS.

PIN: Pt. 17-16-401-009-0000

PARCEL 1:

THAT PART OF BLOCKS 87 AND 88 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 393.51 FEET TO THE DOCK LINE OF THE NEW CHANNEL OF THE

SOUTH BRANCH OF CHICAGO RIVER, AS ESTABLISHED BY ORDINANCE PASSED BY THE CITY COUNCIL ON JULY 8, 1926; THENCE NORTH 10 DEGREES 00 MINUTES 52 SECONDS WEST, ALONG SAID EAST DOCK LINE, BEING A LINE WHICH IS 200.00 FEET EASTERLY FROM AND PARALLEL WITH THE EAST LINES OF LOTS 15, 17 AND 18 IN RAILROAD COMPANY'S RESUBDIVISION OF PART OF SCHOOL SECTION ADDITION TO CHICAGO, THE PLAT OF WHICH WAS RECORDED MARCH 29, 1924 AS DOCUMENT 8339751, A DISTANCE OF 319.25 FEET; THENCE NORTH 09 DEGREES 56 MINUTES 14 SECONDS WEST, CONTINUING ALONG SAID EAST DOCK LINE, A DISTANCE OF 154.95 TO A POINT ON A LINE PERPENDICULAR TO THE WEST LINE OF SOUTH WELLS STREET AND 325.00 FEET SOUTH OF THE NORTH LINE OF LOT 88 AS MEASURED ALONG THE WEST LINE OF SOUTH WELLS STREET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, ALONG SAID LAST DESCRIBED LINE, 242.80 FEET TO THE POINT OF BEGINNING,

THENCE CONTINUING NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, ALONG SAID LAST DESCRIBED LINE, 367.83 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG THE WEST LINE OF SOUTH WELLS STREET, 150.50 FEET; THENCE SOUTH 88 DEGREES 24 MINUTES 47 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED COURSE, 367.83 FEET; THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 150.50 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 55,359 SQUARE FEET OR 1.271 ACRES, MORE OR LESS.

PARCEL 2:

THAT PART OF BLOCK 87 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDARY AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 165.00 FEET TO A POINT ON A LINE 165.00 FEET WEST OF AND PARALLEL WITH THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE NORTH 01 DEGREES 35 MINUTES 13 SECONDS WEST, ALONG SAID PARALLEL LINE, 290.72 FEET; THENCE NORTH 88 DEGREES 24 MINUTES 47 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, A DISTANCE OF 165.00 FEET TO A POINT ON THE WEST LINE OF SAID SOUTH WELLS STREET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG SAID WEST LINE, 291.00 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 47,992 SQUARE FEET OR 1.102 ACRES, MORE OR LESS.

PARCEL 3:

THAT PART OF BLOCK 87 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN AND THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, ALL TAKEN AS ONE TRACT, BOUNDARY AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE OF SOUTH WELLS STREET AND THE NORTH LINE OF WEST POLK STREET; THENCE SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 179.67 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING SOUTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE NORTH LINE OF SAID WEST POLK STREET, 185.88 FEET; THENCE NORTHERLY 89.66 FEET, ALONG THE ARC OF A NON-TANGENT CIRCLE TO THE RIGHT, HAVING A RADIUS OF 1000.00 FEET AND WHOSE CHORD BEARS NORTH 08 DEGREES 18 MINUTES 36 SECONDS WEST, 89.63 FEET TO A POINT OF TANGENCY; THENCE NORTH 05 DEGREES 44 MINUTES 28 SECONDS WEST, 19.03 FEET TO A POINT OF CURVATURE; THENCE NORTHERLY 26.65 FEET, ALONG THE ARC OF A TANGENT CIRCLE TO THE RIGHT, HAVING A RADIUS OF 100.00 FEET AND WHOSE CHORD BEARS NORTH 01 DEGREES 53 MINUTES 40 SECONDS EAST, 26.57 FEET TO A POINT OF TANGENCY; THENCE NORTH 09 DEGREES 31 MINUTES 48 SECONDS EAST, 5.29 FEET TO A POINT OF CURVATURE; THENCE NORTHERLY 7.90 FEET, ALONG THE ARC OF A TANGENT CIRCLE TO THE LEFT, HAVING A RADIUS OF 100.00 FEET AND WHOSE CHORD BEARS NORTH 07 DEGREES 16 MINUTES 04 SECONDS EAST, 7.89 FEET TO A POINT ON A LINE 147.50 FEET NORTH OF AND PARALLEL WITH THE NORTH LINE OF SAID WEST POLK STREET; THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS EAST, ALONG SAID PARALLEL LINE, 193.90 FEET; THENCE SOUTH 01 DEGREES 35 MINUTES 13 SECONDS EAST, ALONG A LINE PARALLEL WITH THE WEST LINE OF SOUTH WELLS STREET, 147.50 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 28,583 SQUARE FEET OR 0.656 ACRES, MORE OR LESS.

PIN: Pt. 17-16-416-004-0000

PARCEL 1

A TRACT OF LAND, LYING EASTERLY OF AND ADJOINING THE EASTERLY BOUNDARY OF THE NEW CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, SAID TRACT OF LAND COMPRISED OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF THE CHICAGO RIVER (ABANDONED), TOGETHER WITH SUNDRY LOTS AND BLOCKS IN SCHOOL SECTION ADDITION TO CHICAGO, BEING

A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE RELOCATED SOUTH WELLS STREET PER DOCUMENT NUMBER 0021366616 AND THE SOUTH LINE OF WEST TAYLOR STREET, SAID POINT OF INTERSECTION ALSO BEING 801.61 FEET WEST OF THE WEST LINE OF SOUTH CLARK ST, AS WIDENED; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG THE WEST LINE RELOCATED SOUTH WELLS STREET, 14.00 FEET TO THE PONT OF BEGINNING;

THENCE CONTINUING SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 156.47 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 263.39 FEET; THENCE NORTH 01 DEGREES 40 MINUTES 05 SECONDS WEST, PARALLEL TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 157.23 FEET TO A POINT ON A LINE 14.00 FEET SOUTH OF AND PARALLEL WITH THE SOUTH LINE OF WEST TAYLOR STREET; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS EAST, ALONG SAID PARALLEL LINE, 263.39 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 41,312 SQUARE FEET OR 0.948 ACRES, MORE OR LESS.

PARCEL 2:

A TRACT OF LAND, LYING EASTERLY OF AND ADJOINING THE EASTERLY BOUNDARY OF THE NEW CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, SAID TRACT OF LAND COMPRISED OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF THE CHICAGO RIVER (ABANDONED), TOGETHER WITH SUNDRY LOTS AND BLOCKS IN SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE RELOCATED SOUTH WELLS STREET PER DOCUMENT NUMBER 0021366616 AND THE SOUTH LINE OF WEST TAYLOR STREET, SAID POINT OF INTERSECTION ALSO BEING 801.61 FEET WEST OF THE WEST LINE OF SOUTH CLARK ST, AS WIDENED; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG THE WEST LINE RELOCATED SOUTH WELLS STREET, 187.47 FEET TO THE PONT OF BEGINNING;

THENCE CONTINUING SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 491.80 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 205.54 FEET; THENCE NORTH 07 DEGREES 10 MINUTES 05 SECONDS WEST, 49.09 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 4.26 FEET; THENCE NORTH 01 DEGREES 40 MINUTES 05 SECONDS WEST, PARALLEL TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 44.23 FEET; THENCE NORTH 07 DEGREES 09 MINUTES 40 SECONDS WEST, 153.66 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55

SECONDS WEST, PERPENDICULAR TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 3.29 FEET; THENCE NORTH 01 DEGREES 40 MINUTES 05 SECONDS WEST, PARALLEL TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 34.42 FEET; THENCE NORTH 07 DEGREES 10 MINUTES 50 SECONDS WEST, 140.41 FEET; THENCE SOUTH 88 DEGREES 19 MINUTES 55 SECONDS WEST, PERPENDICULAR TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 4.01 FEET; THENCE NORTH 01 DEGREES 40 MINUTES 05 SECONDS WEST, PARALLEL TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 71.57 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE LAST COURSE, 250.00 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 112,911 SQUARE FEET OR 2.592 ACRES, MORE OR LESS.

PARCEL 3:

A TRACT OF LAND, LYING EASTERLY OF AND ADJOINING THE EASTERLY BOUNDARY OF THE NEW CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER, SAID TRACT OF LAND COMPRISED OF PART OF THE ORIGINAL BED OF SAID SOUTH BRANCH OF THE CHICAGO RIVER (ABANDONED), TOGETHER WITH SUNDRY LOTS AND BLOCKS IN SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14 EAST OF THE THIRD PRINCIPAL MERIDIAN BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE WEST LINE RELOCATED SOUTH WELLS STREET PER DOCUMENT NUMBER 0021366616 AND THE SOUTH LINE OF WEST TAYLOR STREET, SAID POINT OF INTERSECTION ALSO BEING 801.61 FEET WEST OF THE WEST LINE OF SOUTH CLARK ST, AS WIDENED; THENCE SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG THE WEST LINE RELOCATED SOUTH WELLS STREET, 697.27 FEET TO THE PONT OF BEGINNING;

THENCE CONTINUING SOUTH 01 DEGREES 40 MINUTES 05 SECONDS EAST, ALONG SAID WEST LINE, 146.62 FEET TO A POINT ON A LINE 33.00 FEET NORTH OF AND PARALLEL WITH THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 16; THENCE SOUTH 88 DEGREES 28 MINUTES 26 SECONDS WEST, ALONG SAID PARALLEL LINE, 189.42 FEET; THENCE NORTH 01 DEGREES 37 MINUTES 42 SECONDS WEST, PERPENDICULAR TO THE LAST COURSE, 146.15 FEET; THENCE NORTH 88 DEGREES 19 MINUTES 55 SECONDS EAST, PERPENDICULAR TO THE WEST LINE OF RELOCATED SOUTH WELLS STREET, 189.32 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 27,721 SQUARE FEET OR 0.636 ACRES, MORE OR LESS.

PIN: 17-16-401-013-0000

THAT PART OF BLOCK 86 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16, TOWNSHIP 39 NORTH, RANGE 14, EAST OF

THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 AFORESAID WITH THE SOUTH LINE OF WEST POLK STREET; THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE SOUTH LINE OF WEST POLK STREET, 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST ALONG THE WEST LINE OF SOUTH WELLS STREET AFORESAID. 388.14 FEET TO THE POINT OF BEGINNING;

THENCE SOUTH 88 DEGREES 21 MINUTES 27 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED LINE, 199.78 FEET TO A POINT ON A LINE DRAWN 1.51 FEET (AS MEASURED PERPENDICULARLY) EAST OF AND PARALLEL WITH THE EASTERLY LINE OF A 20 FOOT PERMANENT ACCESS EASEMENT PER CIRCUIT COURT OF COOK COUNTY CASE NO. 76L 11684 ENTERED JULY 1, 1977; THENCE SOUTH 07 DEGREES 01 MINUTES 11 SECONDS EAST, ALONG SAID PARALLEL LINE, 9.49 FEET TO A POINT ON THE SOUTH LINE OF BLOCK 86; THENCE NORTH 88 DEGREES 29 MINUTES 49 SECONDS EAST, ALONG SAID SOUTH LINE, 198.89 FEET TO THE WEST LINE OF SOUTH WELLS STREET; THENCE NORTH 01 DEGREES 39 MINUTES 28 SECONDS WEST, ALONG SAID WEST LINE, 9.93 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 1,931 SQUARE FEET OR 0.044 ACRES, MORE OR LESS.

PIN: Pt. 17-16-401-014-0000

THAT PART OF BLOCK 85 IN THE SCHOOL SECTION ADDITION TO CHICAGO, BEING A SUBDIVISION OF SECTION 16. TOWNSHIP 39 NORTH; RANGE 14. EAST OF THE THIRD PRINCIPAL MERIDIAN AND OF THE FILLED OLD CHANNEL OF THE SOUTH BRANCH OF THE CHICAGO RIVER. ALL TAKEN AS A TRACT, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF BLOCK 86 N THE SCHOOL SECTION ADDITION TO CHICAGO, WITH THE SOUTH LINE OF WEST POLK STREET; THENCE NORTH 88 DEGREES 30 MINUTES 41 SECONDS WEST, ALONG THE SOUTH LINE OF WEST POLK STREET, 10.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET (SAID WEST LINE BEING DRAWN 10.00 FEET WEST OF AND PARALLEL WITH THE AFOREMENTIONED EAST LINE OF BLOCK 86); THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS EAST, ALONG THE WEST LINE OF SOUTH WELLS STREET, 398.06 FEET TO THE NORTH LINE OF BLOCK 85 IN SAID SCHOOL SECTION ADDITION TO CHICAGO, SAID POINT ALSO BEING THE POINT OF BEGINNING;

THENCE SOUTH 88 DEGREES 21 MINUTES 27 SECONDS WEST, ALONG THE NORTH LINE OF SAID BLOCK 85, A DISTANCE OF 199.78 FEET TO A POINT ON A LINE DRAWN 1.51 FEET (AS MEASURED PERPENDICULARLY) EAST OF AND PARALLEL WITH THE EASTERLY LINE OF A 20 FOOT PERMANENT ACCESS EASEMENT PER CIRCUIT COURT OF COOK COUNTY CASE NO. 76L 11684 ENTERED JULY 1, 1977; THENCE SOUTH 7 DEGREES 01 MINUTES 11 SECONDS EAST, ALONG SAID PARALLEL LINE, 98.56 FEET; THENCE SOUTH 82 DEGREES 58 MINUTES 49 SECONDS WEST, PERPENDICULAR TO THE LAST DESCRIBED LINE, 141.50 FEET TO A POINT ON THE EAST LINE OF THE SOUTH BRANCH OF THE CHICAGO RIVER AS ESTABLISHED BY ORDINANCE PASSED JULY 8, 1926; THENCE SOUTH 7 DEGREES 02 MINUTES 37 SECONDS EAST, ALONG SAID EAST LINE, 41.41 FEET; THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 124.98 FEET; THENCE SOUTH 01 DEGREES 39 MINUTES 28 SECONDS WEST, PARALLEL TO THE WEST LINE OF SOUTH WELLS STREET, 123.00 FEET; THENCE NORTH 88 DEGREES 29 MINUTES 17 SECONDS EAST, 202.00 FEET TO A POINT ON THE WEST LINE OF SOUTH WELLS STREET; THENCE NORTH 01 DEGREES 39 MINUTES 28 SECONDS WEST, ALONG SAID WEST LINE, 275.87 FEET TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS.

CONTAINING 60,981 SQUARE FEET OR 1.400 ACRES, MORE OR LESS.

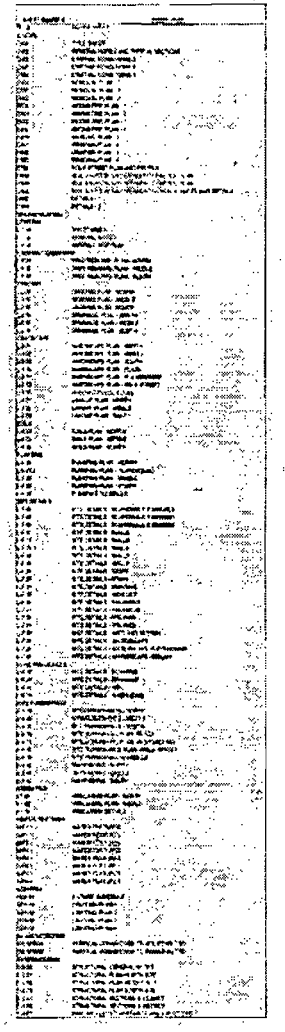
EXHIBIT "G"

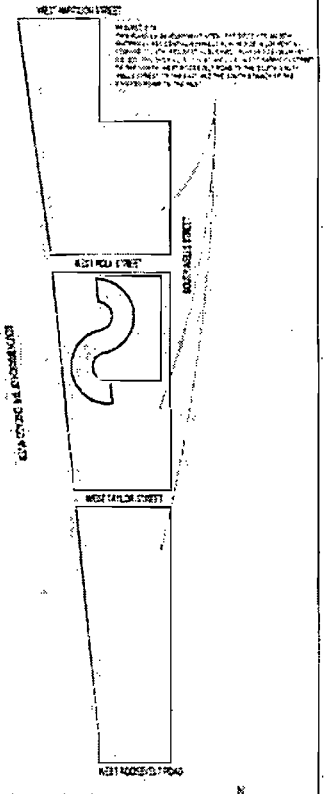
PLANS AND SPECIFICATIONS FOR THE PROJECT

(attached)

RIVERLINE

1000 SOUTH WELLS STREET
CHICAGO, ILLINOIS





CITY OF CHICAGO
LOCATION MAP

N

OPEN SPACE
ISSUED FOR SPECIAL ASSESSMENT DISTRICT

CIVIL	ARCHITECTURAL	MECHANICAL	CITY OF CHICAGO ENERGY CODE COMPLIANCE	DIGGERS NOTICE	BEFORE YOU DIG IN CHICAGO, CALL DIGGER (312) 744-7000
LANDSCAPE	STRUCTURAL	ELECTRICAL	PLUMBING	ILLINOIS ACCESSIBILITY CODE COMPLIANCE	

PERKINS + WILL

CITY OF CHICAGO
RIVERLINE SPECIAL ASSESSMENT DISTRICT
NO. 58827 / WARRANT NO. 42538

CMN

CMN DEVELOPMENT CORPORATION

LEGO LEASE

COVER SHEET

00-00

SITE IMPROVEMENT PLANS
for

RIVER SOUTH

CHICAGO, ILLINOIS

PROJECT NO:8749.08

FLOOD HAZARD AREA

ARCHITECT

DIGGER

DUTY TO ACCOMPANY

NOTE:

INDEX

LOCATION MAP

KEY MAP

REVISIONS

CITY OF CHICAGO

CMA DEVELOPMENT CORPORATION

TITLE SHEET

C100

PAVEMENT

EROSION AND SEDIMENTATION CONTROL

BUREAU OF TRAFFIC

CTA

BUREAU OF ELECTRICITY

CDOT ED

GENERAL NOTES FOR WORK IN THE PUBLIC WAY

UNDERGROUND NOTES

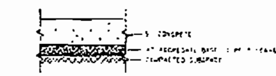
GENERAL NOTES

BUREAU OF WATER ENGINEERING

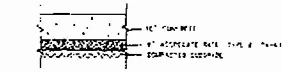
DEPARTMENT OF WATER MANAGEMENT SEWER REQUIREMENTS

WORK ZONE TRAFFIC CONTROL (UNDER PROJECTS)

STRIPING AND PAVEMENT MARKING



CITY STANDARD FOR P.C. CONCRETE SIDEWALK



CITY STANDARD FOR P.C. CONCRETE PAVEMENT

CITY STANDARD FOR NEW ASPHALT PAVEMENT (COLLECTOR STREET – POLY)

CITY STANDARD FOR ASPHALT PAVEMENT REPLACEMENT (COLLECTOR STREET – RELIST)

PERMITS

DESCRIPTION	DATE FILED	PERMIT NO.	DATE ISSUED

CONTACT INFORMATION

BENCHMARKS

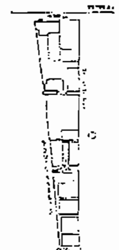
BENCHMARK INFORMATION PROVIDED FOR REFERENCE ONLY

SEE ALTA/ACSM LAND TITLE SURVEY BY GREMLEY & BIEDERMANN FOR BENCHMARK

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
55417 / WARRANT NO. 52528
CHICAGO, ILLINOIS

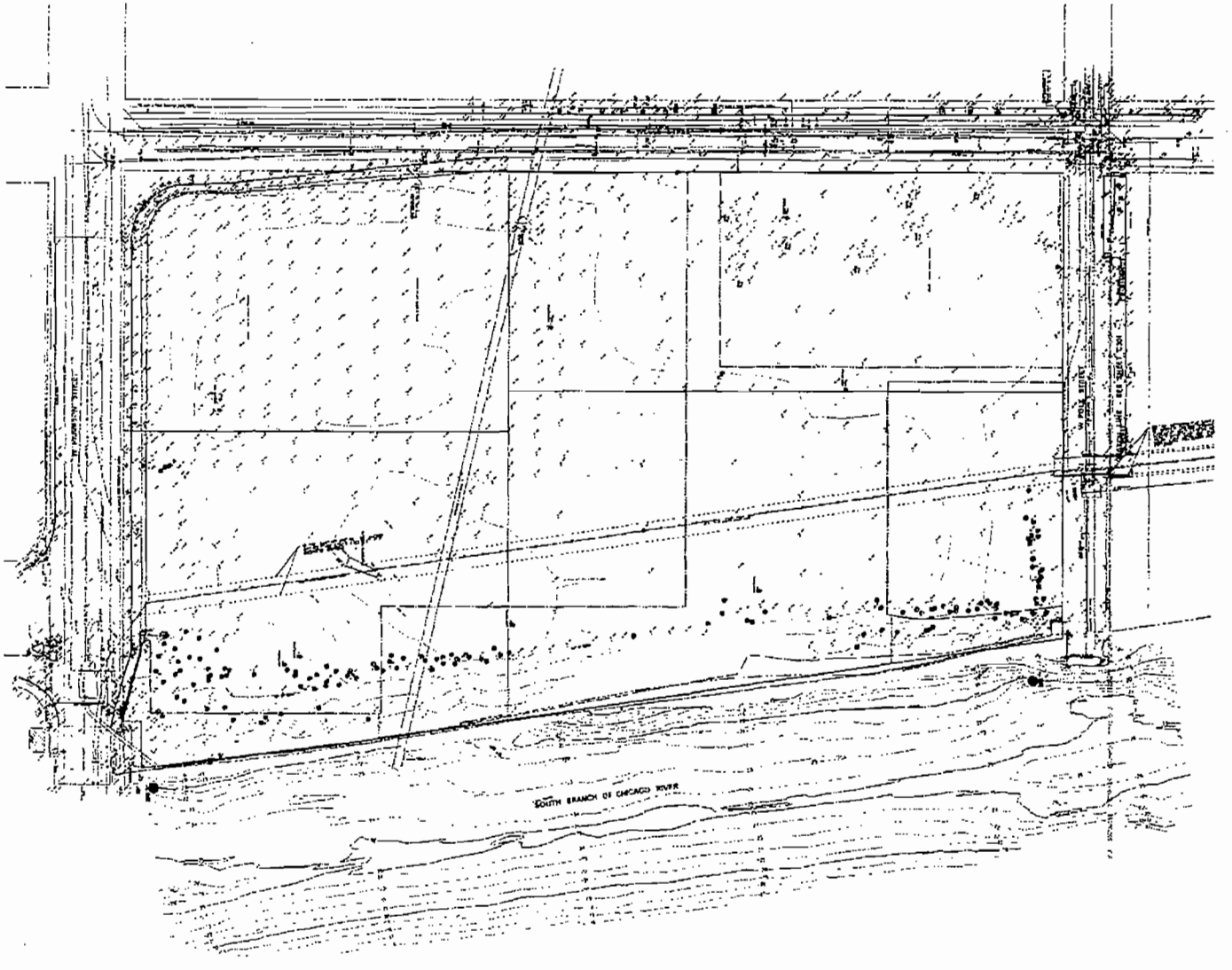
CMK DEVELOPMENT CORPORATION

LENDLEASE



GENERAL NOTES AND TYPICAL SECTIONS

C200



LEGEND

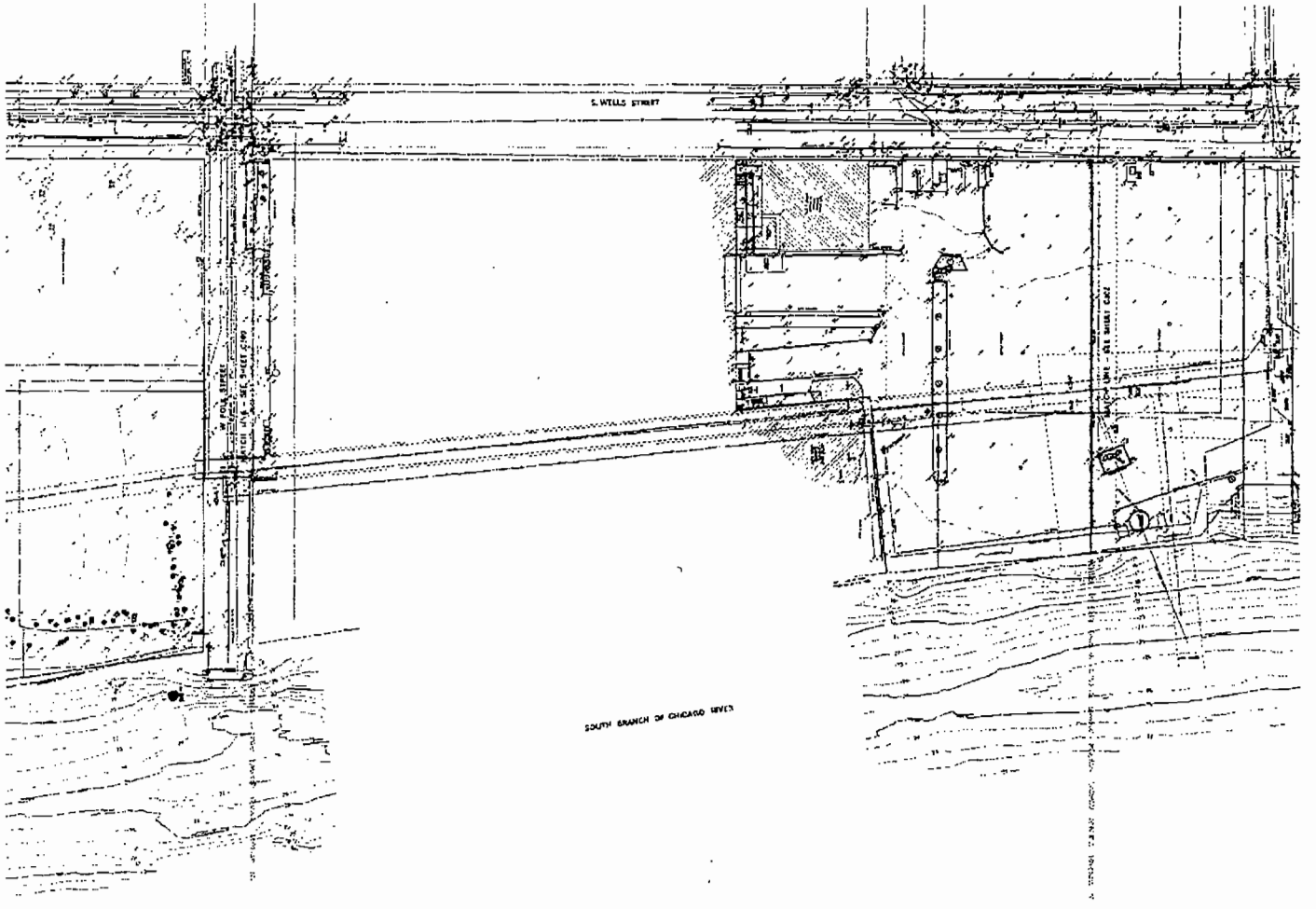
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
9800 / MAINPLANT NO. 62530

CMK DEVELOPMENT
CORPORATION

LENDLEASE

EXISTING CONDITIONS-1

C300



LEGEND

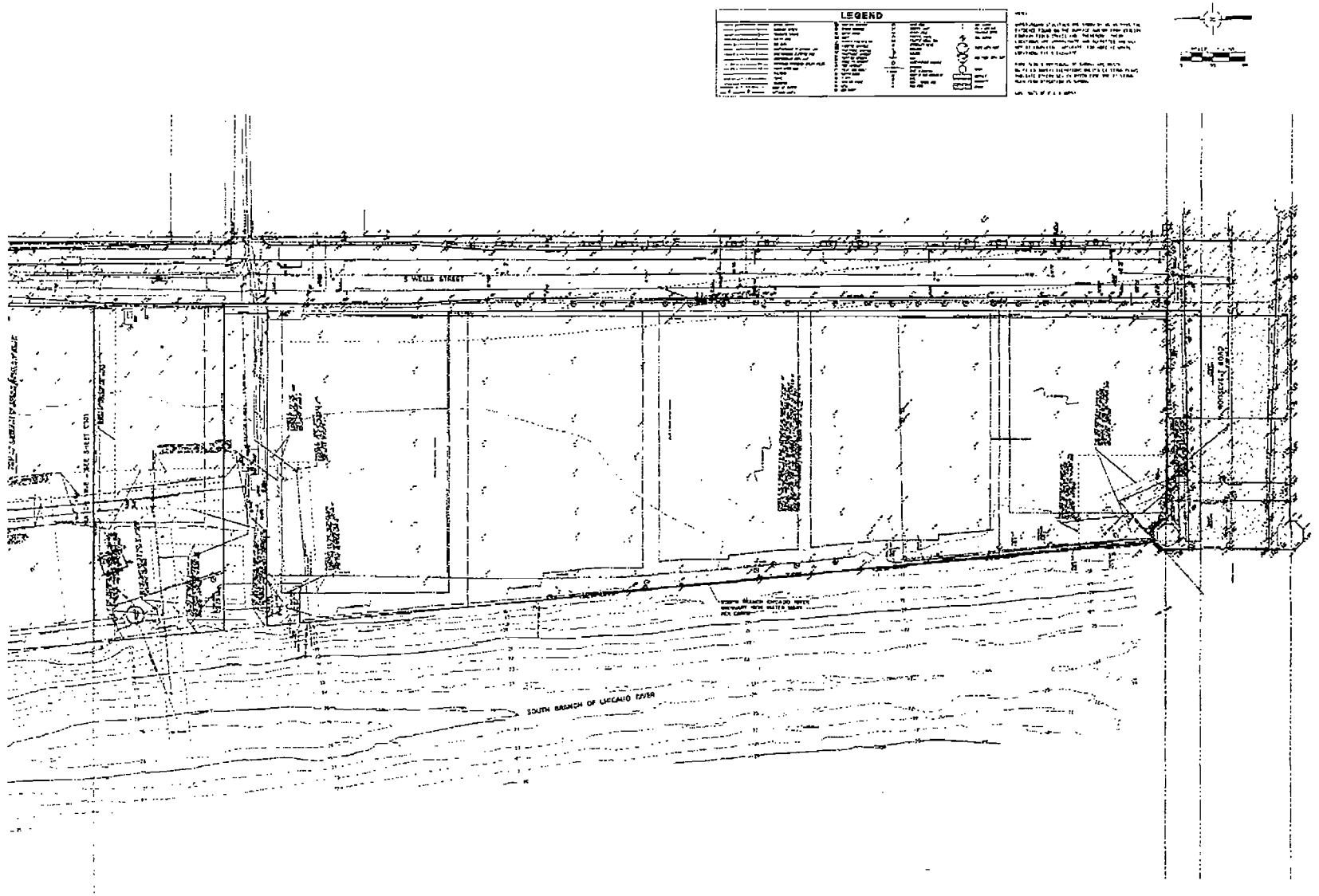
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58827 / WARRANT NO. 62529

CMK DEVELOPMENT
CORPORATION

LENDLEASE

EXISTING CONDITIONS-2

C301



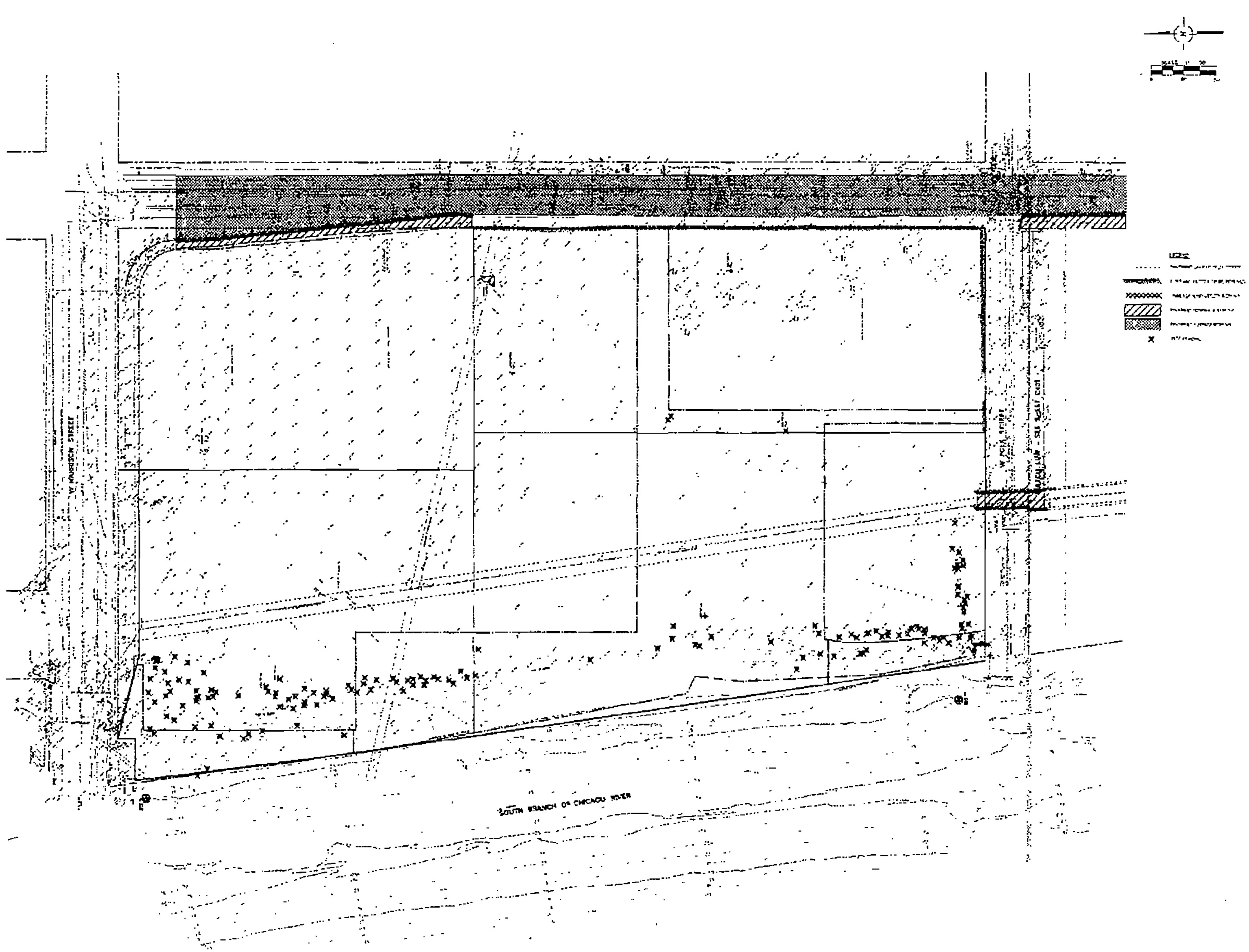
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET 100
95637 / WARRANT NO. 97538

CMK DEVELOPMENT
CORPORATION

LENDLEASE

EXISTING CONDITIONS 3

C302



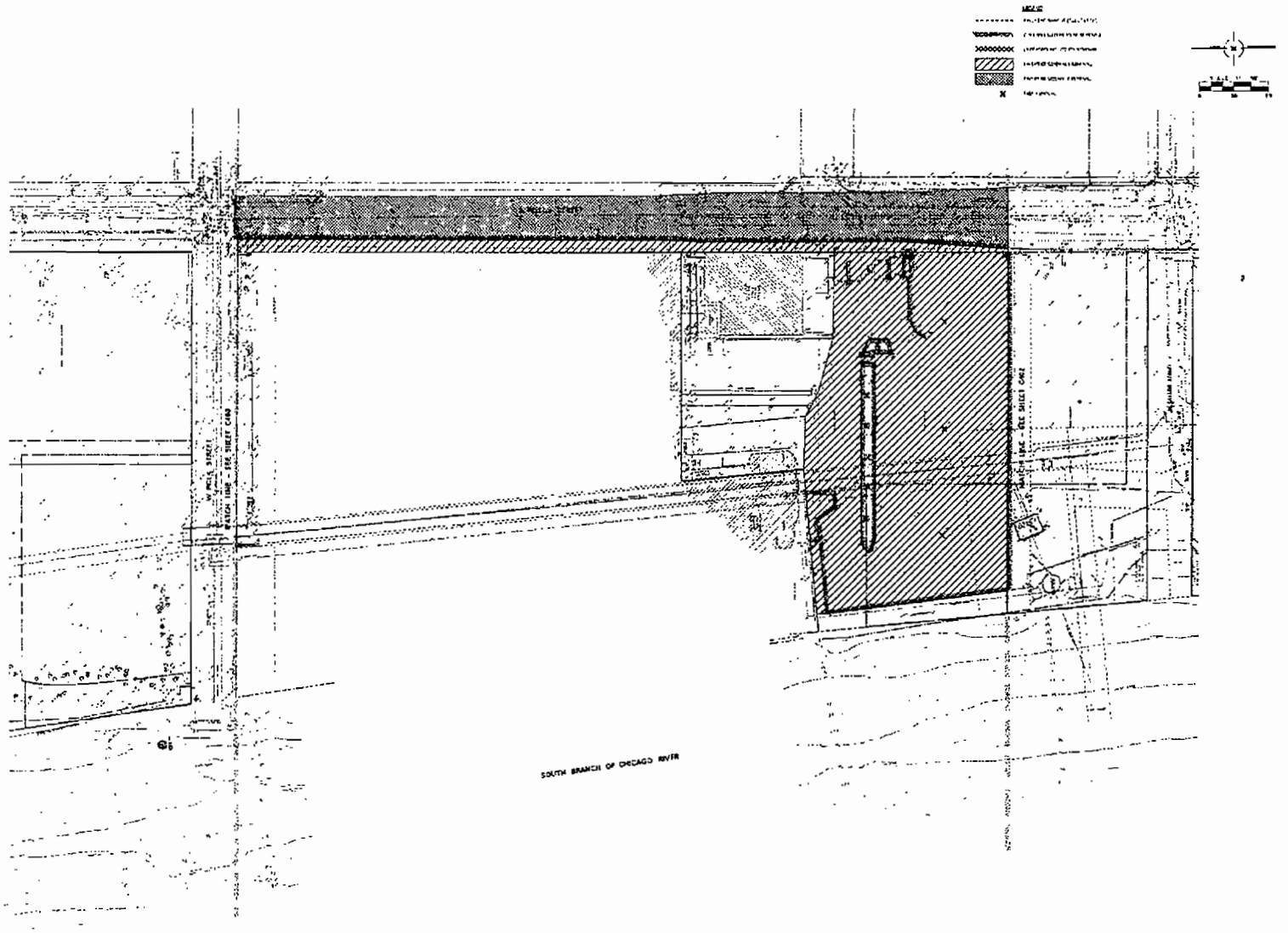
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
[illegible] / WARRANT NO. [illegible]
[illegible] SOUTH WELLS STREET
CHICAGO, ILLINOIS

CMK DEVELOPMENT
CORPORATION

LENDLEASE

REMOVAL PLAN-1

C400



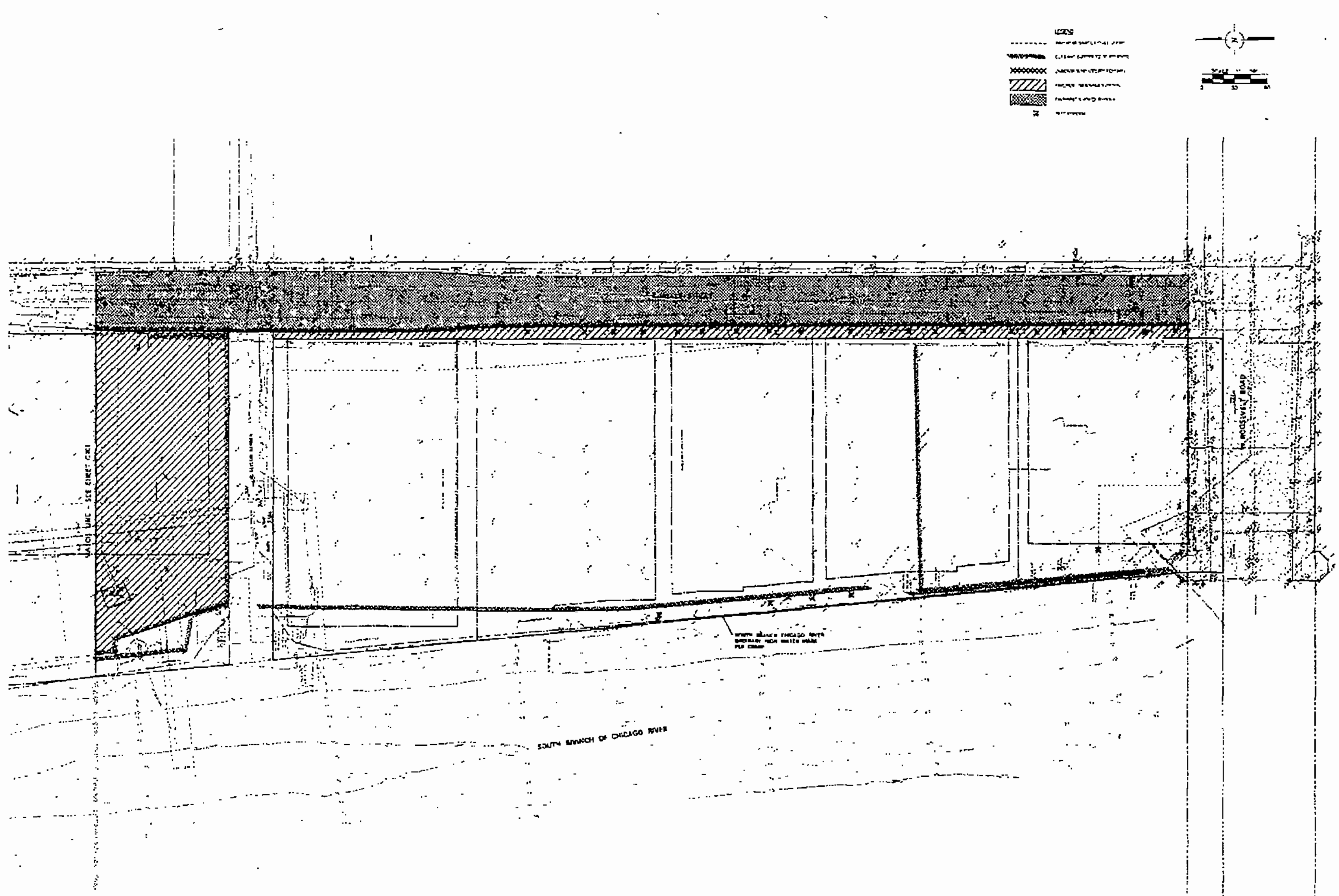
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58837 / WARRANT NO. 62558

CMK DEVELOPMENT
CORPORATION

LENDLEASE

REMOVAL PLAN 2

C401



PROJECT

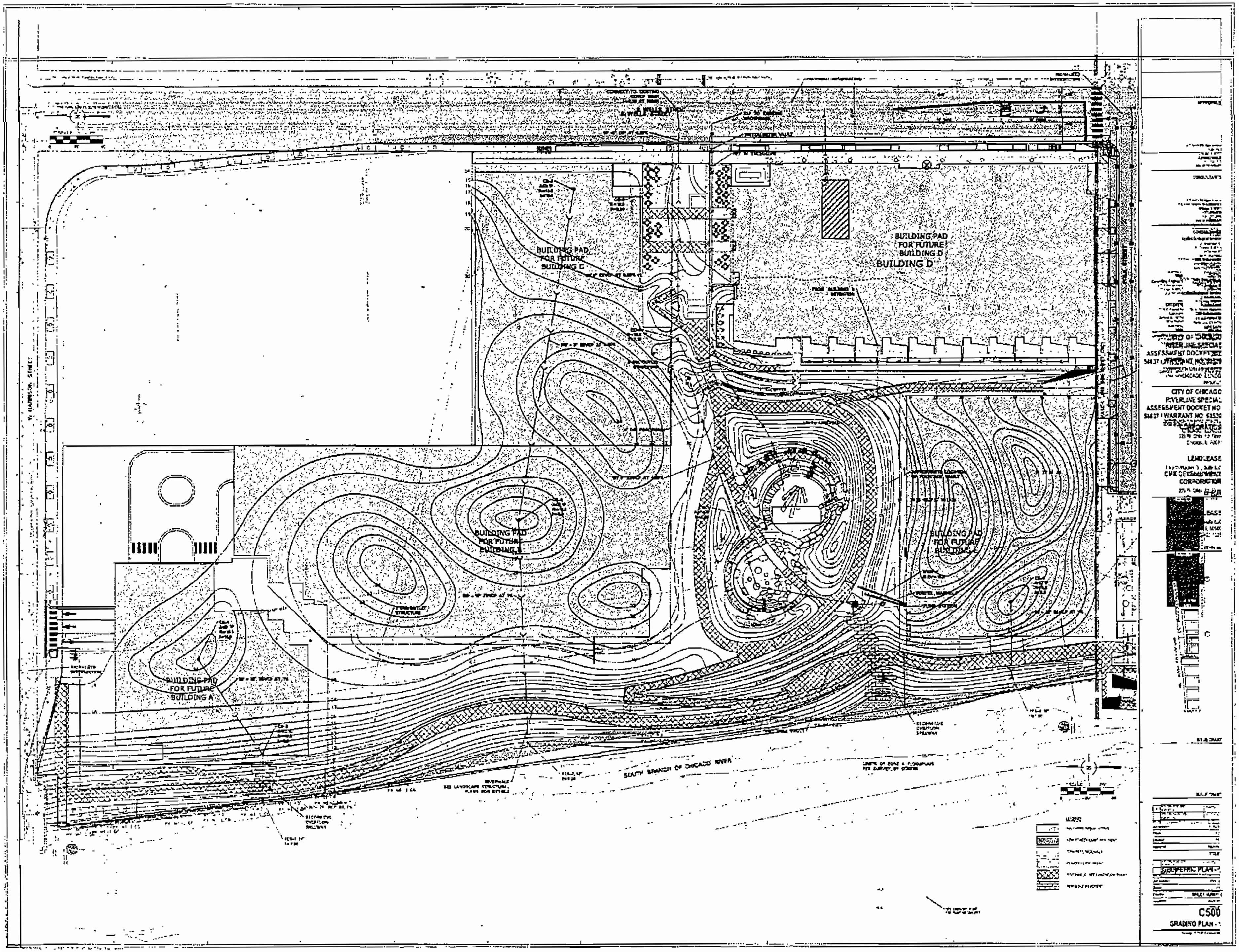
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58837 / WARRANT NO. 67536
SOUTH WELLS STREET
CHICAGO ILLINOIS

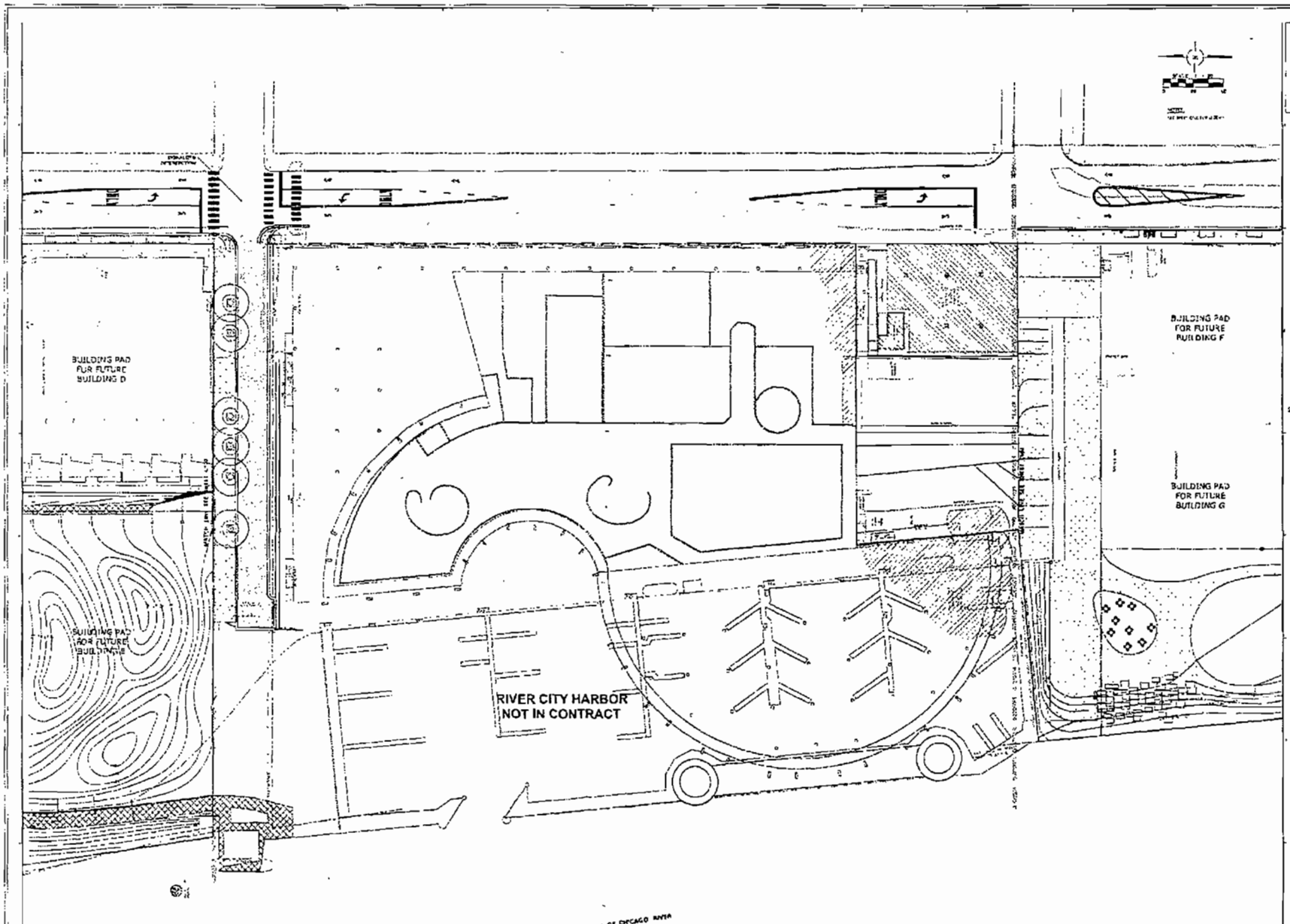
CMK DEVELOPMENT
CORPORATION

LENDLEASE

REMOVAL PLAN-3

C402


BUILDING PAD
FOR FUTURE
BUILDING D
BUILDING D
BUILDING PAD
FOR FUTURE
BUILDING C
BUILDING PAD
FOR FUTURE
BUILDING B
BUILDING PAD
FOR FUTURE
BUILDING E
BUILDING PAD
FOR FUTURE
BUILDING A
SOUTH BRANCH OF CHICAGO RIVER
W. HARRISON STREET
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO
LEND LEASE
CORPORATION
C500
GRADING PLAN - 1



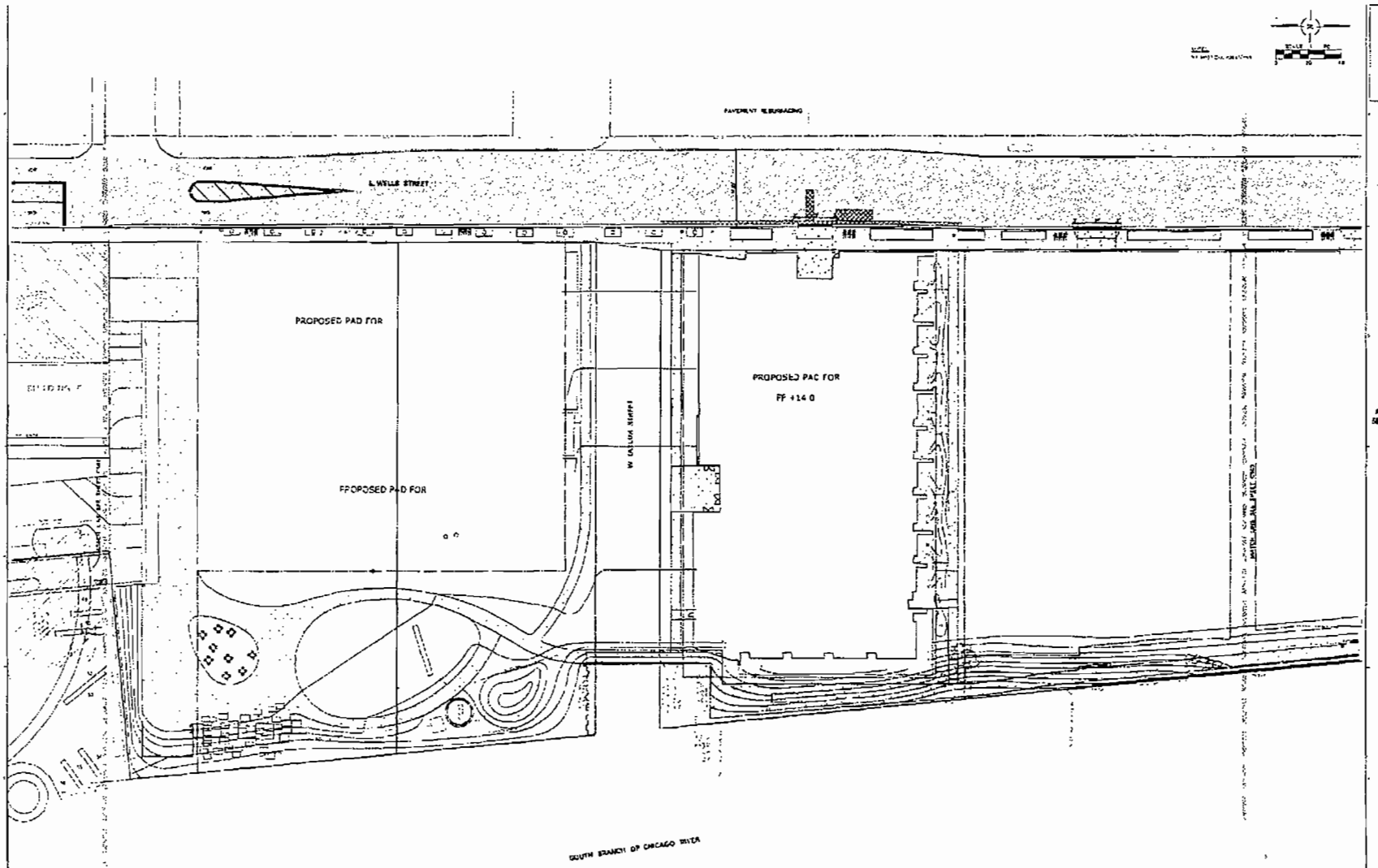
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO
SHEET / WARRANT NO. 67630

CMK DEVELOPMENT
CORPORATION

LENDLEASE

GEOMETRIC PLAN - 2

C501



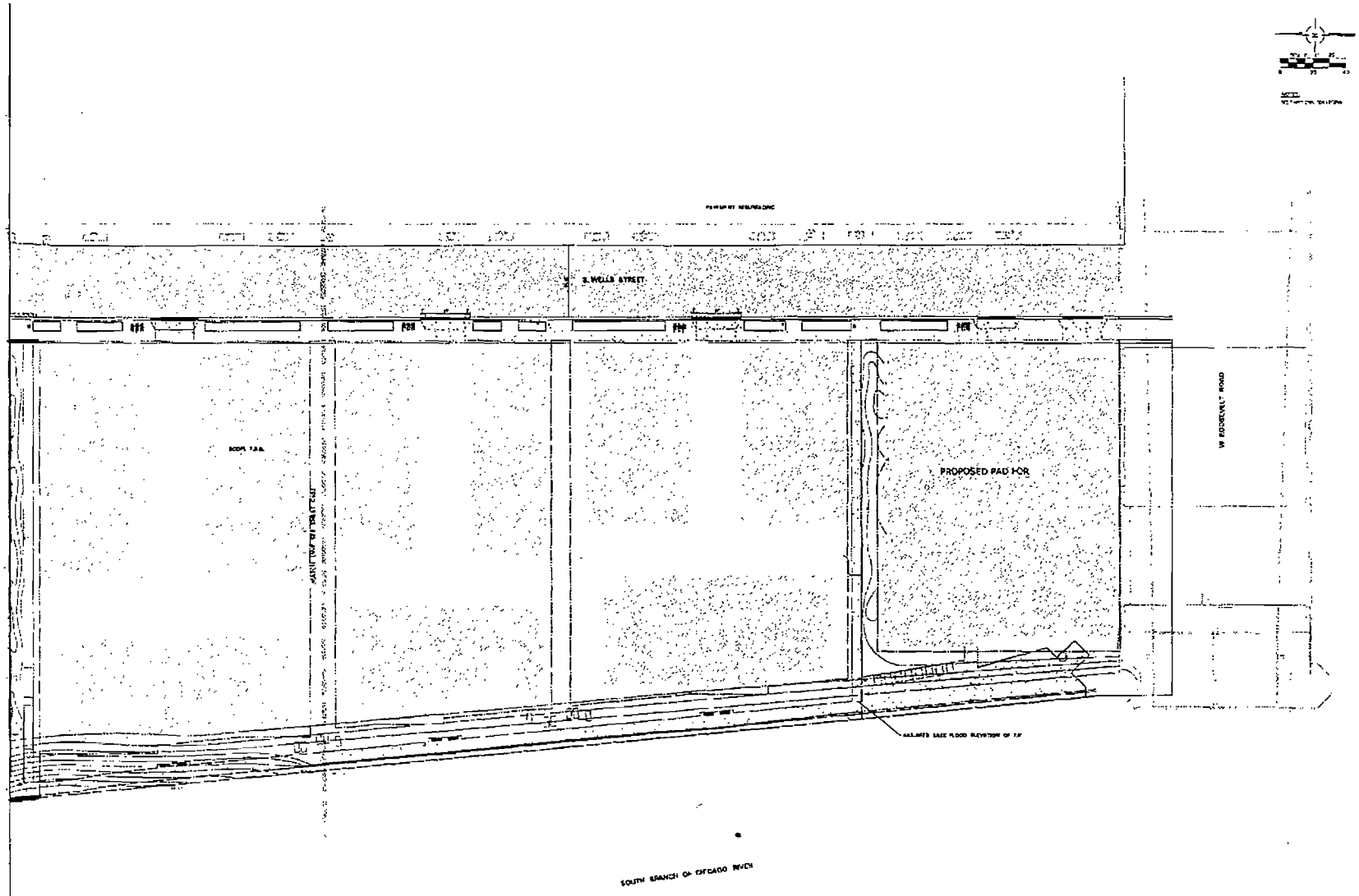
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58837 / WARRANT NO. 93636

CMK DEVELOPMENT
CORPORATION

LENDLEASE

GEOMETRIC PLAN - 3

C502



CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO
98837 / WARRANT NO. 62536

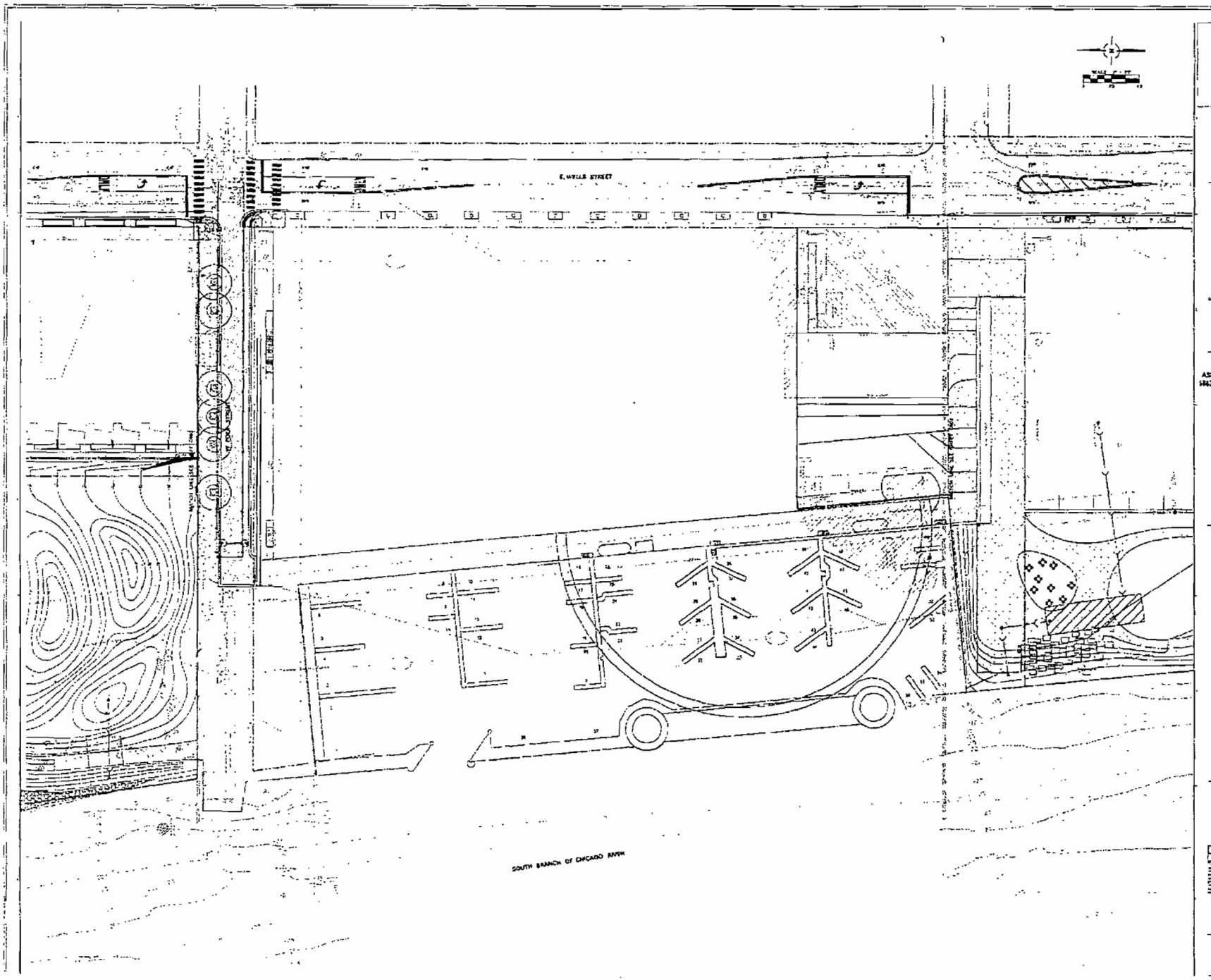
CMK DEVELOPMENT
CORPORATION

LENDLEASE

GEOMETRIC PLAN - 6

C503

W. MADISON STREET
SOUTH BRANCH OF CHICAGO RIVER
BUILDING D



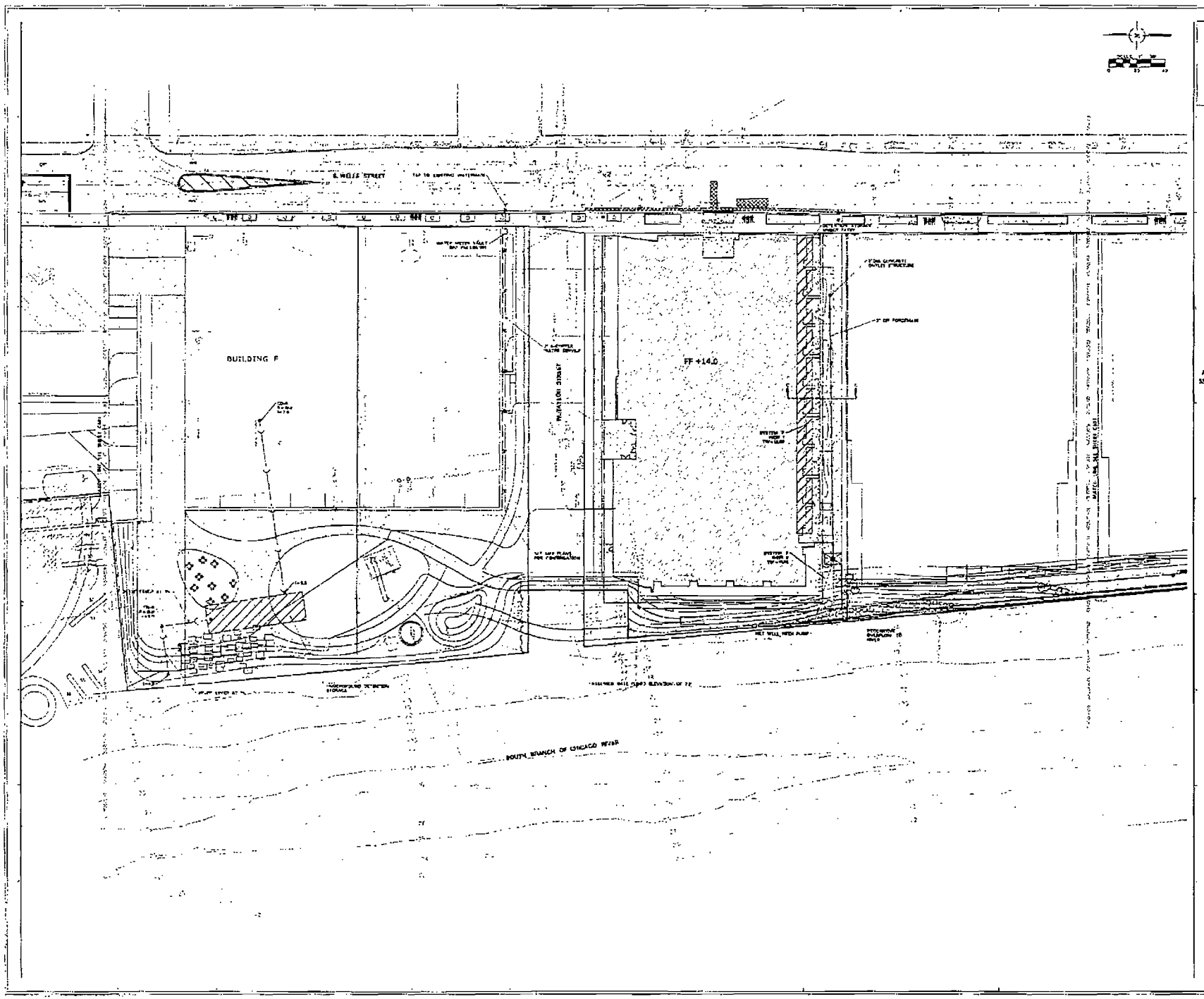
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58437 / WARRANT NO. 82533

CDC DEVELOPMENT
CORPORATION

LENDLEASE

GRADING PLAN - 2

C601



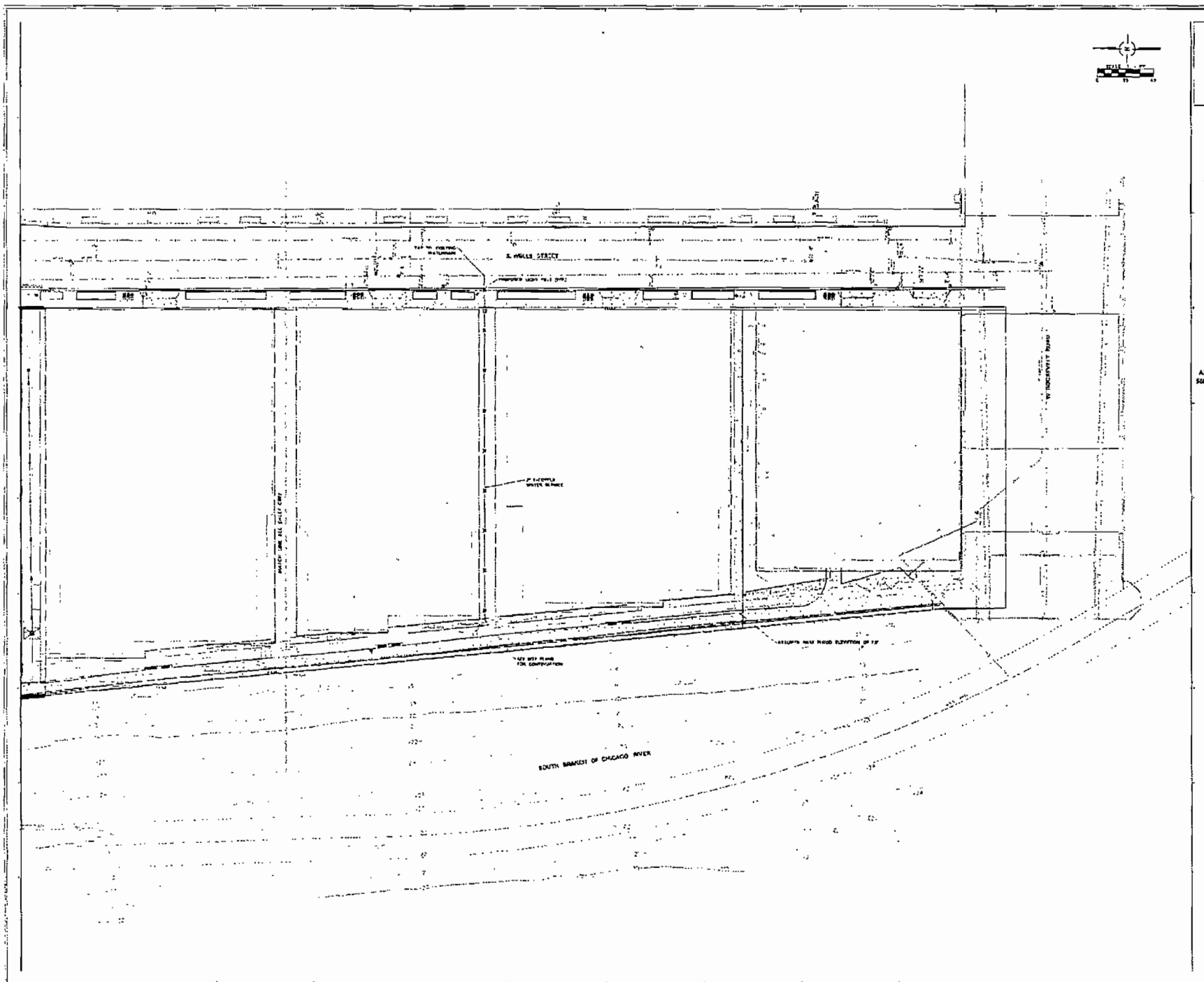
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
55837 / WARRANT NO. 62533
[illegible] SOUTH WELLS STREET
CHICAGO, ILLINOIS

CMK DEVELOPMENT
CORPORATION
[illegible]

LENDLEASE
[illegible]

GRADING PLAN 3

C602



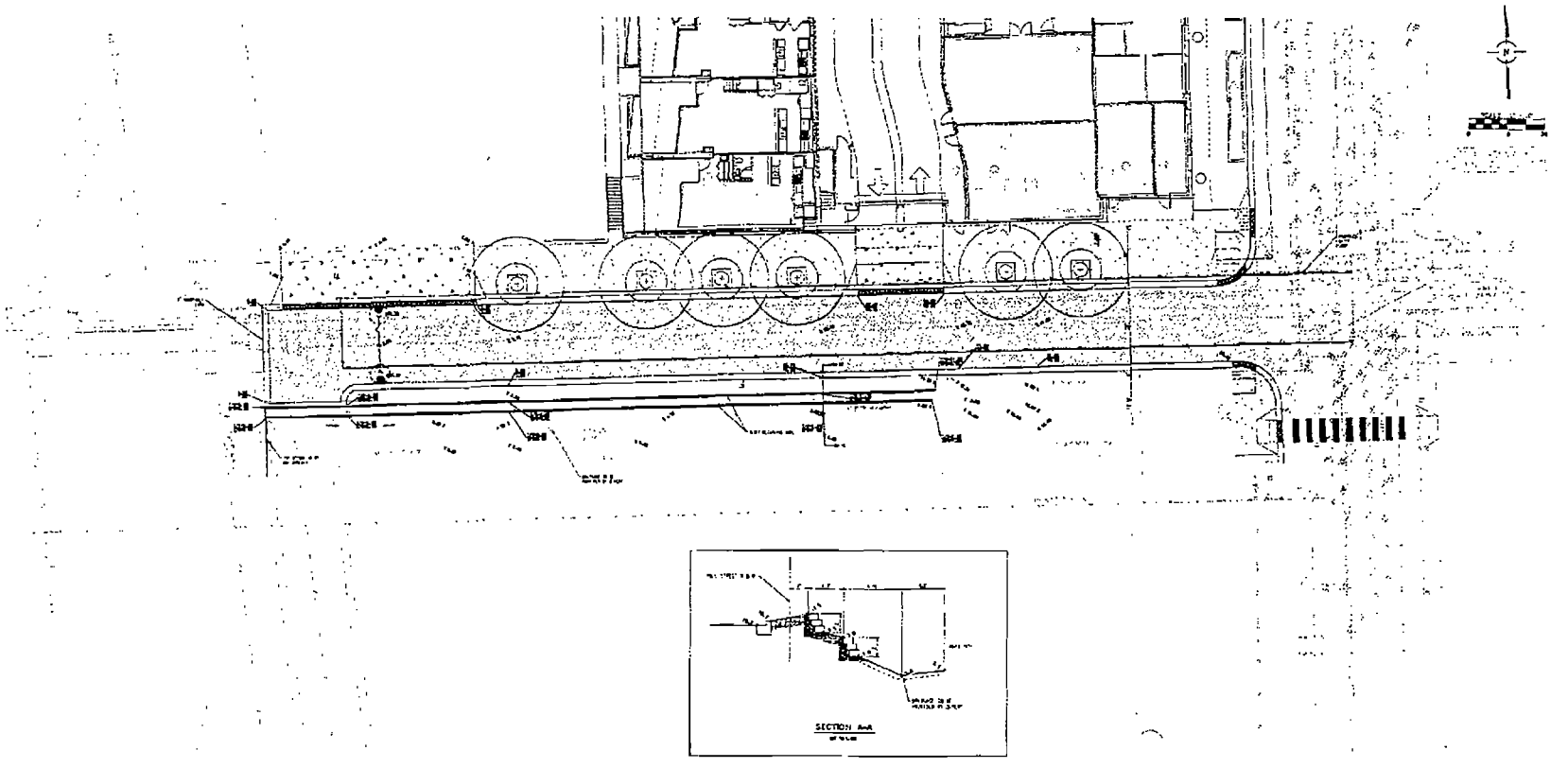
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO
WARRANT NO. 62530

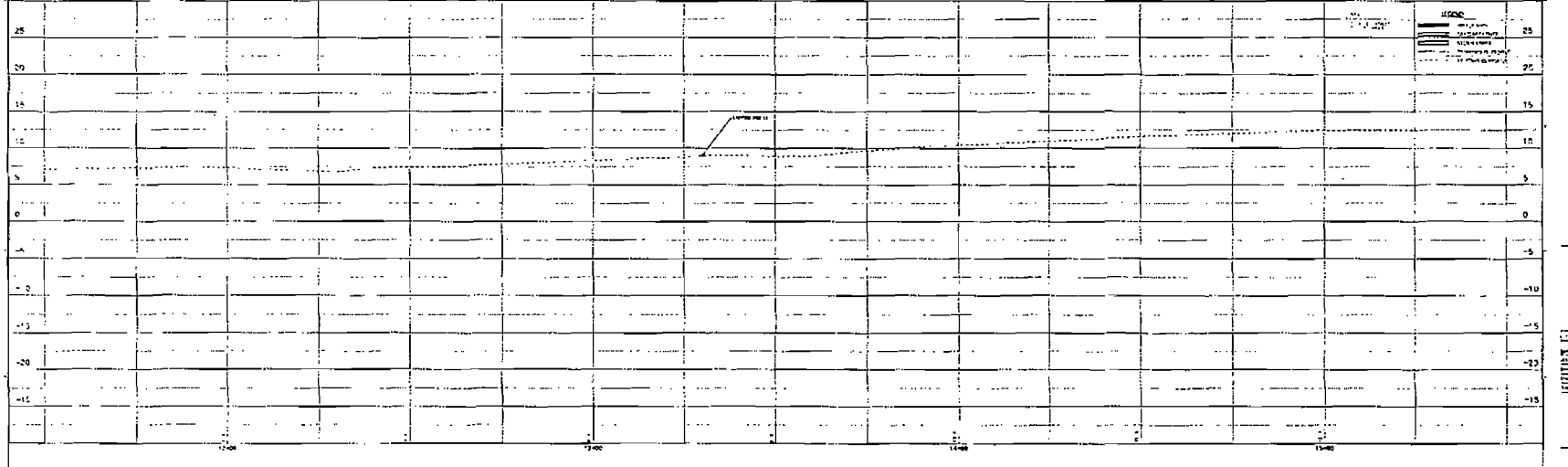
DPK DEVELOPMENT
CORPORATION

LENDLEASE

GRADING PLAN - 4

C603





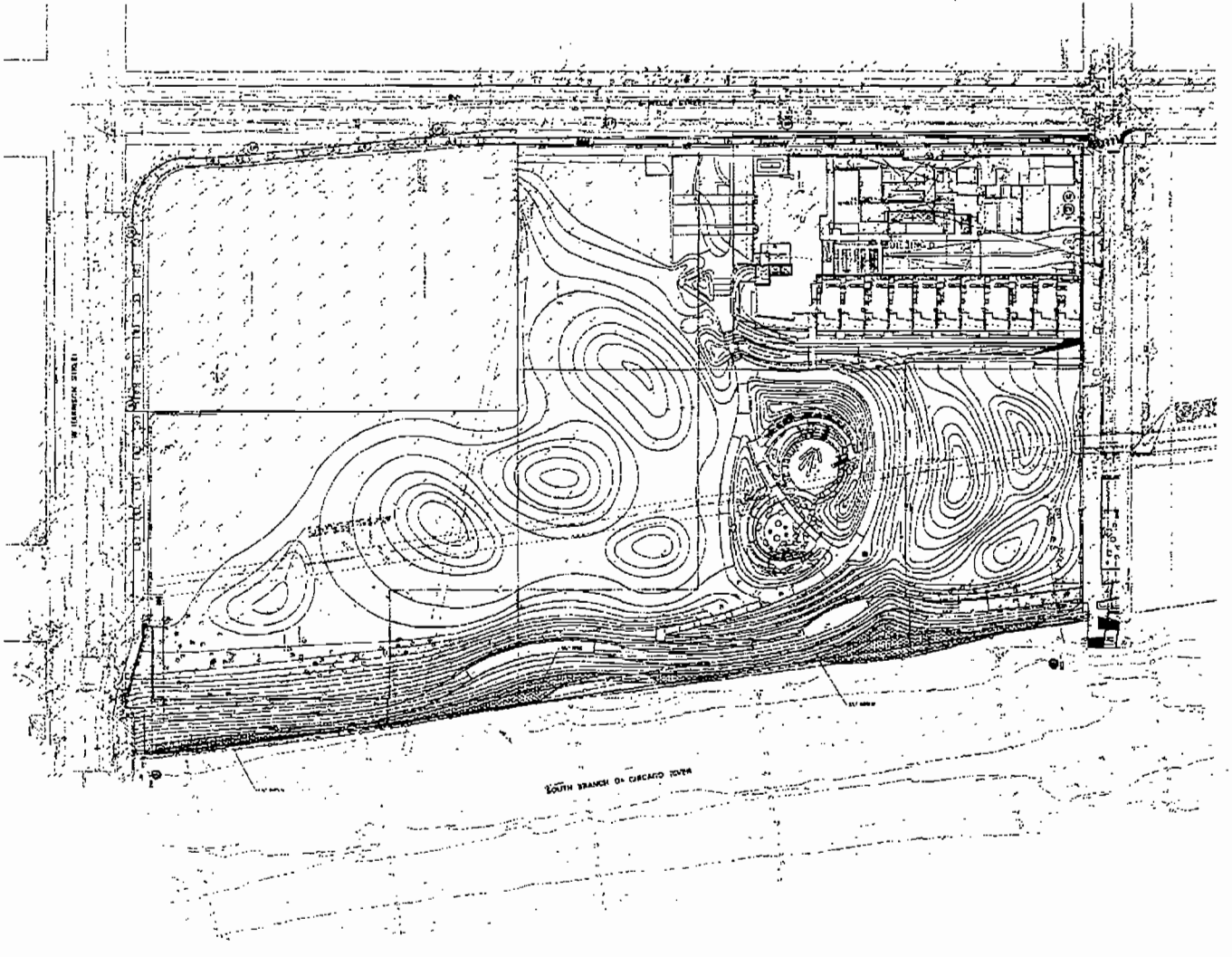
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKS 1 NO
SERIES 1 WARRANT NO. 62530

CMK DEVELOPMENT
CORPORATION

LENDLEASE

POLK STREET
PLAN AND PROFILE

C700



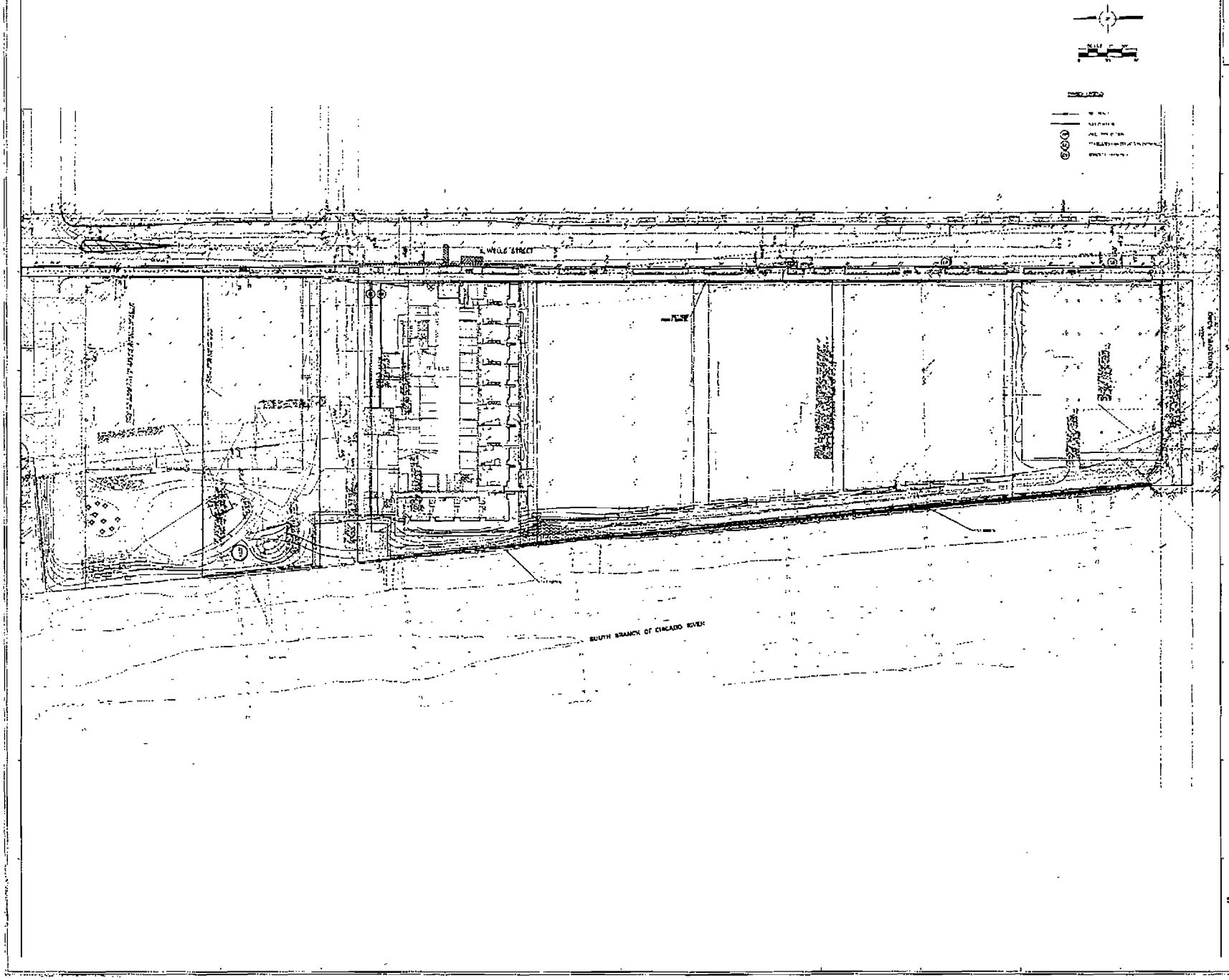
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
SHEET / WARRANT NO. 63518

CMK DEVELOPMENT
CORPORATION

LENDLEASE

SOIL EROSION AND
SEDIMENT CONTROL PLAN

C800



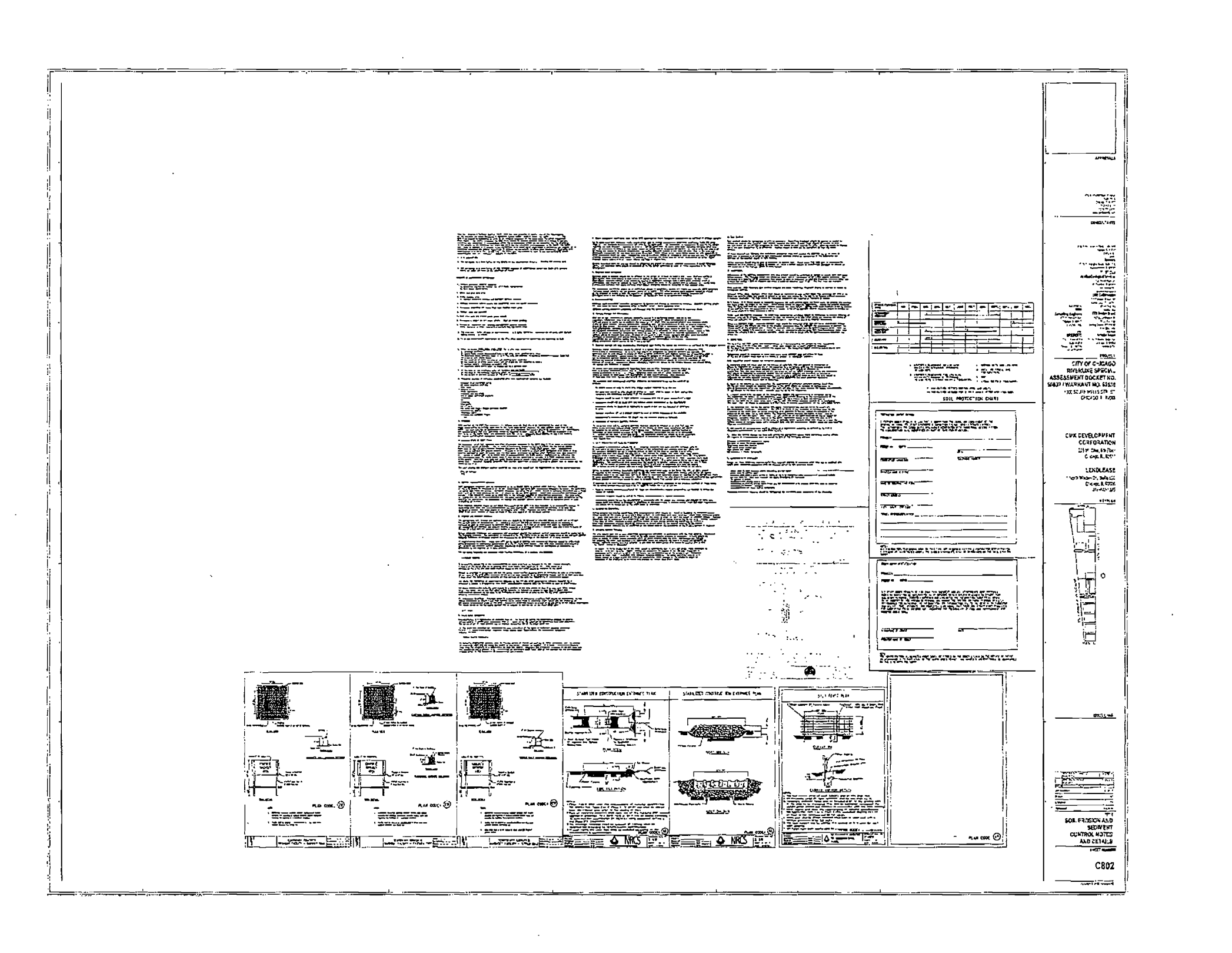
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58837 / WARRANT NO. 6850C

OAK DEVELOPMENT
CORPORATION

LEADLEASE

SOIL EROSION AND
SEDIMENT CONTROL PLAN

C801



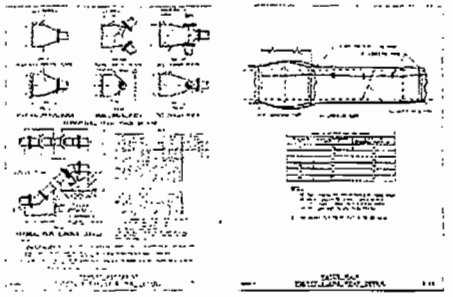
CITY OF CHICAGO
RIVERSIDE SPECIAL
ASSESSMENT DOCKET NO.
98837 / WARRANT NO. 63838

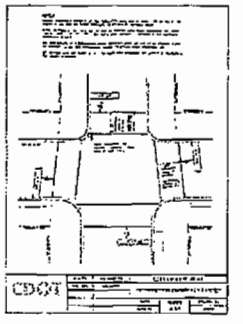
CMK DEVELOPMENT
CORPORATION

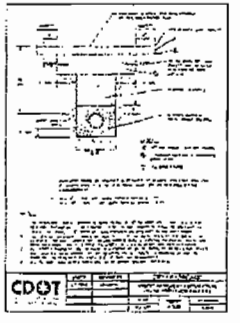
LENDLEASE

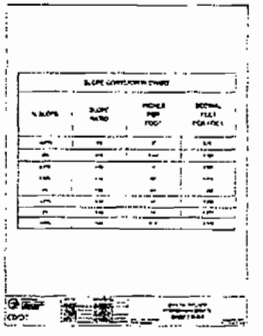
SOIL EROSION AND
SEDIMENT
CONTROL NOTES
AND DETAILS

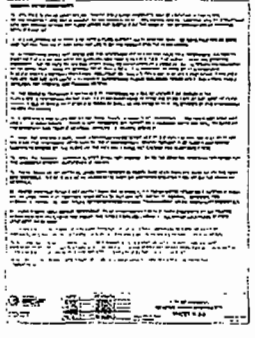
C802

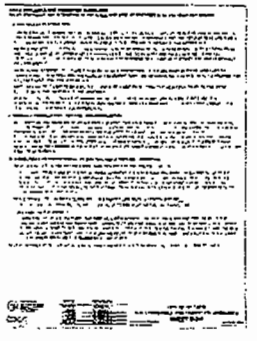


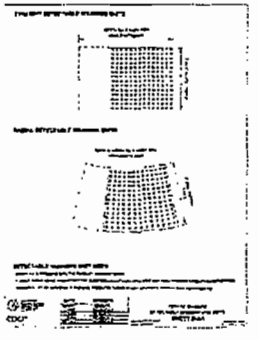


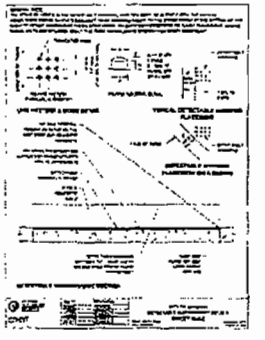


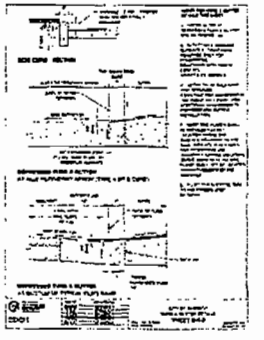


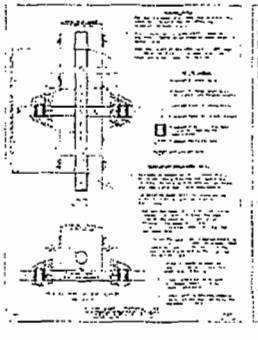


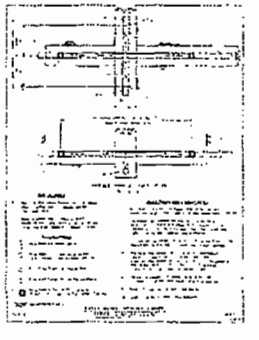


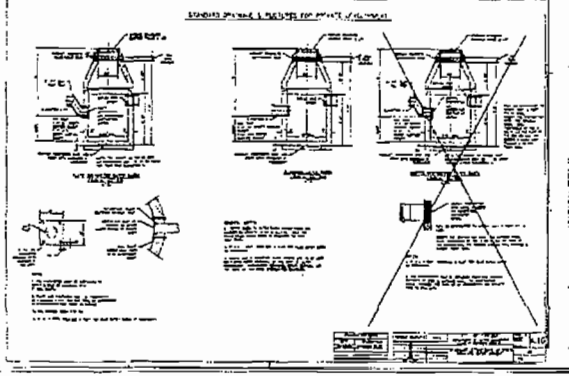








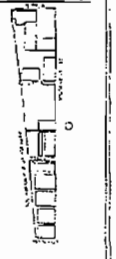




CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58437 / WARRANT VOL. 62530

CMX DEVELOPMENT
CORPORATION

LENDLEASE



DETAILS - 1

C900

LANDSCAPE DRAWINGS FOR RIVERLINE

ISSUE FOR SPECIAL ASSESSMENT DISTRICT

Landscape Sheet Index

Sheet Number	Sheet Title	Issuances					
GENERAL							
L-0.01	SHEET INDEX	•			•	•	
L-0.02	GENERAL NOTES	•	•	•	•	•	•
L-0.03	OVERALL SITE PLAN	•	•	•	•	•	•
EXISTING CONDITIONS							
L-1.01	TREE REMOVAL PLAN - NORTH			•	•	•	•
L-1.02	TREE REMOVAL PLAN - MIDDLE			•	•	•	•
L-1.03	TREE REMOVAL PLAN - SOUTH			•	•	•	•
GRADING							
L-2.01	GRADING PLAN - NORTH	•	•	•	•	•	•
L-2.02	GRADING PLAN - MIDDLE	•		•	•	•	•
L-2.03	GRADING PLAN - SOUTH	•		•	•	•	•
L-2.11	DRAINAGE PLAN - NORTH			•	•	•	•
L-2.12	DRAINAGE PLAN - MIDDLE			•	•	•	•
L-2.13	DRAINAGE PLAN - SOUTH			•	•	•	•
HARDSCAPE							
L-3.01	HARDSCAPE PLAN - NORTH	•	•	•	•	•	•
L-3.02	HARDSCAPE PLAN - MIDDLE	•		•	•	•	•
L-3.03	HARDSCAPE PLAN - SOUTH	•		•	•	•	•
L-3.10	HARDSCAPE PLAN ENLARGEMENT - PLAZA				•	•	•
L-3.11	HARDSCAPE PLAN ENLARGEMENT - PLAYGROUND				•	•	•
L-3.12	HARDSCAPE PLAN ENLARGEMENT - POLK STREET					•	•
L-3.19	HARDSCAPE SCHEDULE	•		•	•	•	•
L-3.21	LAYOUT PLAN - NORTH					•	•
L-3.22	LAYOUT PLAN - MIDDLE					•	•
L-3.23	LAYOUT PLAN - SOUTH					•	•
SOILS							
L-4.01	SOILS PLAN - NORTH			•	•	•	•
L-4.02	SOILS PLAN - MIDDLE			•	•	•	•
L-4.03	SOILS PLAN - SOUTH			•	•	•	•
PLANTING							
L-5.00	OVERALL SITE PLAN			•	•	•	•
L-5.01	PLANTING PLAN - NORTH	•	•	•	•	•	•
L-5.01.1	PLANTING PLAN - PLAYGROUND						•
L-5.02	PLANTING PLAN - MIDDLE	•		•	•	•	•
L-5.03	PLANTING PLAN - SOUTH	•		•	•	•	•
L-5.04	PLANTING SCHEDULE	•		•	•	•	•

Sheet Number	Sheet Title	Issuances					
SITE DETAILS							
L-7.00	SITE DETAILS - BOARDWALK & BRIDGES	•	•	•	•	•	•
L-7.01	SITE DETAILS - BOARDWALK & BRIDGES	•	•	•	•	•	•
L-7.02	SITE DETAILS - BOARDWALK & BRIDGES				•	•	•
L-7.10	SITE DETAILS - WALLS			•	•	•	•
L-7.11	SITE DETAILS - WALLS				•	•	•
L-7.11.1	SITE DETAILS - WALLS					•	•
L-7.14	SITE DETAILS - WALLS					•	•
L-7.15	SITE DETAILS - WALLS					•	•
L-7.20	SITE DETAILS - STEPS				•	•	•
L-7.21	SITE DETAILS - STEPS				•	•	•
L-7.30	SITE DETAILS - BENCHES			•	•	•	•
L-7.31	SITE DETAILS - BENCHES				•	•	•
L-7.32	SITE DETAILS - BENCHES					•	•
L-7.40	SITE DETAILS - PAVEMENT	•	•	•	•	•	•
L-7.41	SITE DETAILS - PAVEMENT			•	•	•	•
L-7.42	SITE DETAILS - PAVING ENLARGEMENT					•	•
L-7.45	SITE DETAILS - PAVING ENLARGEMENT				•	•	•
L-7.50	SITE DETAILS - RAILINGS	•	•	•	•	•	•
L-7.51	SITE DETAILS - RAILINGS				•	•	•
L-7.70	SITE DETAILS - WETLAND SYSTEMS					•	•
L-7.80	SITE DETAILS - WATERSCAPE				•	•	•
L-7.81	SITE DETAILS - WATERSCAPE PLAYGROUND	•	•	•	•	•	•
L-7.82	SITE DETAILS - WATERSCAPE STREAM				•	•	•
L-7.90	SITE DETAILS - FURNISHINGS				•	•	•
L-7.91	SITE DETAILS - FURNISHINGS PLAYGROUND	•	•	•	•	•	•
L-7.92	SITE DETAILS - FURNISHINGS BENCHES				•	•	•
PLANTING DETAILS							
L-8.00	SITE DETAILS - PLANTING				•	•	•
L-8.01	SITE DETAILS - DRAINAGE			•		•	•
L-8.10	SITE DETAILS - SOIL	•	•	•	•	•	•
L-8.11	SITE DETAILS - RIVER EDGE			•	•	•	•
SITE FURNISHINGS							
L-9.01	SITE FURNISHINGS - NORTH	•		•	•	•	•
L-9.02	SITE FURNISHINGS - MIDDLE	•		•	•	•	•
L-9.03	SITE FURNISHINGS - SOUTH			•	•	•	•
L-9.10	SITE FURNISHING PLAN - PLAZA				•	•	•
L-9.11	SITE FURNISHING PLAN - PLAYGROUND				•	•	•
L-9.12	SITE FURNISHINGS PLAN - POLK STREET					•	•
L-9.19	SITE FURNISHING SCHEDULE				•	•	•
L-9.40	WAYFINDING - NORTH					•	•
L-9.41	WAYFINDING - MIDDLE					•	•
L-9.42	WAYFINDING - SOUTH					•	•
IRRIGATION							
I-1.01	IRRIGATION PLAN - NORTH	•		•	•	•	•
I-1.02	IRRIGATION PLAN - MIDDLE	•		•	•	•	•
I-1.03	IRRIGATION PLAN - SOUTH	•		•	•	•	•
I-1.04	IRRIGATION DETAILS				•	•	•
WATER FEATURES							
WE1.1	WATER FEATURES					•	•
WP1.1	WATER FEATURES					•	•
WP2.1	WATER FEATURES					•	•
WP3.1	WATER FEATURES					•	•
WP4.1	WATER FEATURES					•	•
WP4.2	WATER FEATURES					•	•
WP4.3	WATER FEATURES					•	•
WP4.4	WATER FEATURES					•	•
LIGHTING							
LD0-01	LIGHTING FIXTURE					•	•
LD1-01	LIGHTING					•	•
LD1-02	LIGHTING					•	•
LD1-03	LIGHTING					•	•
LD1-04	LIGHTING					•	•

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DOCKET NO.

CMK DEVELOPMENT CORPORATION

LENDLEASE

SITE

SHEET INDEX

L-0.01

DEFINITIONS

1. CONTRACTOR: RESPONSIBLE FOR THE DAY-TO-DAY OVERSIGHT OF THE CONSTRUCTION SITE, MANAGEMENT OF VENDORS AND TRADES, AND COMMUNICATION OF INFORMATION TO ALL INVOLVED PARTIES THROUGHOUT THE COURSE OF THE PROJECT UNTIL COMPLETION.

2. SUBCONTRACTOR: PERFORMS SPECIFIC TASKS AS PART OF THE OVERALL PROJECT.

3. LANDSCAPE ARCHITECT: INVOLVED IN THE PLANNING, DESIGN AND [illegible] DIRECTION OF A LANDSCAPE, GARDEN, OR DISTINCT SPACE.

4. VENDOR: PROVIDES GOODS OR SERVICES TO A COMPANY OR INDIVIDUAL. A VENDOR OFTEN [illegible] ITEMS AND SELLS THOSE ITEMS TO [illegible].

GENERAL NOTES

1. SURVEY INFORMATION OBTAINED FROM [illegible] DATED MARCH 22, 2018.

2. CONTRACTOR TO VERIFY SITE CONDITIONS AND INFORMATION ON DRAWINGS. PROMPTLY REPORT ANY CONCEALED CONDITIONS, MISTAKES, DISCREPANCIES OR DEVIATIONS FROM THE INFORMATION SHOWN IN THE CONTRACT DOCUMENTS. THE OWNER IS NOT RESPONSIBLE FOR UNAUTHORIZED CHANGES OR EXTRA WORK REQUIRED TO CORRECT UNREPORTED DISCREPANCIES.

3. CONTRACTOR SHALL [illegible] AND PAY FOR PERMITS, FEES, AND INSPECTIONS NECESSARY FOR THE PROPER EXECUTION OF THIS WORK. COMPLY WITH [illegible] APPLICABLE TO THE WORK.

4. THE CONTRACTOR SHALL DETERMINE EXACT LOCATION OF ALL PUBLIC AND PRIVATE UTILITIES PRIOR TO START OF LANDSCAPE OPERATIONS. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO LOCATE AND MARK ALL [illegible] UTILITIES. FOR UTILITY LOCATIONS CALL DIGGER AT [illegible]. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR MAINTAINING ALL UTILITY LOCATIONS, AS MARKED, THROUGHOUT THE DURATION OF LANDSCAPE CONSTRUCTION.

5. THE CONTRACTOR SHALL VERIFY ALL SITE CONDITIONS IN THE FIELD. ANY DISCREPANCIES BETWEEN THE DRAWING AND EXISTING SITE CONDITIONS SHALL BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE LANDSCAPE ARCHITECT.

6. THE CONTRACTOR SHALL TAKE GREAT CARE NOT TO DAMAGE EXISTING PAVEMENT AND/OR STRUCTURES DURING EXCAVATION AND PLANTING OPERATIONS, AND SHALL REPAIR ANY SUCH DAMAGE AT NO ADDITIONAL COST TO [illegible].

7. THE CONTRACTOR SHALL REPORT SUBSURFACE SOIL OR DRAINAGE PROBLEMS TO THE LANDSCAPE ARCHITECT IMMEDIATELY.

8. THE CONTRACTOR SHALL TAKE GREAT CARE NOT TO DAMAGE TREES AND THEIR ROOT STRUCTURES DURING EXCAVATION AND PLANTING OPERATIONS.

9. THE CONTRACTOR SHALL REMOVE ALL RUBBLE, TRASH, [illegible] AND ANY OTHER MISCELLANEOUS ITEMS FROM THE SITE [illegible] MANNER AND IN COMPLIANCE WITH THE CONSTRUCTION WASTE MANAGEMENT PLAN [illegible] REQUIREMENTS.

10. THE CONTRACTOR SHALL REMOVE FROM THE SITE AND IN A LEGAL MANNER ANY AND ALL DEBRIS GENERATED DURING CONSTRUCTION.

11. THE CONTRACTOR SHALL PERFORM ALL MAINTENANCE ACTIVITIES WITHIN THE SCOPE AREA [illegible] COMPLETION OF THE CONSTRUCTION PROJECT AND UNTIL FINAL WALK-THROUGH WITH LANDSCAPE ARCHITECT AND A WRITTEN NOTE OF ACCEPTANCE.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING ALL AREAS DAMAGED BY THEIR CONSTRUCTION OPERATIONS WHETHER WITHIN THE CONSTRUCTION LIMITS OR NOT.

13. ALL CONTRACTORS, SUBCONTRACTORS AND THEIR EMPLOYEES SHALL BE FAMILIAR AND COMPLY WITH ALL LAWS, ORDINANCES, RULES AND REGULATIONS OF ALL THE GOVERNMENTAL AUTHORITIES HAVING JURISDICTION WITH REGARD TO THIS WORK.

14. THE CONTRACTOR AND HIS/HER SUBCONTRACTORS SHALL HOLD HARMLESS THE ARCHITECT, [illegible] AND THE OWNERS AGAINST LOSS, DAMAGES, LIABILITY OR ANY EXPENSE ARISING IN ANY MANNER FROM THE WRONGFUL AND NEGLIGENT ACTS OF THE CONTRACTOR, THE SUBCONTRACTORS OR THEIR RESPECTIVE EMPLOYEES AND AGENTS.

15. UPON COMPLETION OF CONSTRUCTION, AND ANY NECESSARY REPAIRS, THE CONTRACTOR OR OWNER WILL CONTACT THE LANDSCAPE ARCHITECT TO ARRANGE A FINAL WALK THROUGH. LANDSCAPE ARCHITECT TO PROVIDE A FORMAL LETTER OF ACCEPTANCE TO THE CLIENT PRIOR TO TURN OVER.

GRADING AND DRAINAGE NOTES

1. REFER TO CIVIL SEWER DRAWINGS FOR ALL UNDERGROUND UTILITY INFORMATION.

2. REFER TO CIVIL DRAWINGS FOR EROSION CONTROL NEEDED.

3. CONTRACTOR WILL BE REQUIRED TO INSTALL, MAINTAIN, INSPECT AND MONITOR ALL EROSION CONTROL MEASURES AND KEEP RECORDS OF ALL EROSION CONTROL ACTIVITIES FOR THE SITE.

PROVISIONS
THE CONTRACTOR SHALL PROVIDE ALL NECESSARY [illegible] DRAINAGE PROVISIONS TO PROPERLY DRAIN THE SITE DURING CONSTRUCTION UNTIL THE FINAL CIVIL AND LANDSCAPE DRAINAGE IS COMPLETED. THIS INCLUDES ADDITIONAL [illegible] FENCING AND ANY OTHER PROTECTION METHOD OR MATERIAL TO PROTECT EXISTING PROPERTY AND WORK UNDER CONSTRUCTION.

FINISH GRADING
1. PROVIDE ALL GRADES FOR NATURAL RUNOFF OF WATER WITHOUT LOW SPOTS OR POCKETS. [illegible] GRADES AT 2% MIN. UNLESS OTHERWISE NOTED ON THE DRAWINGS.

2. FINISH GRADES SHALL BE SMOOTH, EVEN, AND ON A UNIFORM PLANE WITH NO ABRUPT CHANGES OF SURFACE. SLOPE TO RUN UNIFORMLY BETWEEN GIVEN SPOT ELEVATIONS.

3. GRADES NOT OTHERWISE INDICATED SHALL BE UNIFORM AND LEVEL OR SLOPED BETWEEN POINTS WHERE ELEVATIONS ARE GIVEN AS NECESSARY BETWEEN POINTS ESTABLISHED BY WALKS, PAVING, CURBS, OR CATCH BASINS.

4. TOPS AND TOES OF ALL SLOPES SHALL BE ROUNDED TO PRODUCE A GRADUAL AND NATURAL APPEARING TRANSITION BETWEEN RELATIVELY LEVEL AREAS AND SLOPES.

TOLERANCES: ALL PLANTING AREAS INCLUDING LAWN AREAS SHALL BE TRUE TO GRADE WITHIN 1 INCH WHEN TESTED WITH A 10' STRAIGHTEDGE.

> ALL NOTES IN THIS SHEET ARE TO BE FOLLOWED UNLESS THEY ARE IN CONFLICT WITH LOCAL CODE, IN WHICH CASE, LOCAL CODE SHALL PREVAIL.

LAYOUT

1. PER LAYOUT PLAN OR TOTAL STATION STAKE ALL LAYOUT IN FIELD AND CONFIRM PRIOR TO INSTALLATION.

2. LANDSCAPE ARCHITECT TO APPROVE STAKED LAYOUT IN THE FIELD.

3. CONTRACTOR SHALL ADJUST LAYOUT AS REQUIRED AT NO ADDITIONAL COSTS.

4. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT COSTS.

5. CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING LAYOUT POINTS THROUGHOUT CONSTRUCTION. THE COST OF SUBSEQUENT LAYOUT [illegible] BE AT THE CONTRACTOR'S COST.

6. ALL LINES SHALL BE STRAIGHT AND TRUE IN ACCORDANCE WITH THE DRAWINGS. ALL ARCS [illegible] CONTINUOUS OR TANGENT. NO FLATTENED AREAS WILL BE ACCEPTED.

7. CURVES SHALL BE SMOOTH AND WITHOUT KINKS.

8. REFER TO CIVIL DRAWINGS FOR [illegible] ELEVATIONS.

9. LICENSED SURVEYOR TO PROVIDE FINAL PAVEMENT LAYOUT.

10. CONTRACTOR TO PROVIDE A PERMANENT BENCH MARK ON SITE THAT WILL REMAIN PROTECTED DURING CONSTRUCTION.

11. CONTRACTOR TO [illegible] LINES AND CONFIRM WITH LANDSCAPE ARCHITECT PRIOR TO WORK.

PLANT NOTES

1. THE CONTRACTOR SHALL OBTAIN A PERMIT TO REMOVE, SPRAY OR IN ANY WAY AFFECT THE GENERAL HEALTH AND/OR THE STRUCTURES OF TREES.

2. THE CONTRACTOR SHALL TAKE GREAT CARE NOT TO DAMAGE EXISTING [illegible] TREES AND PLANTS DURING EXCAVATION AND PLANTING OPERATIONS. THE CONTRACTOR SHALL SEEK LANDSCAPE ARCHITECT APPROVAL TO WORK WITHIN THE DRIPLINE OF ALL TREES.

3. THE CONTRACTOR SHALL TAKE GREAT CARE NOT TO DISTURB THE ROOT SYSTEMS OF EXISTING TREES. WHEN TRENCHING WITHIN THE DRIPLINE OF ANY TREE THE OPERATION SHOULD BE PERFORMED BY HAND WORKING IN A [illegible] MANNER FROM THE TRUNK OUTWARD. DAMAGED OR TORN ROOTS SHALL BE IMMEDIATELY REPAIRED WITH A SMOOTH, CLEAN CUT. THE CONTRACTOR SHALL TAKE GREAT CARE DURING [illegible] OPERATIONS WITHIN THE [illegible] TREE PROTECTION ZONES OF TREES TO REMAIN. WHEN MAJOR ROOTS ARE ENCOUNTERED, THE CONTRACTOR SHALL EXCAVATE SOIL BY HAND TO AVOID DAMAGE TO ROOTS.

4. PRUNING OPERATION SHALL FOLLOW APPLICABLE ANSI STANDARDS UNLESS OTHERWISE DIRECTED. UPON COMPLETION OF WORK UNDER THIS CONTRACT, PRUNE AND REPAIR INJURIES TO ALL PLANTS. LIMIT AMOUNT OF PRUNING TO MINIMUM NECESSARY TO REMOVE DEAD OR INJURED TWIGS AND BRANCHES AND TO COMPENSATE FOR THE LOSS OF ROOTS AS A RESULT OF TRANSPLANTING OPERATIONS. PRUNE IN SUCH A MANNER AS NOT TO CHANGE NATURAL HABIT OR SHAPE OF PLANT UNLESS OTHERWISE DIRECTED BY THE LANDSCAPE ARCHITECT. ALL HEDGES SHALL BE PRUNED UNDER THE DIRECTION OF LANDSCAPE ARCHITECT.

5. THE CONTRACTOR SHALL WARRANTY PLANT MATERIAL AS INDICATED IN THE SPECIFICATIONS. REMOVE AND REPLACE TREES, SHRUBS, OR OTHER PLANTS FOUND TO BE DEAD OR IN UNHEALTHY CONDITION DURING GUARANTEE PERIOD AS ASSESSED AND APPROVED BY LANDSCAPE ARCHITECT. MAKE REPLACEMENTS DURING APPROPRIATE PLANTING SEASON AS IT RELATES TO LOCAL CLIMATE. REPLACEMENTS SHALL COMPLY WITH REQUIREMENTS SHOWN AND SPECIFIED. SEE SPECIFICATIONS FOR ANY MAINTENANCE REQUIREMENTS. CHARACTER AND FORM OF ANY REPLACEMENTS TO BE SIMILAR TO ORIGINAL AND/OR APPROVED BY LANDSCAPE ARCHITECT.

6. ALL PLANT MATERIAL AND LANDSCAPE IRRIGATION SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL CODES AND ORDINANCES. IRRIGATION ZONES SHALL BE PROVIDED BY IRRIGATION CONTRACTOR TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION OF IRRIGATION SYSTEM.

7. ALL NEWLY INSTALLED PLANT MATERIALS SHALL BEAR THE SAME RELATIONSHIP TO THE NEW GRADE AS THEY BORE TO PREVIOUS NURSERY GRADES UNLESS NOTED OTHERWISE IN DETAILS PROVIDED.

8. ALL PLANT MATERIAL SHALL BE SPECIMEN QUALITY, WELL MATCHED IN FORM, NURSERY GROWN, SOUND, HEALTHY, VIGOROUS AND FREE FROM INSECTS, DISEASE AND INJURIES WITH HABIT OF GROWTH THAT IS NORMAL FOR THE SPECIES. SIZES SHALL BE EQUAL TO OR EXCEEDING SIZES INDICATED ON THE PLANT LIST. THE CONTRACTOR SHALL SUPPLY PLANTS IN QUANTITIES AS SHOWN ON THE PLANT LIST. CONTRACTOR SHALL NOT PROCEED WITH THE INSTALLATION OF PLANT MATERIAL WITHOUT LANDSCAPE ARCHITECT APPROVAL UNLESS OTHERWISE DIRECTED BY THE LANDSCAPE ARCHITECT. ALL B&B TREES SHALL BE OBTAINED FROM AN APPROVED NURSERY WITH SIMILAR [illegible] CONDITIONS TO THE CONTRACT AREA.

9. THE CONTRACTOR MUST PROVIDE OWNER REPRESENTATIVE AND LANDSCAPE ARCHITECT WITH PLANT LIST SHOWING QUANTITY, SIZES AND SUPPLIER WITHIN [illegible] OF AWARD OF CONTRACT. ANY UNAVAILABLE PLANT MATERIAL SHOULD BE NOTED AT THAT TIME. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO ASSIST IN SOURCING MATERIALS WHEN NECESSARY. THE CONTRACTOR SHALL PROVIDE LANDSCAPE ARCHITECT WITH AVAILABLE SUBSTITUTION LIST AT THE REQUEST OF THE LANDSCAPE ARCHITECT.

10. CONTRACTOR TO PROVIDE PICTURES OF ALL PLANT MATERIAL [illegible] UPON RECEIPT OF PICTURES, [illegible] WILL DETERMINE WHICH PLANTS THEY WILL TAG IN PERSON.

11. THE CONTRACTOR MUST COORDINATE [illegible] AND/OR APPROVAL OF ALL PLANT MATERIAL WITH THE LANDSCAPE ARCHITECT. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO SELECT AND APPROVE OR DECLINE ALL PLANT MATERIAL. LANDSCAPE ARCHITECT MAY REJECT PLANT MATERIAL UPON ARRIVAL TO THE SITE IF IT DOES NOT MEET THE DESIRED INTENT OR HAS INCURRED DAMAGE FOLLOWING INITIAL TAGGING AND/OR APPROVAL.

12. THE CONTRACTOR SHALL STAKE OUT [illegible] PLANTS IN FIELD AS INDICATED ON THE DRAWINGS OR AS DIRECTED BY THE LANDSCAPE ARCHITECT FOR APPROVAL BY THE OWNER REPRESENTATIVE AND LANDSCAPE ARCHITECT PRIOR TO PLANTING. THE LANDSCAPE ARCHITECT REQUIRES A MINIMUM OF 3 BUSINESS DAYS NOTICE PRIOR TO FIELD LAYOUT AND/OR APPROVAL (NOT INCLUDING SATURDAYS OR SUNDAYS).

13. ALL PLANT MATERIAL LAYOUT LOCATIONS TO BE INSPECTED BY OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT PRIOR TO INSTALLATION. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO APPROVE LAYOUT ONLY UPON ARRIVAL OF PLANT MATERIAL TO SITE AND REVIEW OF ALL PLANT MATERIAL IN ITS PROPOSED LOCATION. FINAL INSTALLATION INSPECTION AND APPROVAL SHALL OCCUR DURING SUBSTANTIAL COMPLETION SITE VISIT.

14. ALL NEWLY INSTALLED PLANT MATERIALS SHALL BEAR THE SAME RELATIONSHIP TO THE NEW GRADE AS THEY BORE TO PREVIOUS NURSERY GRADES UNLESS NOTED OTHERWISE IN DETAILS PROVIDED.

15. SEE DETAILS AND SPECIFICATIONS PROVIDED FOR MULCH APPLICATION RATES.

PLANT MAINTENANCE

1. DURING THE PROJECT, THE CONTRACTOR SHALL MAINTAIN THE SITE, INCLUDING COMPLETED WORK AND EXISTING CONDITIONS, UNTIL THE PROJECT IS COMPLETE. THE CONTRACTOR SHALL MAKE PERIODIC SITE VISITS TO INSPECT THE SITE AT LEAST ONCE PER MONTH. A WRITTEN RECORD OF EACH VISIT SHALL BE SUBMITTED TO THE LANDSCAPE ARCHITECT.

2. MAINTENANCE SHALL CONSIST OF PRUNING, WATERING, CULTIVATING, WEEDING, MULCHING, REMOVAL OF DEAD MATERIAL, DEADHEADING ANNUALS AND PERENNIALS, REPAIRING AND REPLACING OF TREE STAKES, TIGHTENING AND REPAIRING OF GUYS, REPAIRING AND REPLACING OF DAMAGED [illegible] MATERIAL, RESETTING PLANTS TO PROPER GRADES AND UPRIGHT POSITION, AND FURNISHING AND APPLYING SUCH SPRAYS AS ARE NECESSARY TO KEEP PLANTINGS FREE OF INSECTS AND DISEASE, AND IN HEALTHY GROWING CONDITION. PLANTING AREAS SHALL BE KEPT FREE OF WEEDS, GRASS AND OTHER UNDESIRABLE VEGETATIVE GROWTH. MAINTENANCE SHOULD ALSO INCLUDE A FINAL MOW OF ALL LAWN AREAS AFTER PROJECT COMPLETION. CONTRACTOR SHALL MAKE PERIODIC SITE VISITS FOR THE DURATION OF THE GUARANTEE PERIOD.

3. THE CONTRACTOR SHALL PROVIDE A PRICE FOR THE ABOVE MAINTENANCE FOR 12 MONTHS, TO BEGIN UPON SUBSTANTIAL COMPLETION AND ACCEPTANCE OF PUNCH LIST, FOR ALL OF CONTRACTOR'S WORK.

EXCAVATION NOTES

1. LOOSE MATERIAL AT BOTTOM OF EXCAVATION SHALL BE REMOVED BY HAND OR TAMPED DOWN TO PROVIDE THE MINIMUM SPECIFIED SOIL BEARING CAPACITY.

2. BACKFILL EITHER SIDE OF WALLS IN 6" LIFTS.

3. REMOVE ALL UNSUITABLE SOILS ENCOUNTERED AT THE FOOTING CONSTRUCTION AND REPLACE WITH PROPERLY COMPACTED CLEAN FILL.

4. ALL FOOTINGS SHALL BEAR ON SOIL HAVING A MINIMUM BEARING CAPACITY OF 2,000 POUNDS PER SQUARE FOOT.

GENERAL CARPENTRY

1. ALL CARPENTRY SHALL BE [illegible] AND SANDED. FINAL FINISH AND COLOR [illegible] BY OWNER/LANDSCAPE ARCHITECT. PRICE SHOULD INCLUDE ALL NECESSARY HARDWARE FOR PROPER INSTALLATION [illegible] SUPPORT POSTS, CROSS [illegible] AND LATCHING. CONTRACTOR TO COORDINATE WITH MASON TO PROVIDE NECESSARY CASINGS OR STRUCTURAL NEEDS INTO [illegible] FOR PROPER WEIGHT DISTRIBUTION AND SWING OF THE GATE. ALL HARDWARE WILL BE DIRECTED BY LANDSCAPE ARCHITECT OR APPROVED CONTRACTOR SAMPLE BY LANDSCAPE ARCHITECT PRIOR TO ORDERING. CARPENTER SHALL VERIFY ALL DIMENSIONS IN FIELD AND PROVIDE SHOP DRAWINGS TO LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL. DO NOT ORDER MATERIAL OR INSTALL PRIOR TO SHOP DRAWING APPROVAL.

2. INSTALL ALL HORIZONTAL MEMBERS WITH GOOD FACE OUTWARD.

3. DECKING MATERIAL SHALL BE AS FOLLOWS:
A. COMPRESSED MIXED HARDWOODS WITH THE FOLLOWING MINIMUM PROPERTIES:
[illegible]
PERPENDICULAR [illegible]
B. ALL LUMBER SHALL BE SEASONED [illegible] MAXIMUM MOISTURE CONTENT.
C. ALL WOOD IN CONTACT WITH SOIL SHALL BE PRESSURE TREATED.

4. ALL EXPOSED FASTENERS, NAILS, BOLTS, STAPLES, AND STEEL CONNECTORS OR PLATES SHALL BE STAINLESS STEEL.

5. PREDRILL PILOT HOLES FOR ALL WOOD FASTENERS.

LEGEND

FF	FINISH FLOOR
FG	FINISH GRADE
TW	TOP OF WALL
BW	BOTTOM OF WALL
TB	TOP OF BOARDWALK
HP	HIGH POINT
[illegible]	SPOT ELEVATION
[illegible]	CAFE TABLE AND CHAIRS
[illegible]	LOG BENCHES
[illegible]	BOULDERS
→	BUILDING ENTRANCE - VEHICULAR
▶	BUILDING ENTRANCE - PEDESTRIAN
NIC	NOT IN CONTRACT

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DOCKET NO. [illegible] WARRANT NO. [illegible]

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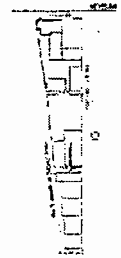
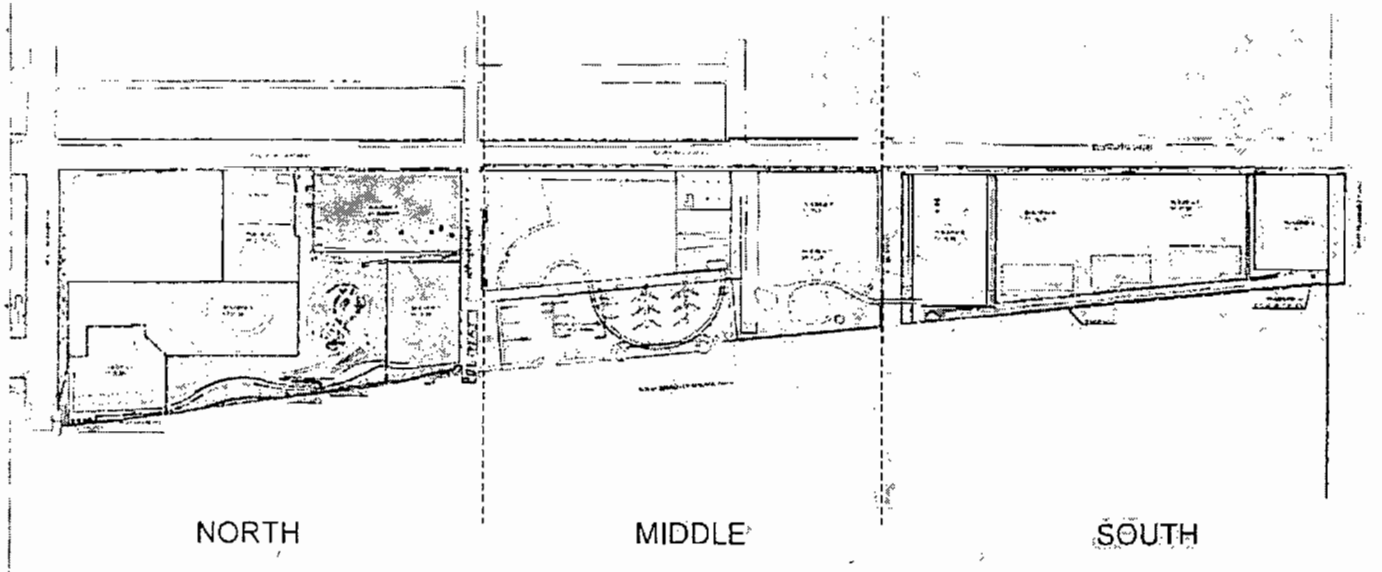
LENDLEASE



SITE

GENERAL NOTES

L-0.02



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ASSESSMENT DOCKET NO.

CNTA

CNTA DEVELOPMENT
CORPORATION

LEXINGTON

SITE

OVERALL SITE PLAN

L-0.03

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RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
... / WARRANT NO.

CMK DEVELOPMENT
CORPORATION

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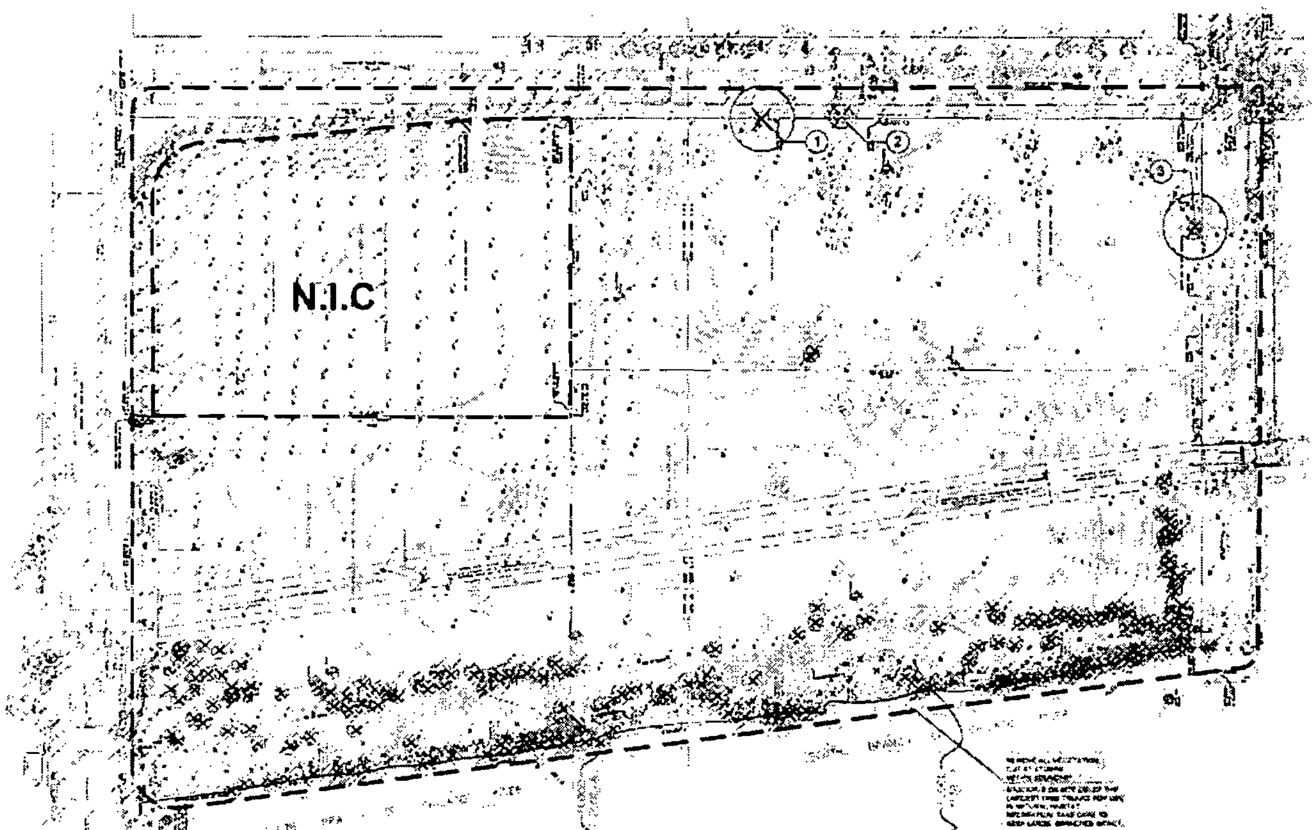

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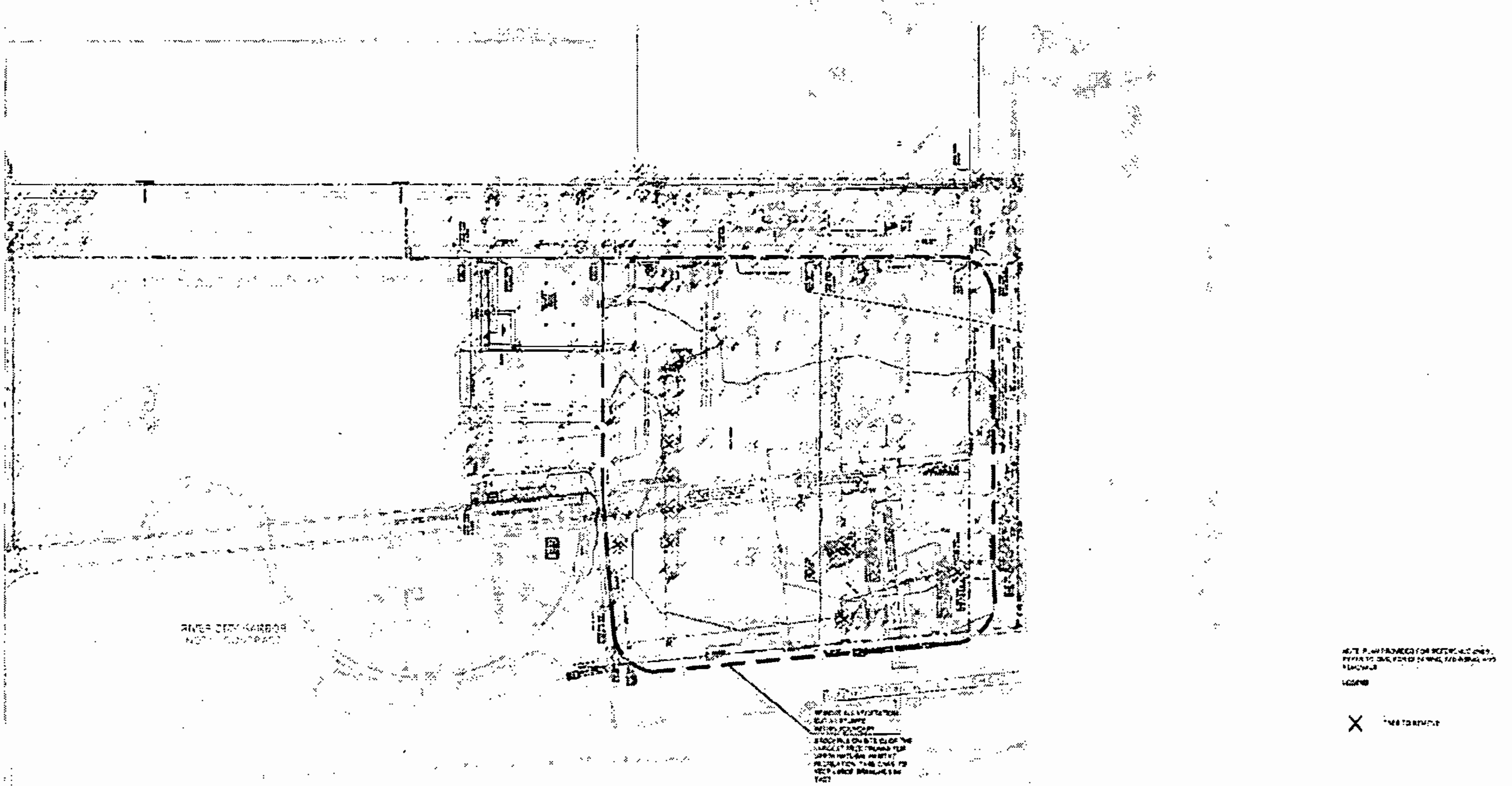
SITE

TREE REMOVAL PLAN - NORTH

L-1.01



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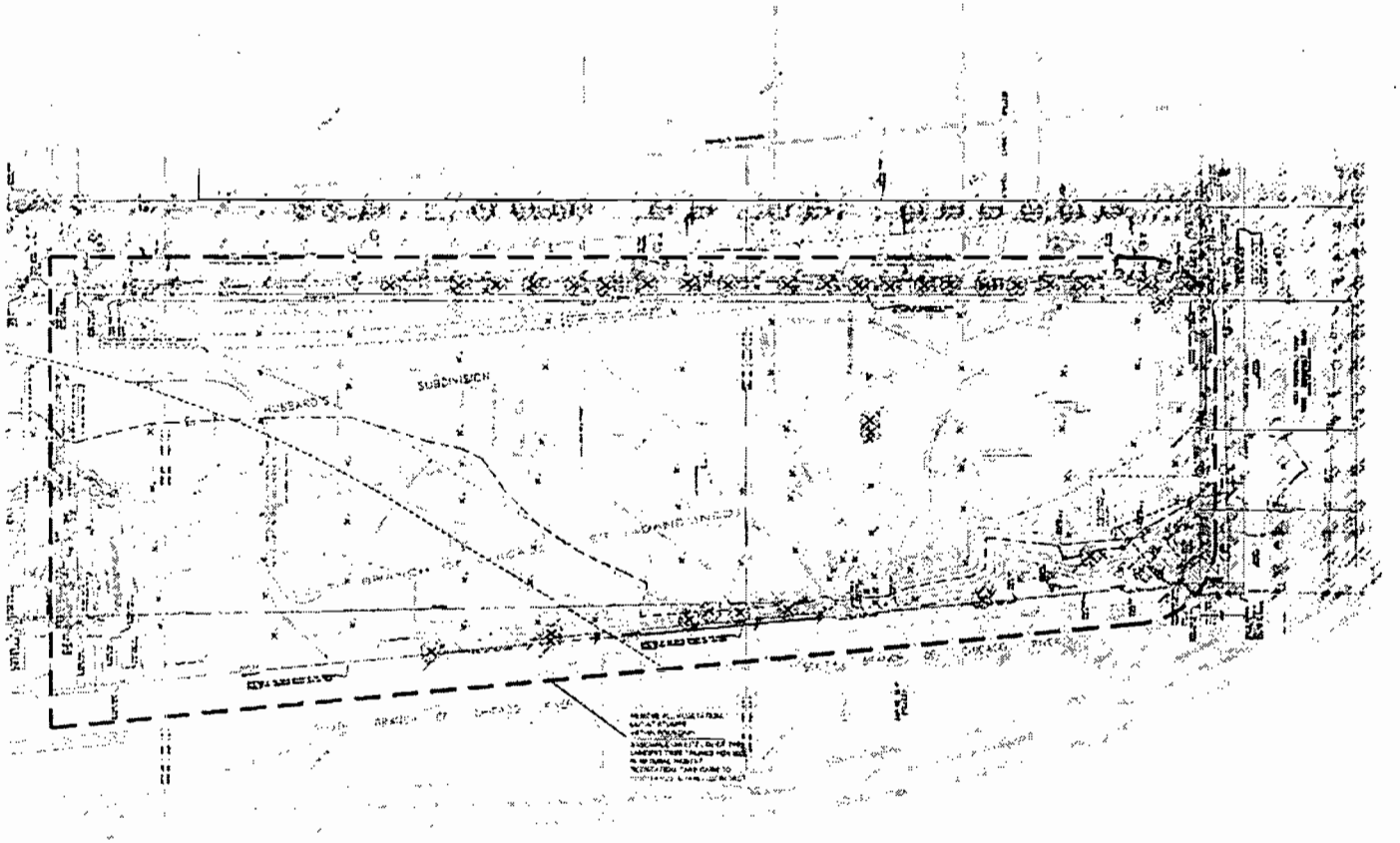
CORPORATION

LENDLEASE

SITE

TREE REMOVAL PLAN - MIDDLE

L-1.02



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ASSESSMENT DISTRICT NO.
SHEET / WARRANT NO.

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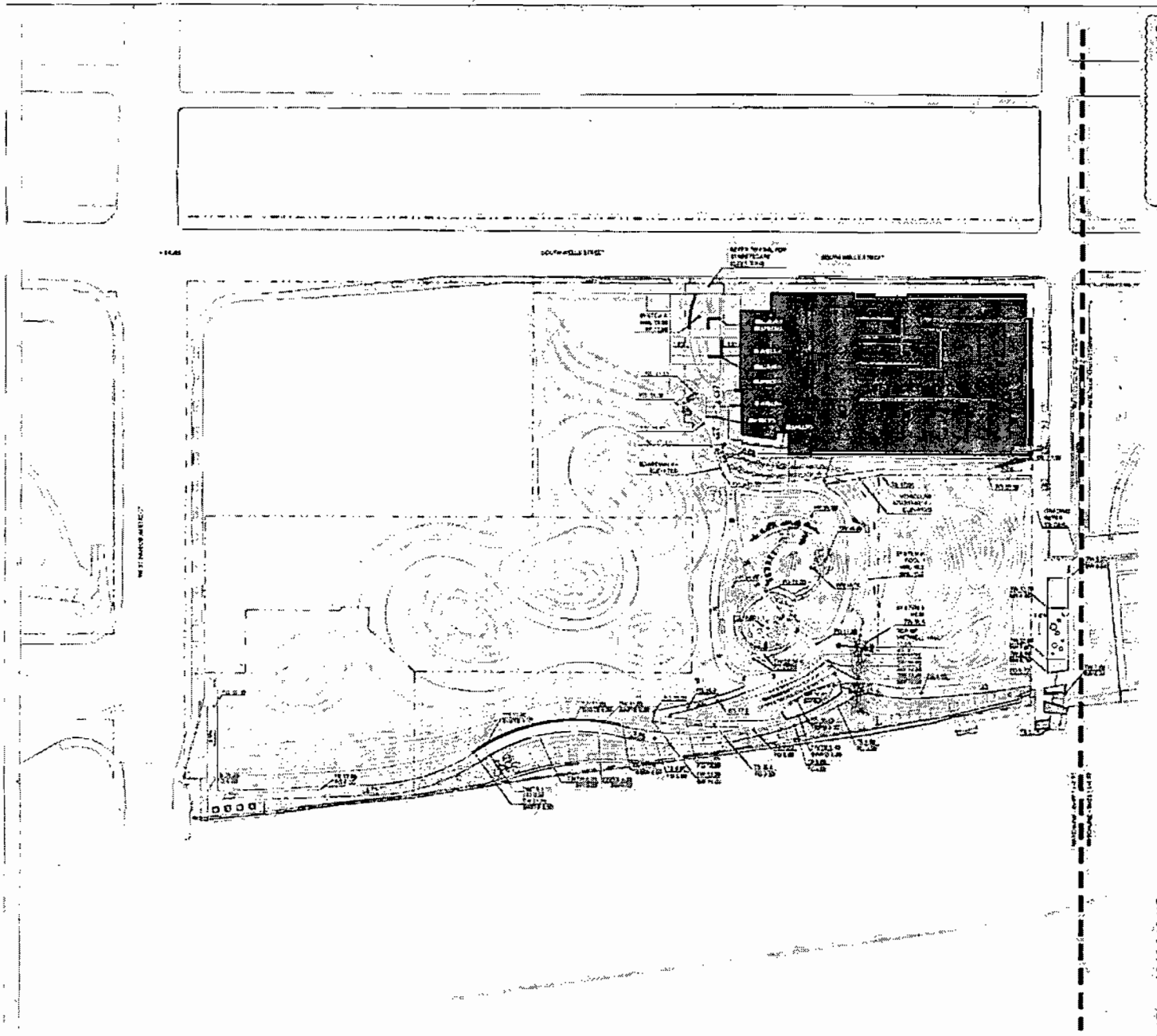
TREE REMOVAL PLAN -
SOUTH

L-1.03



COORDINATION ITEMS:
1. PROVIDE TOP OF BOULDER ELEVATIONS
2. CIVIL TO SHOW ALL PAVING ELEVATIONS AND SLOPES.

GRADING LEGEND

GRADING NOTES

PERKINS + WILL

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CITY OF CHICAGO

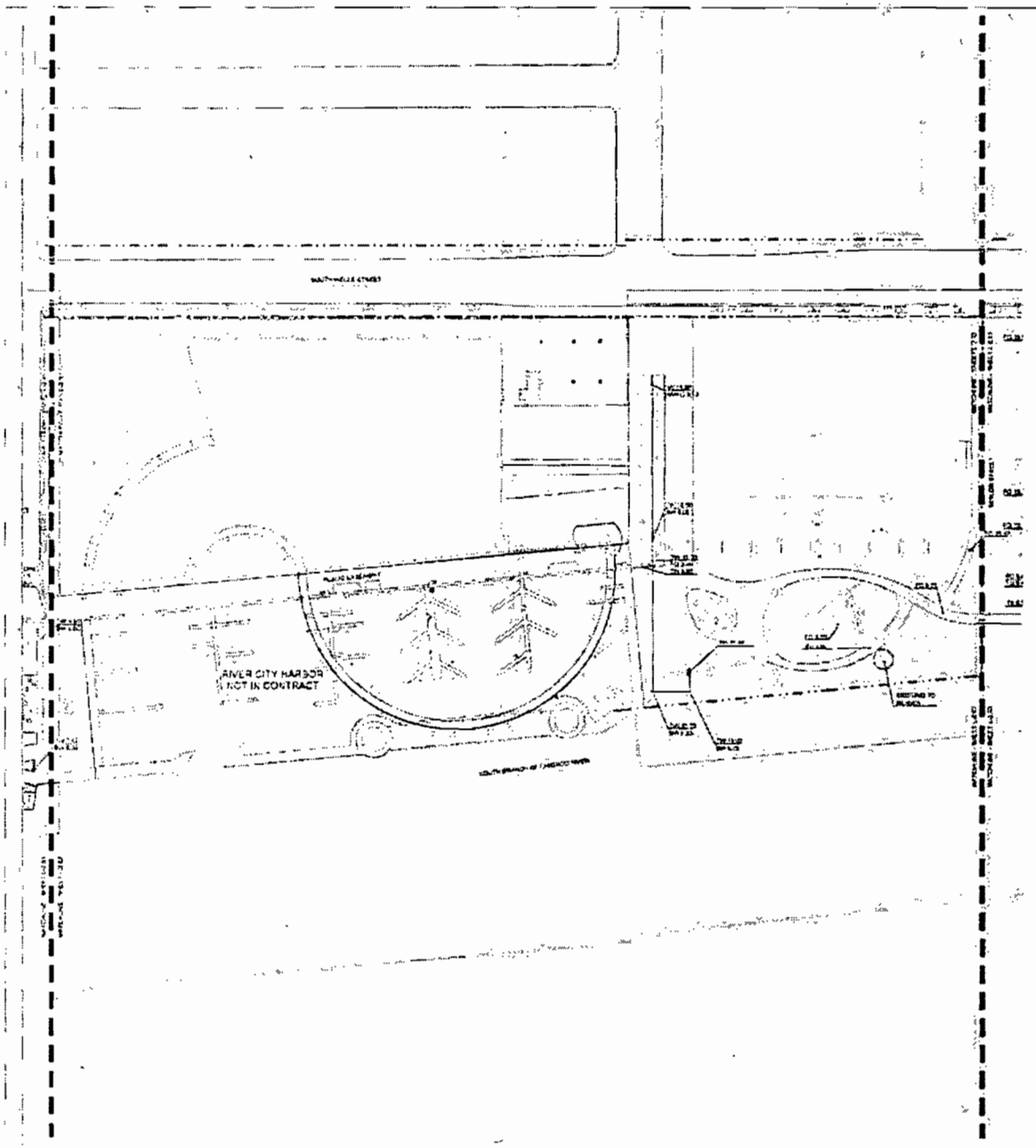
LEK DEVELOPMENT CORPORATION

LEK LEASE

SITE

GRADING PLAN - NORTH

L-2.01



GRADING LEGEND

GRADING NOTES

PERKINS + WILL

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ASSESSMENT DOCKET NO.
DEED / WARRANT NO.

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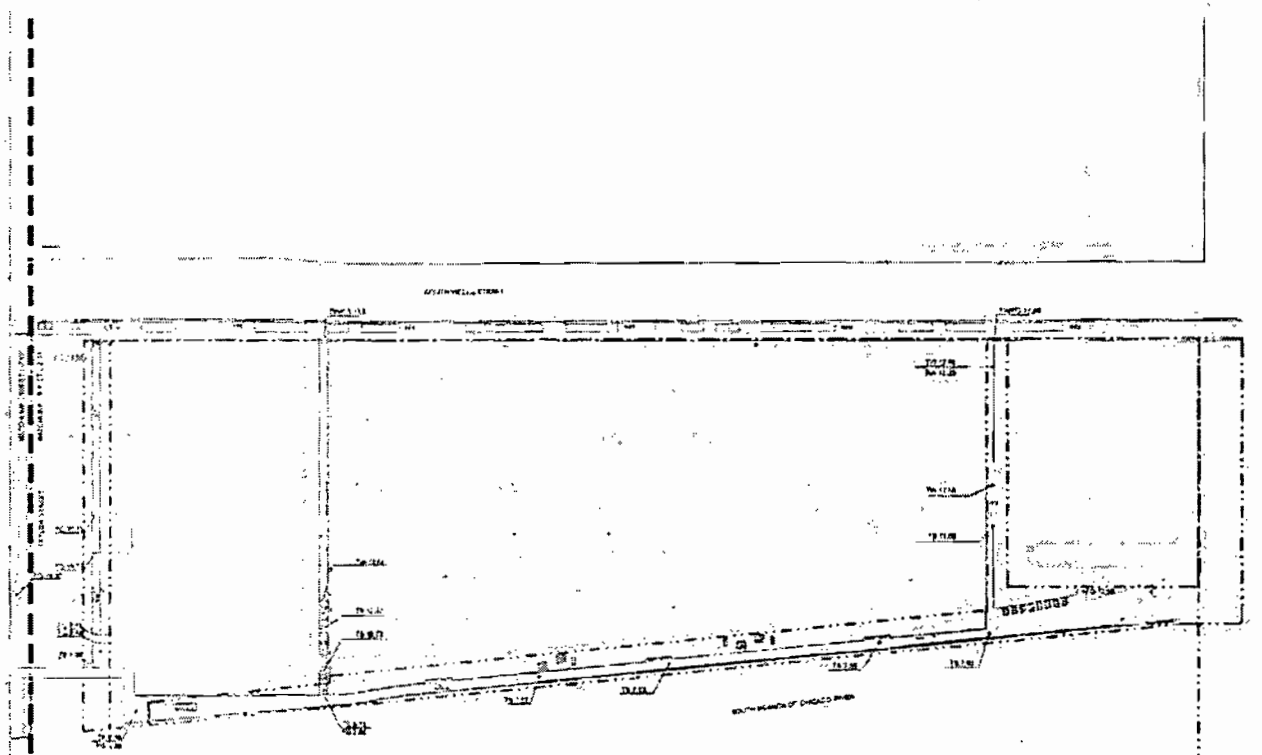
LOADLEASE

SITE

GRADING PLAN - MIDDLE

L-2.02



GRADING LEGEND

GRADING NOTES:

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PROJECT
CITY OF CHICAGO
RIVERLINE SPECIAL ASSESSMENT DOCKET NO.
MEEP / WARRANT NO. 62530
100 SOUTH WELLS STREET
CHICAGO, ILLINOIS

CMK

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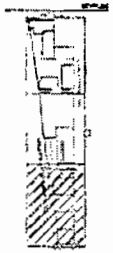
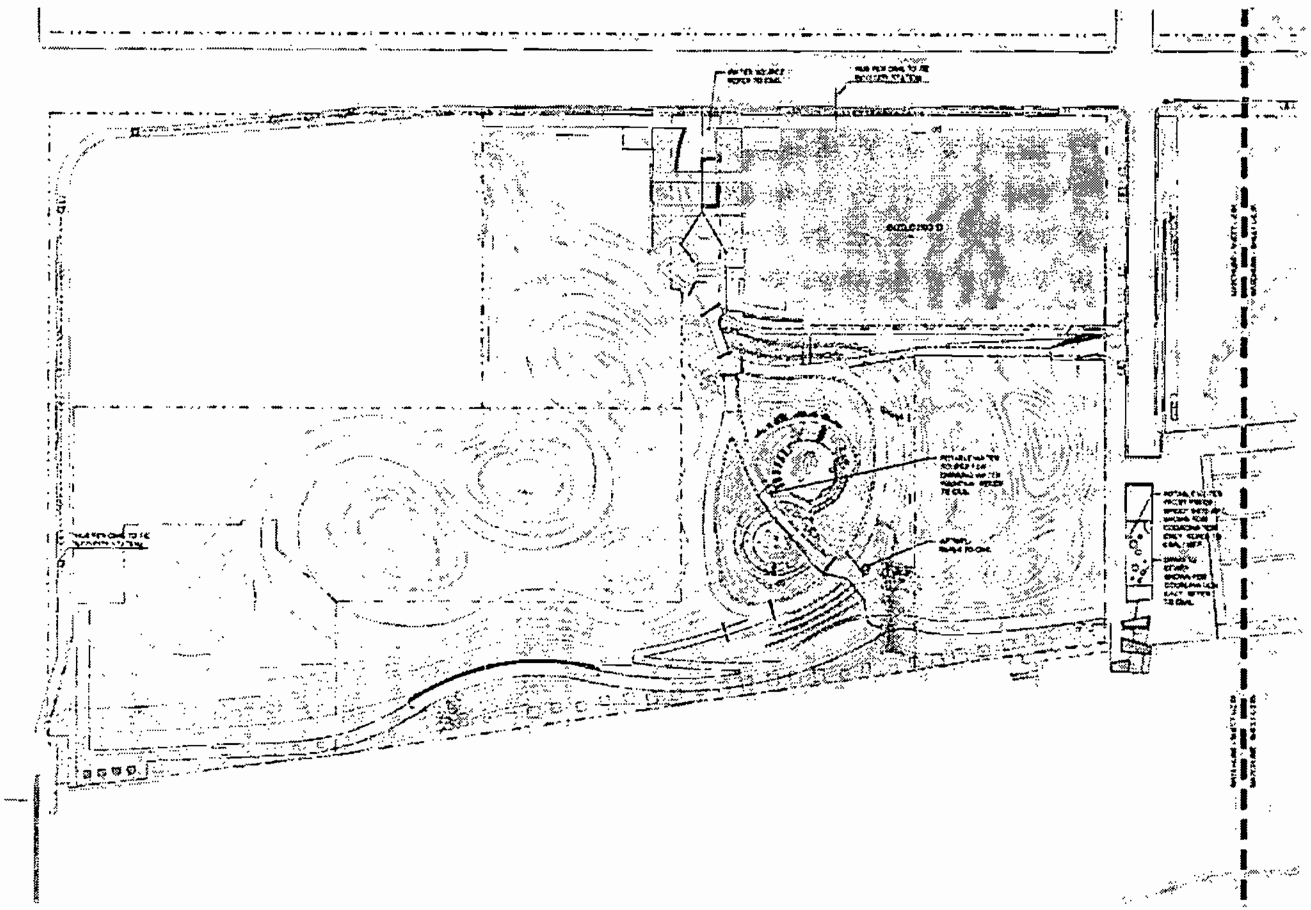
LEADLEASE



SITE

GRADING PLAN - SOUTH

L-2.03



DRAINAGE LEGEND

SYMBOL	DESCRIPTION
	[illegible]
	[illegible]
	[illegible]
	[illegible]
	[illegible]
	TRENCH DRAIN
	[illegible]
	[illegible]
	[illegible]
	[illegible]
	[illegible]

DRAINAGE NOTES

[illegible]

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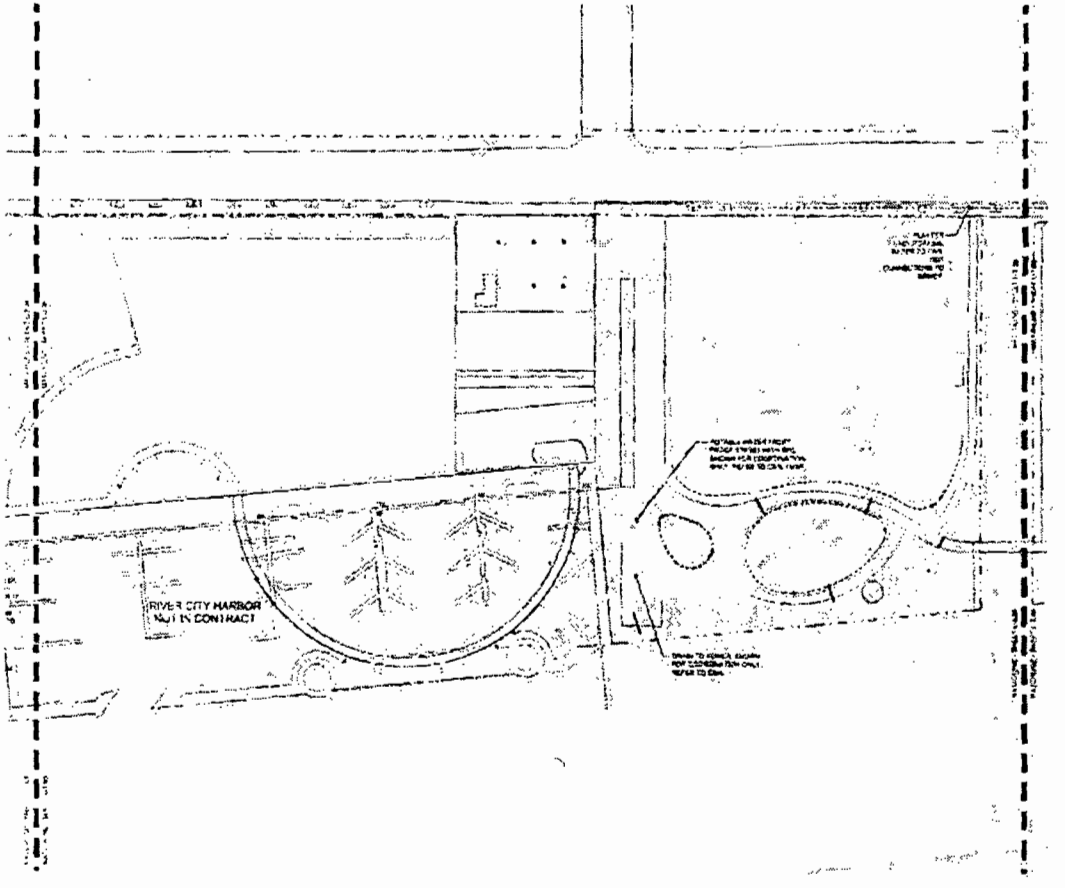
DRAINAGE PLAN - NORTH

L-2.04



DRAINAGE (TYP.AND)

DRAINAGE NOTES

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CMAP

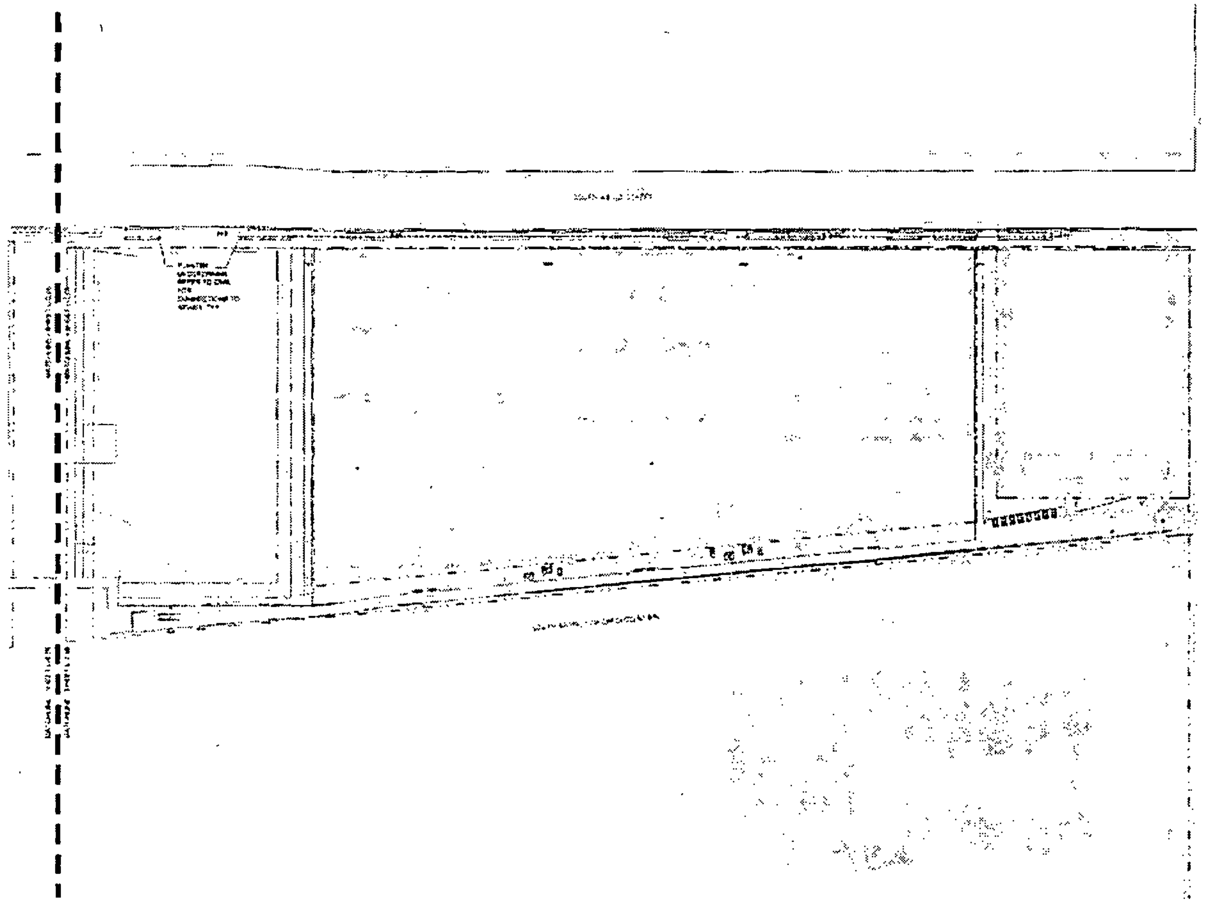
CMY DEVELOPMENT CORPORATION

LENDLEASE

SITE

DRAINAGE PLAN - REGGLE

L-2.05



DRAINAGE LEGEND

DRAINAGE NOTES

PERKINS + WILL

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RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
MIOT / WARRANT NO. E2530

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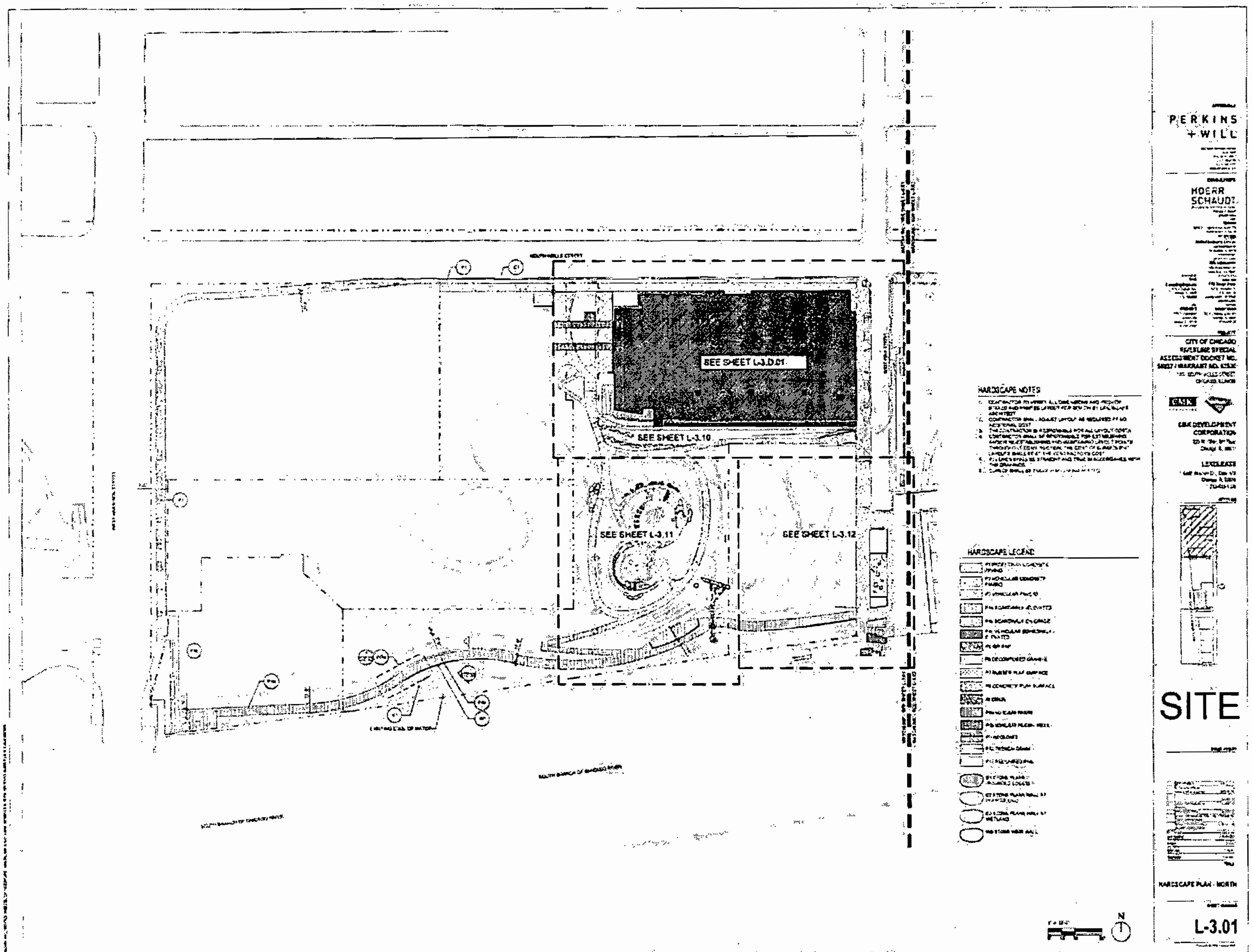
CORPORATION

LENDLEASE

SITE

DRAINAGE PLAN - SOUTH

L-2.06



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CITY OF CHICAGO
ASSESSMENT DOCKET NO.
CHICAGO, ILLINOIS
CORPORATION
HARDSCAPE NOTES
HARDSCAPE LEGEND
SEE SHEET L-3.D.01
SEE SHEET L-3.10
SEE SHEET L-3.11
SEE SHEET L-3.12
SITE
HARDSCAPE PLAN - NORTH
L-3.01
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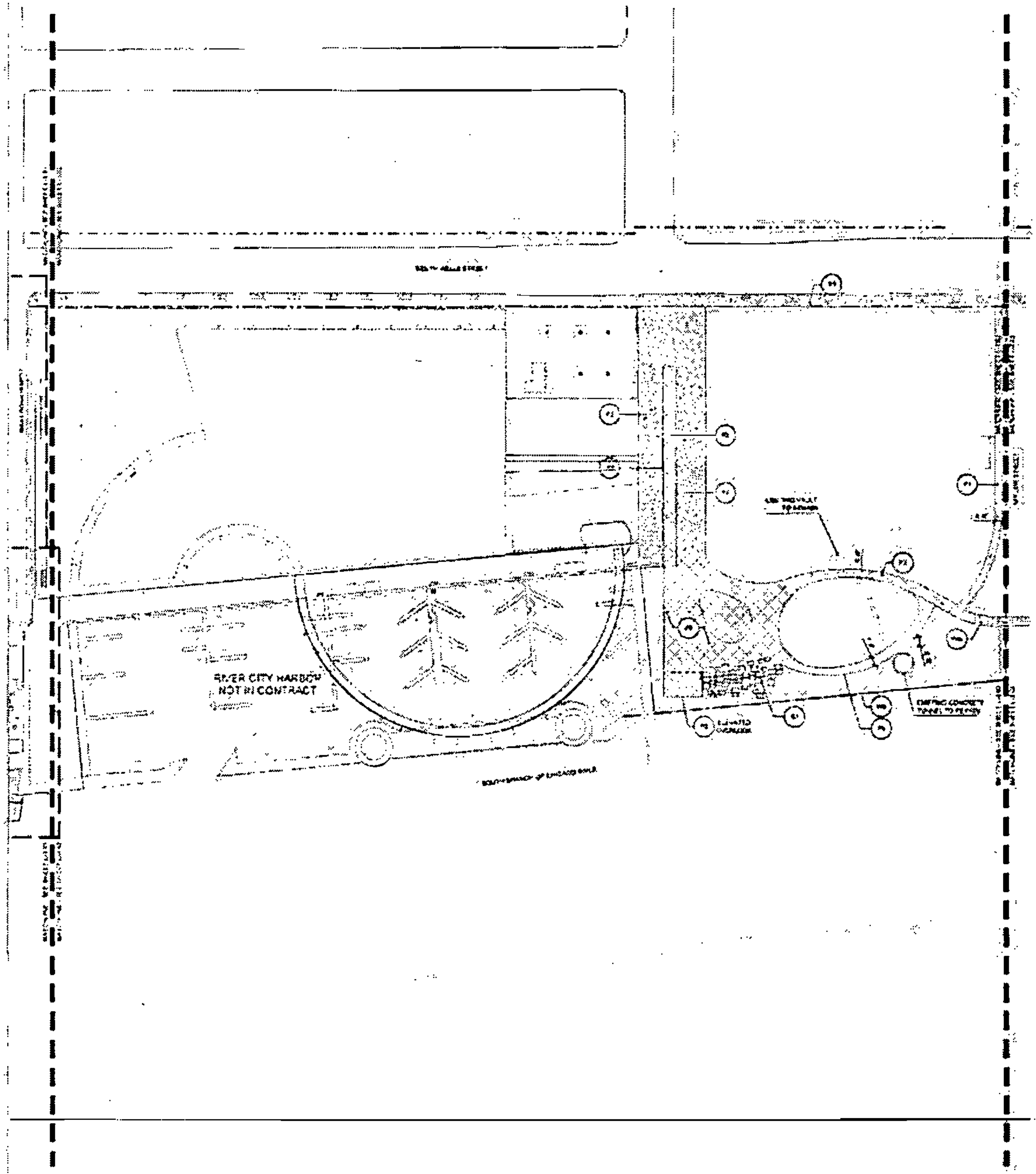

HARDSCAPE NOTES

HARDSCAPE LEGEND

PERKINS
+WILL

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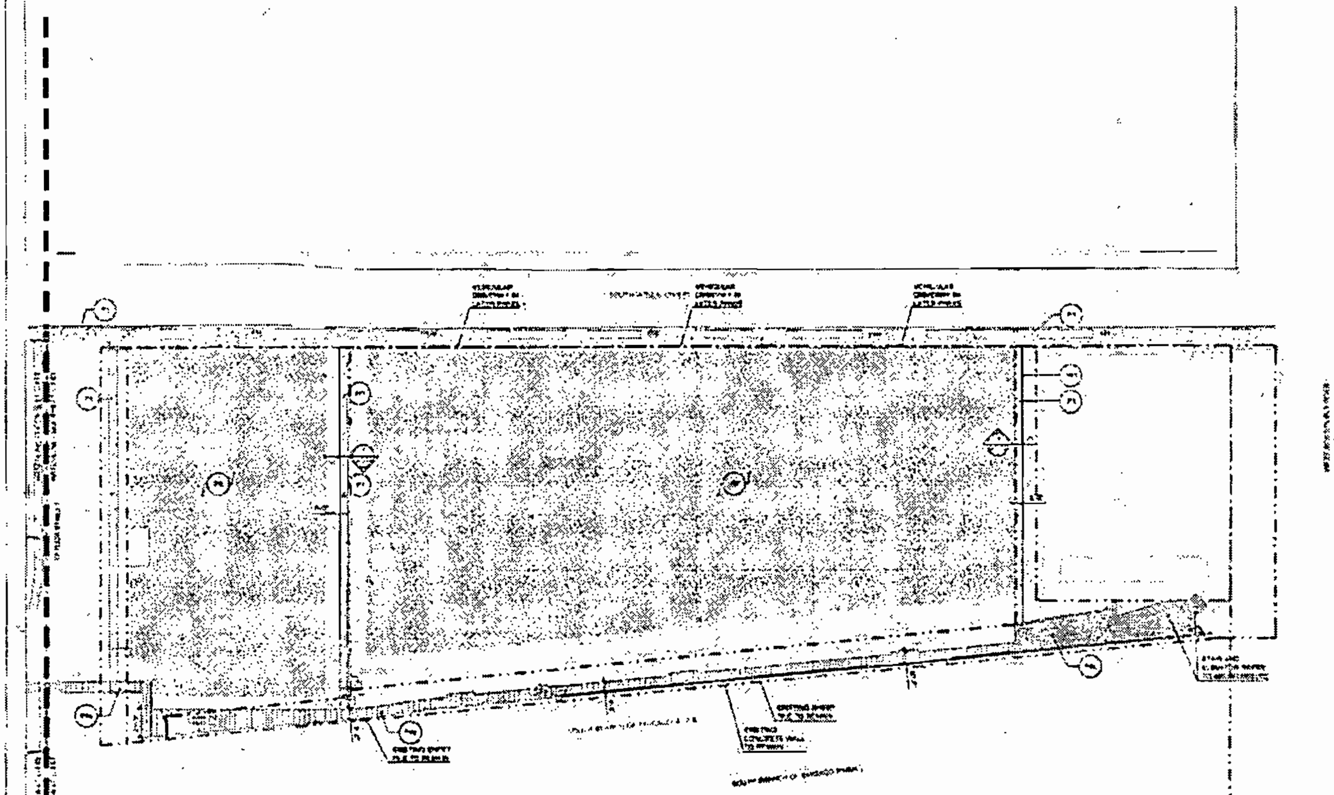
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.

CMK DEVELOPMENT
CORPORATION

LEND LEASE

SITE

L-3.02



HARDSCAPE NOTES

HARDSCAPE LEGEND

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CITY OF CHICAGO
PATHLINE SPECIAL
ASSESSMENT DOCKET NO.
[illegible] / WARRANT NO. [illegible]

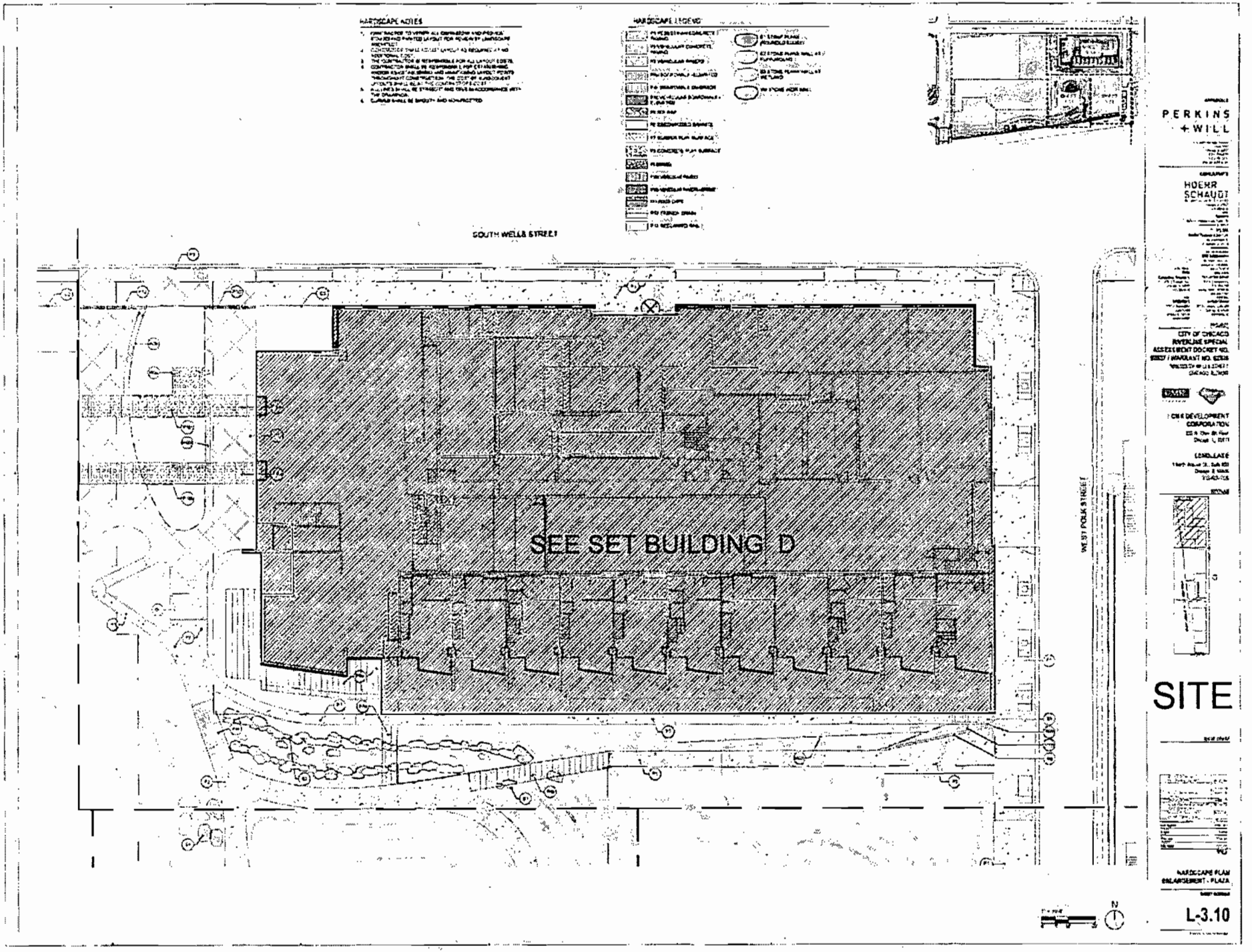
CMK DEVELOPMENT
CORPORATION

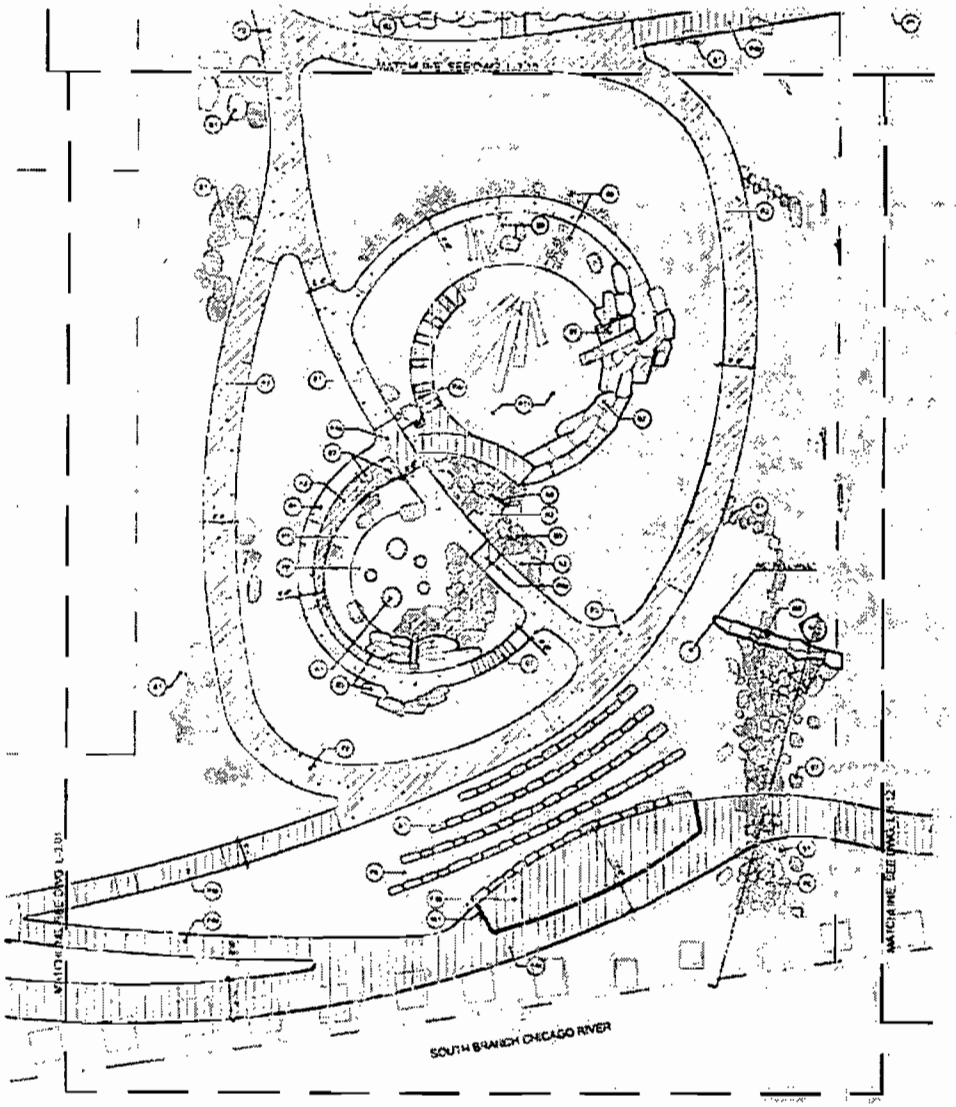
LENDLEASE

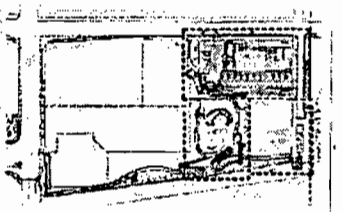
SITE

HARDSCAPE PLAN - SOUTH

L-3.03

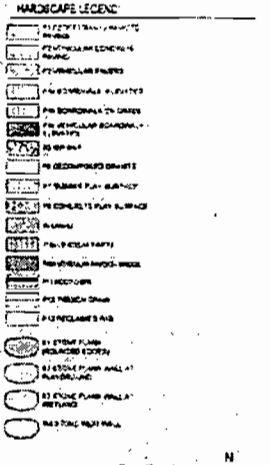

HARDSCAPE NOTES
HARDSCAPE LEGEND
SOUTH WELLS STREET
SEE SET BUILDING D
W. 51ST POLK STREET
PERKINS + WILL
HOERR SCHAUDT
CITY OF CHICAGO
RIVERLINE SPECIAL
CMK DEVELOPMENT CORPORATION
LENDLEASE
SITE
HARDSCAPE PLAN ENLARGEMENT - PLAZA
L-3.10

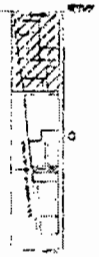




HARDSCAPE NOTES

HARDSCAPE LEGEND





PERKINS +WILL

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CITY OF CHICAGO
RIVERLINE SPECIAL

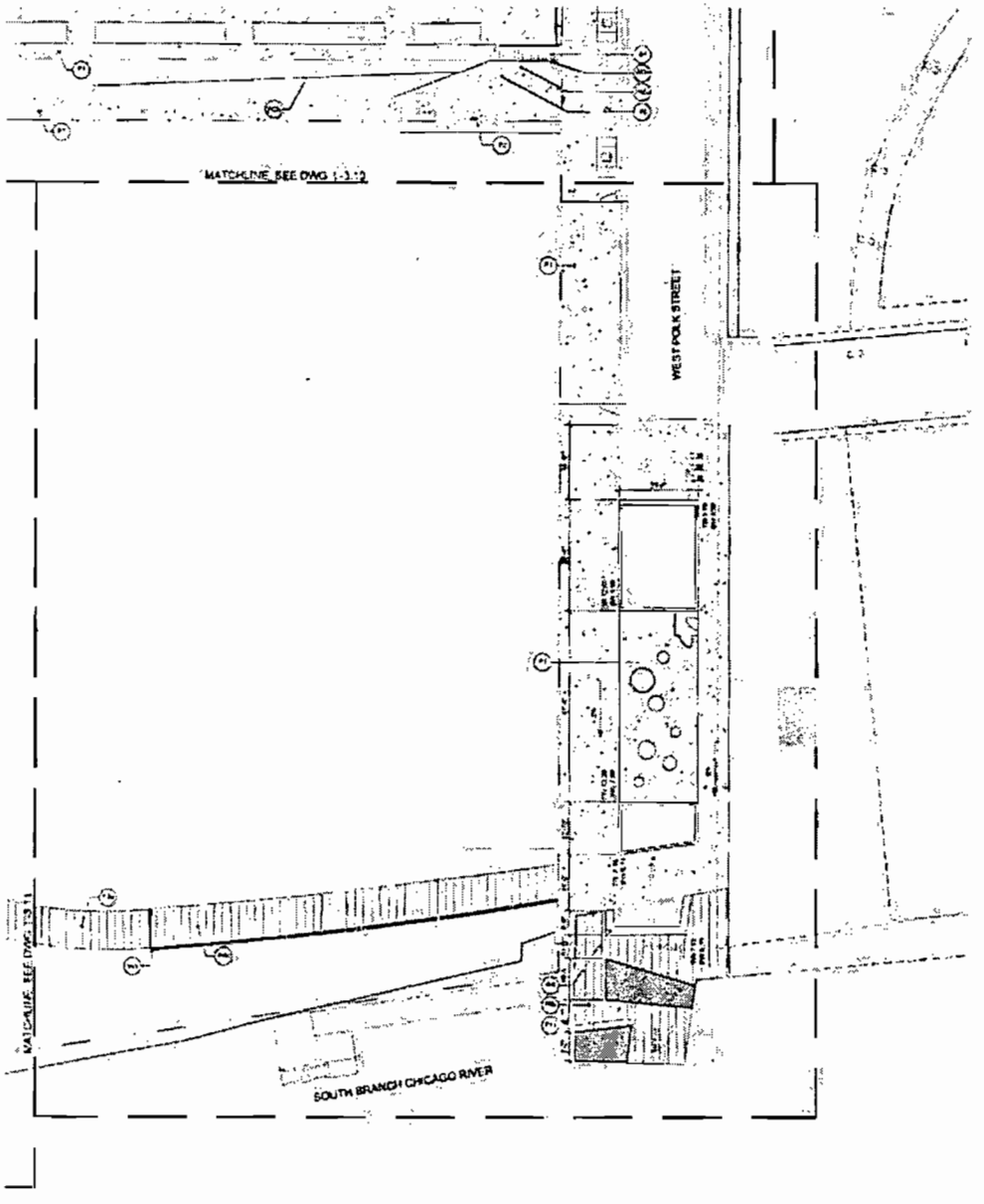
CBX DEVELOPMENT CORPORATION

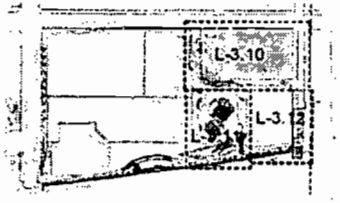
LENDLEASE

SITE

HARDSCAPE PLAN
EMBARCADERO - PLAYGROUND

L-3.11





HARDSCAPE NOTES

HARDSCAPE LEGEND

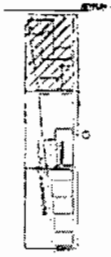
PERKINS + WILL

HOERR SCHAUDT

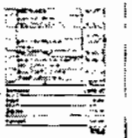
CITY OF CHICAGO
RIVERWALK SPECIAL ASSESSMENT DOCKET NO.

CMK DEVELOPMENT CORPORATION

LEGO LEASE



SITE



HARDSCAPE PLAN ENLARGEMENT - POLK STREET

L-3.12

HARDSCAPE SCHEDULE

HORIZONTAL ELEMENTS

LEGEND	CODE	NAME	MATERIAL	LOCATION	MANUFACTURER	COLOR/SIZE	QUANTITY	DETAIL
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]
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SITE AMENITIES

LEGEND	CODE	NAME	MATERIAL	LOCATION	MANUFACTURER	COLOR/SIZE	QUANTITY	DETAIL
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]

ROCK OUTCROPPINGS

LEGEND	CODE	NAME	MATERIAL	LOCATION	MANUFACTURER	COLOR/SIZE	QUANTITY	DETAIL
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VERTICAL ELEMENTS

LEGEND	CODE	NAME	MATERIAL	LOCATION	MANUFACTURER	COLOR/SIZE	QUANTITY	DETAIL
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	—	—	—

PERKINS
+WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
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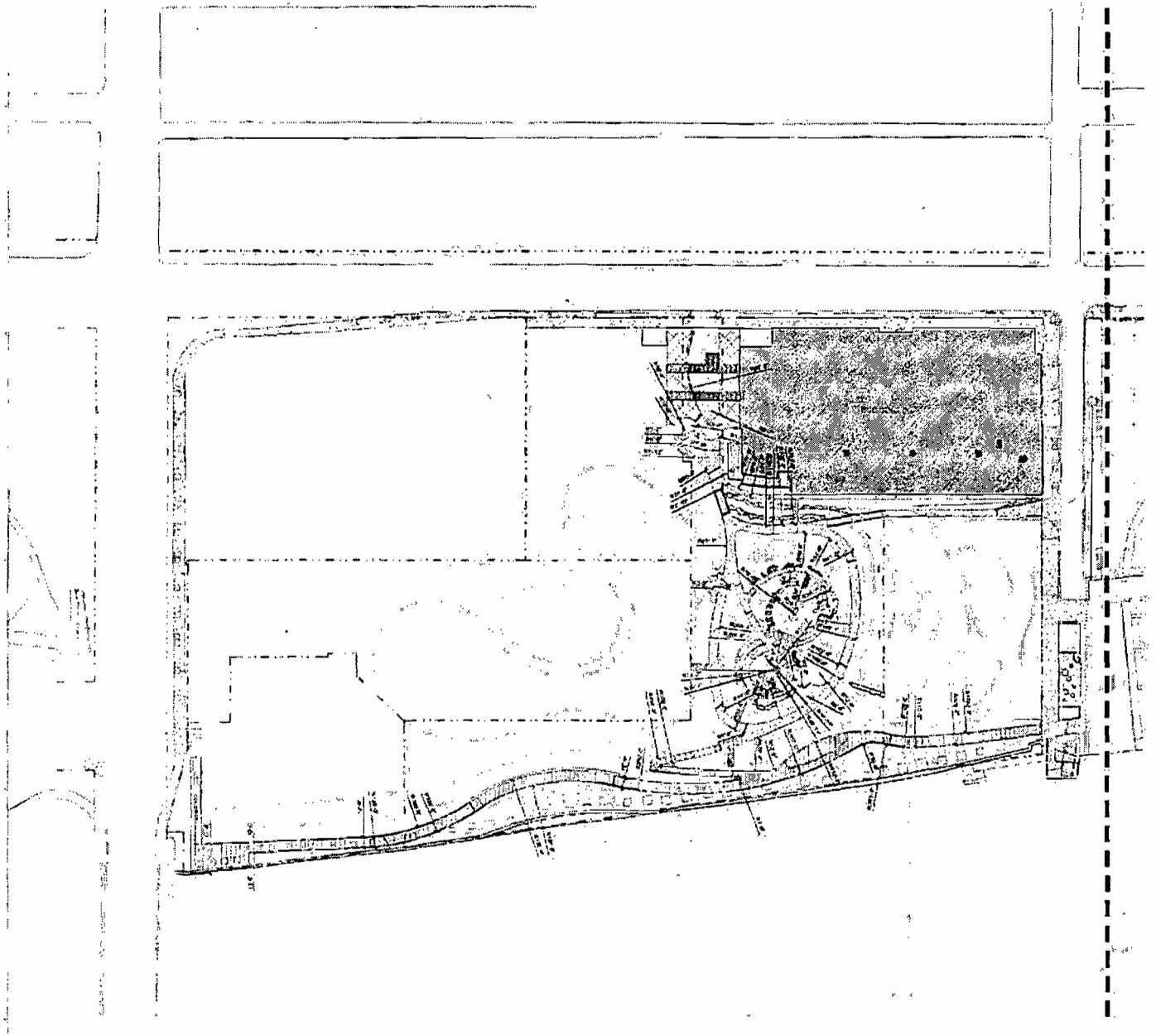
CMK DEVELOPMENT
CORPORATION

LEXCLEAGE

SITE

HARDSCAPE SCHEDULE

L-3.19



PERKINS
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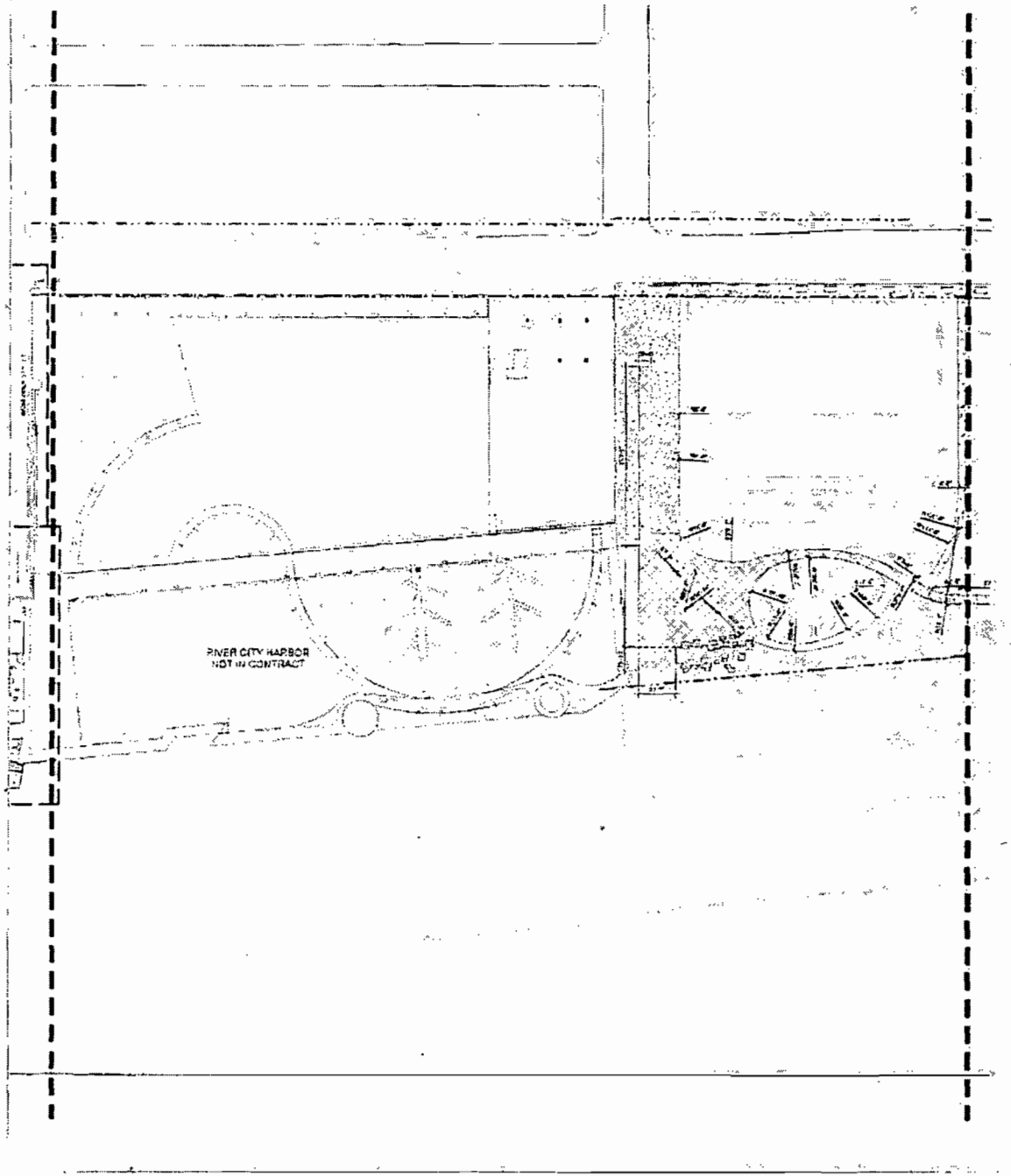
CMK

SITE

LAYOUT PLAN NORTH

L-3.21



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CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
SHEET I WARRANT NO. 02576

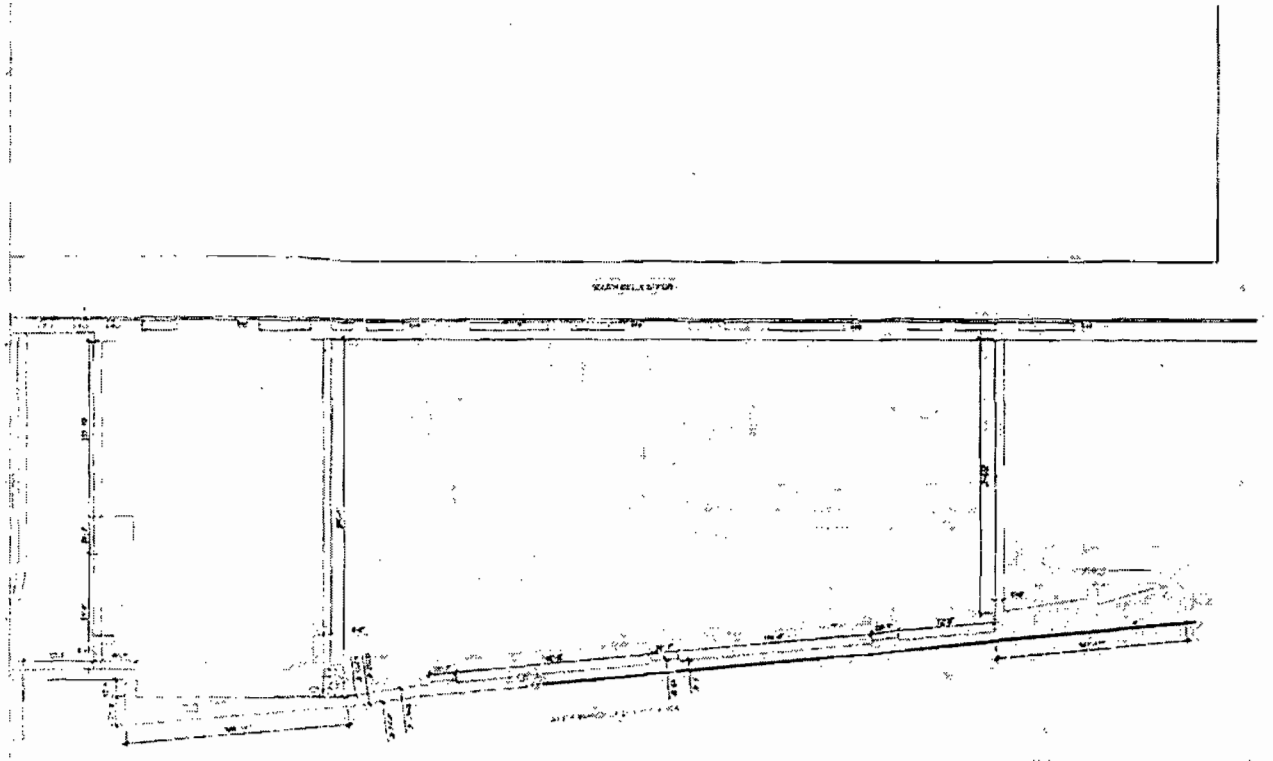
CBA DEVELOPMENT
CORPORATION

LENDLEASE

SITE

LAYOUT PLAN - MIDDLE

L-3.22



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SCHAUDT

CITY OF CHICAGO
TAX INCLUME SPECIAL
ASSESSMENT DOCKET NO.
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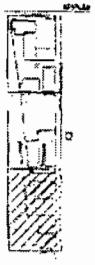
CMK DEVELOPMENT
CORPORATION

LENDLEASE



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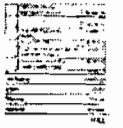
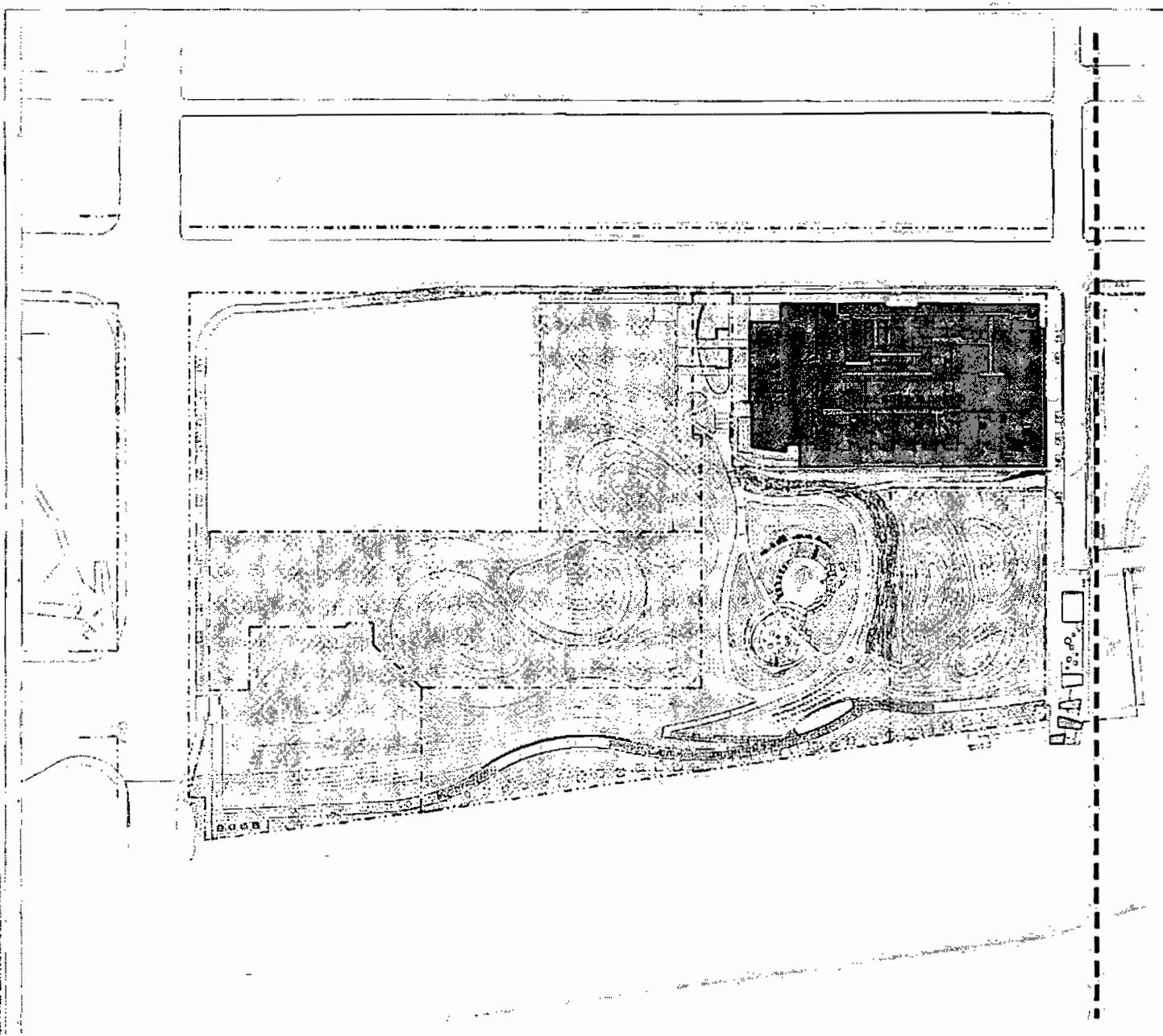


LAYOUT PLAN - SOUTH

L-3.23



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CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
SHEET / WARRANT NO.

CBM DEVELOPMENT CORPORATION

LANDLEASE

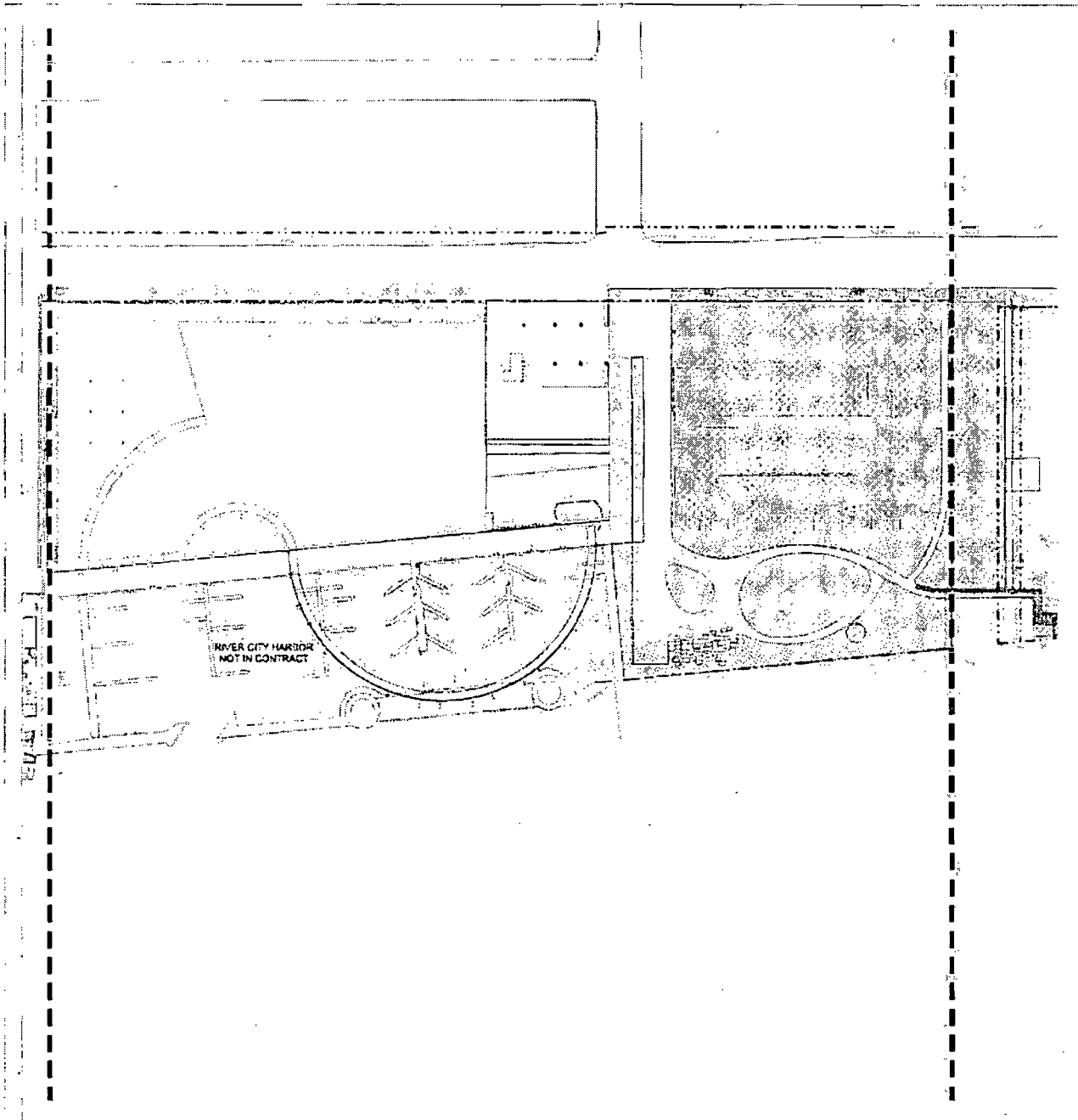
SOIL LEGEND

SOIL NOTES

SITE

SOILS PLAN - NORTH

L-4.01



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CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.

CBRE

CBRE DEVELOPMENT
CORPORATION

LENDLEASE

SOIL LEGEND

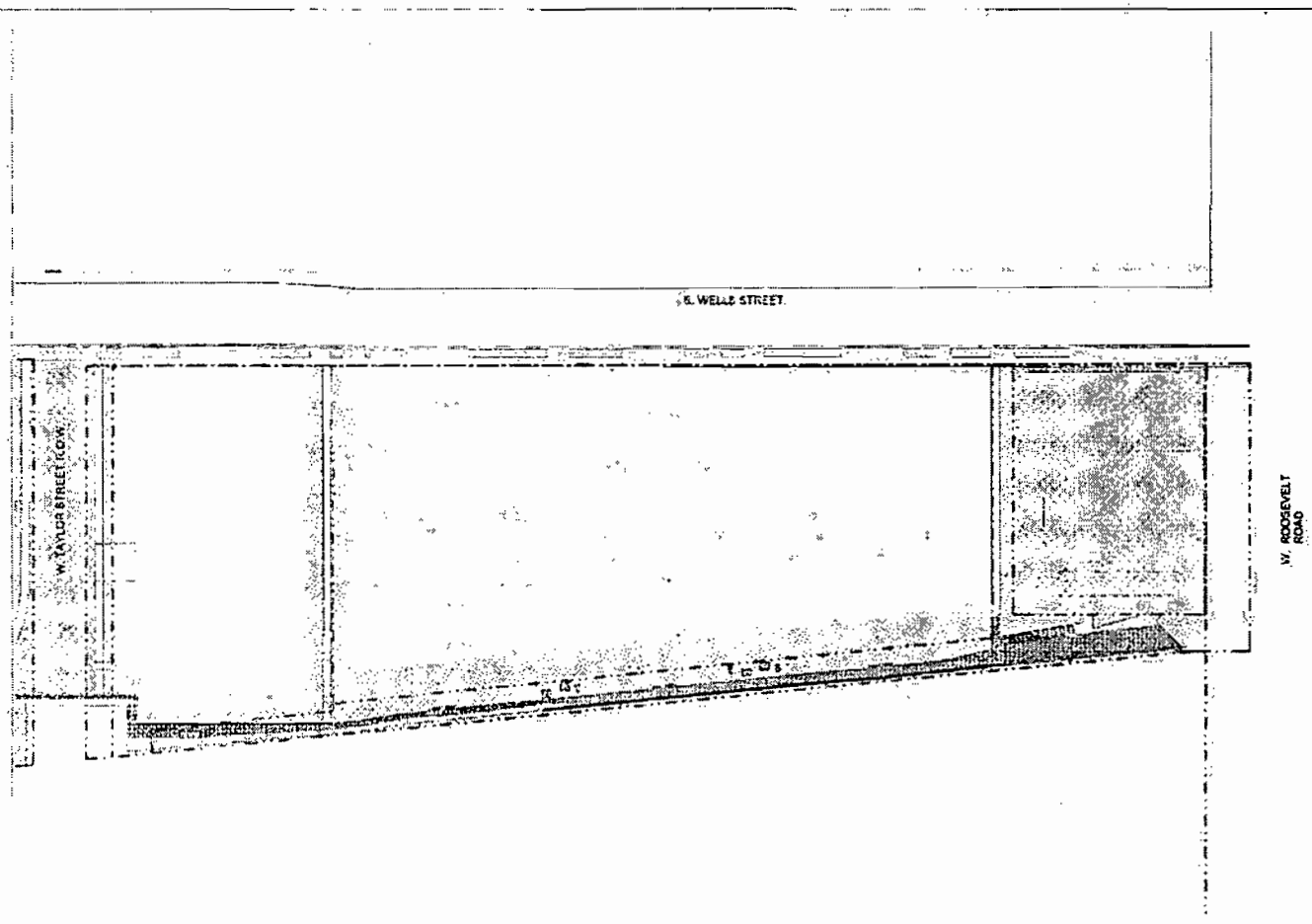
SOIL NOTES

1.

SITE

SOILS PLAN - MIDDLE

L-4.02



SOIL LEGEND

SOIL NOTES

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DOCKET NO.

CBK DEVELOPMENT CORPORATION

LEASE

SITE

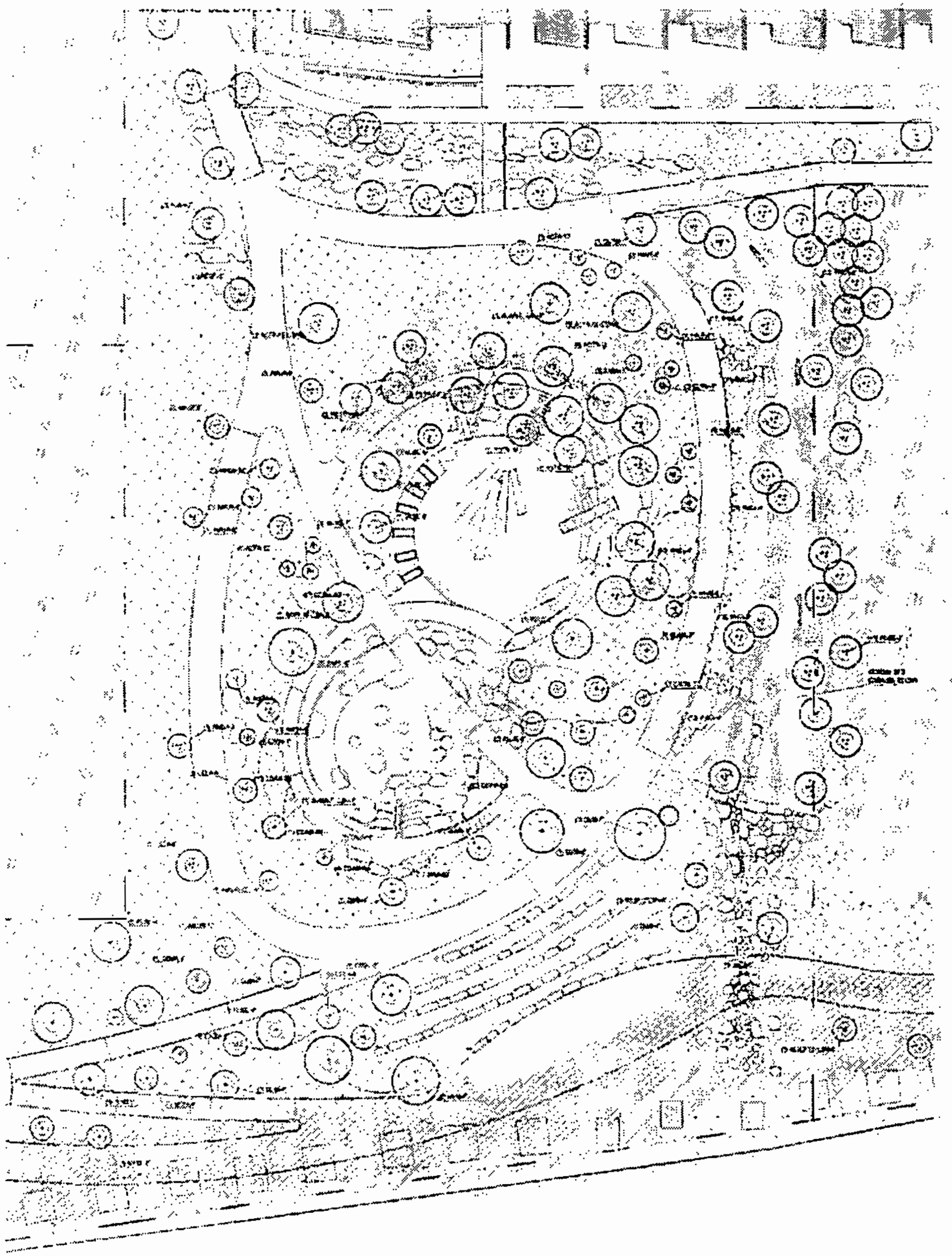
SOILS PLAN - SOUTH

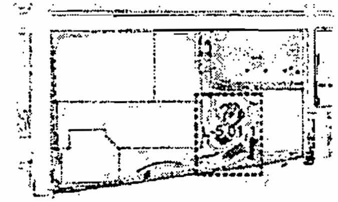
L-4.03

SITE

L-5.01

PERKINS + WILL





PLANTING LEGEND

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RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.

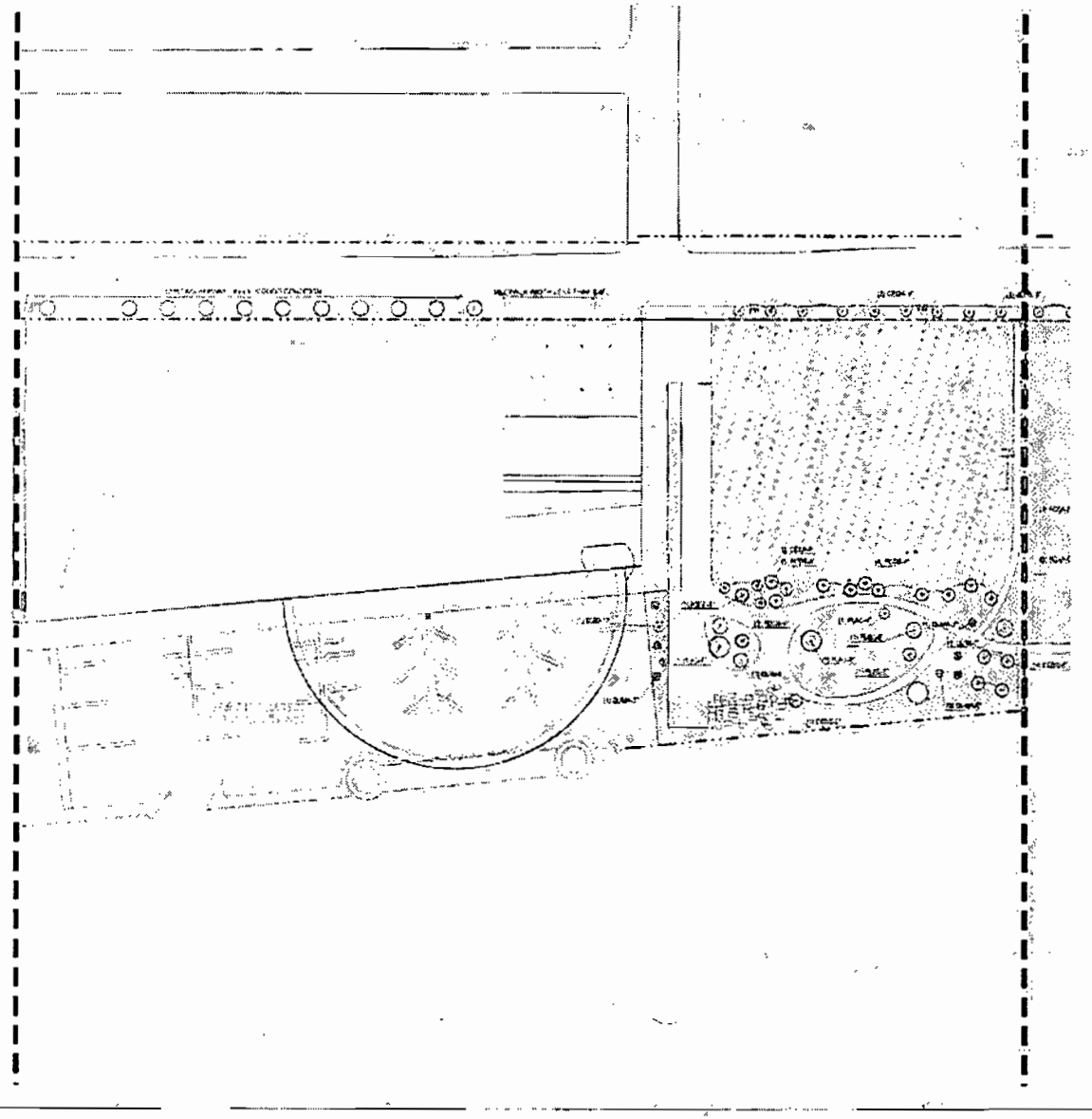
CMK DEVELOPMENT
CORPORATION

LEADLEASE

SITE

PLANTING PLAN - PLAYGROUND

L-5.01.1



PLANTING LEGEND

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SCHAUDT

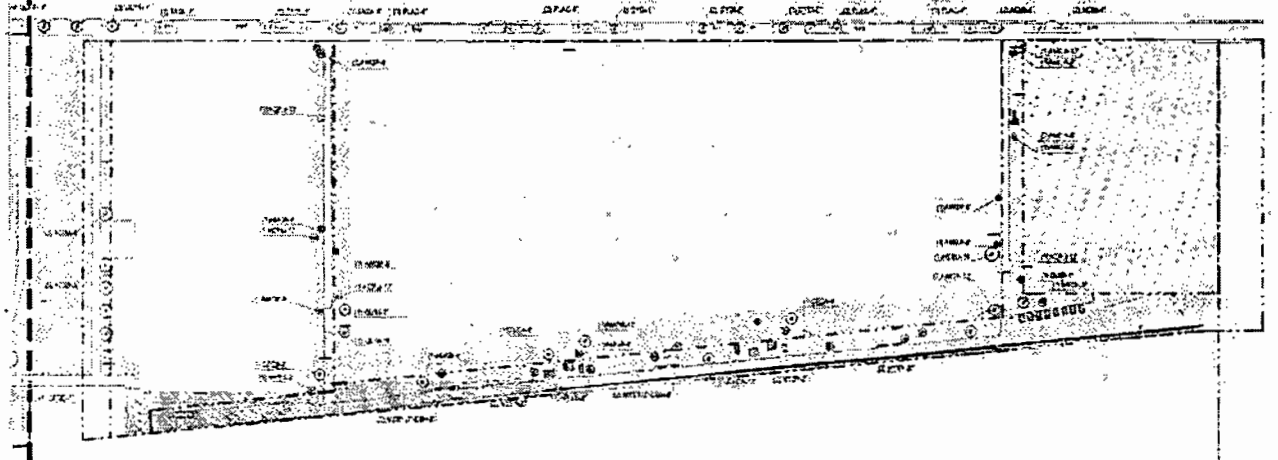
CBK DEVELOPMENT
CORPORATION

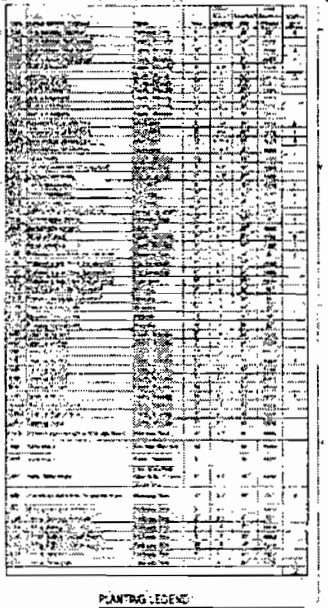
LENDLEASE

SITE

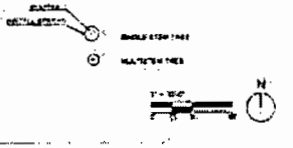
PLANTING PLAN - MIDDLE

L-5.02





PLANTING LEGEND



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CITY OF CHICAGO
WATERLINE SPECIAL ASSESSMENT DOCKET NO.
SHELF / WARRANT NO.

CMS

CRX DEVELOPMENT CORPORATION

LENDLEASE

SITE

PLANTING PLAN - SOUTH

L-5.03

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+WILL

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SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
[illegible] / WARRANT NO. [illegible]
[illegible] SOUTH WELLS STREET
CHICAGO, ILLINOIS

CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

COVER CROP

MESIC PRAIRIE

BULB LAYER

FLOOD TOLERANT MIX

SHRUBS

WET PRAIRIE MIX

SAVANNA MIX

EMERGENT

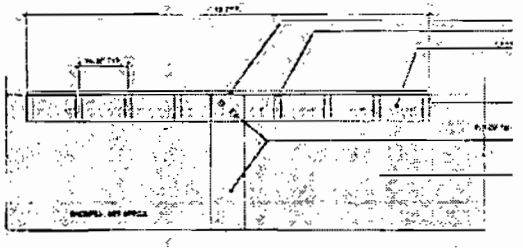
Notes.

1. 38 FLAT sized plants are to be 2 years old when submitted for approval.
2. Quantities are shown for approximate reference only. All quantities to be confirmed by contractor.
3. Quantities assume entire open space landscape is to be installed within one year. If permanent plants are not installed within one year because of delays in the construction schedule, an [illegible] cover crop installation is required the following year.

PLANTING SCHEDULE

L-5.04

3 BORADWALK ON GRADE P4a TO ELEVATED BOARDWALK P4b TRANSITION



2 BOARDWALK ON GRADE (P4b)

1 BOARDWALK - ELEVATED (P4a)

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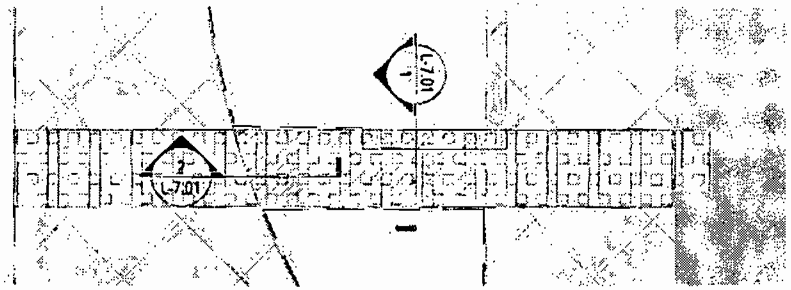
CMK DEVELOPMENT CORPORATION

LEND LEASE

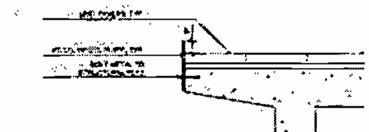
SITE

SITE DETAILS - BOARDWALK & BRIDGES

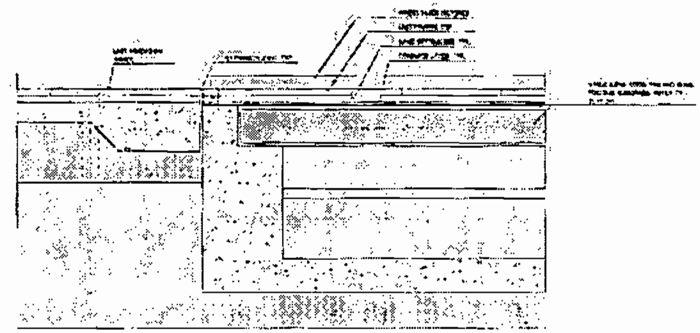
L-7.00



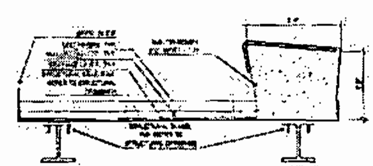
(X) KEY PLAN



(3) WHEEL GUIDE @ POOL EDGE



(2) PLAZA BRIDGE-SECTION



(1) PLAZA BRIDGE-SECTION

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ASSESSMENT DOCKET NO.

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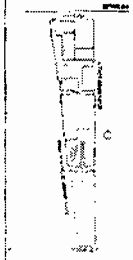
CORPORATION

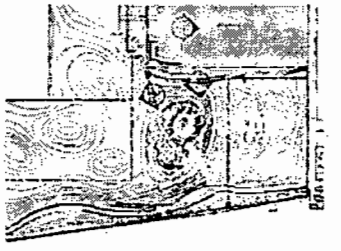
LENDLEASE

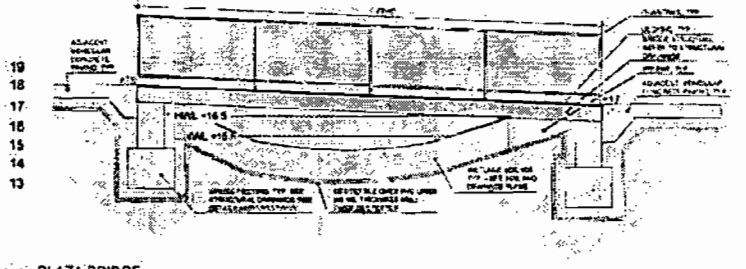


SITE

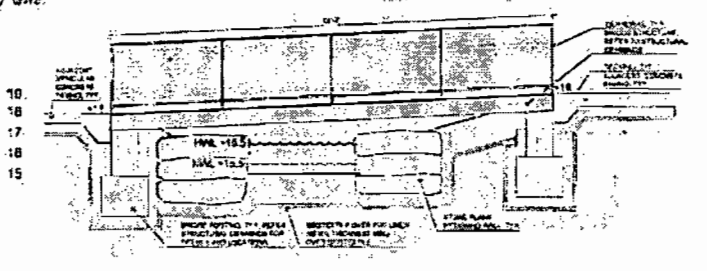
SITE DETAILS -
BOARDWALKS & BRIDGES

L-7.01

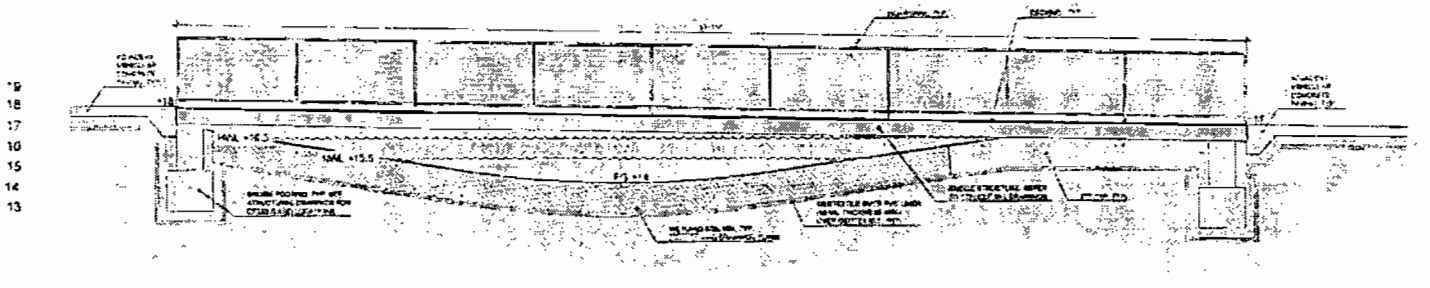




3 PLAZA BRIDGE



2 BRIDGE TO BUILDING D



1 POLK ENTRY BRIDGE

PERKINS + WILL

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CITY OF CHICAGO

CBK DEVELOPMENT CORPORATION

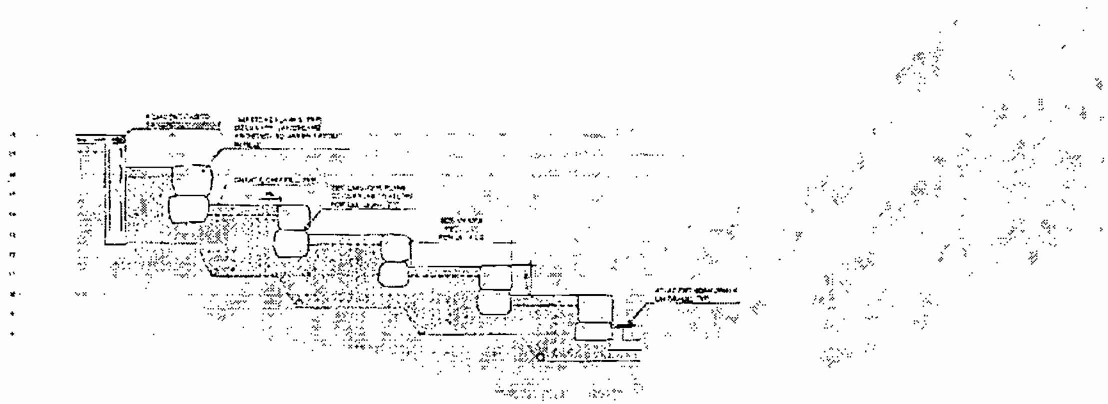
LENDLEASE

SITE

SITE DETAILS - BOARDWALK & BRIDGES

L-7.02

(4) AMPHITHEATER - PARCEL F



(3) AMPHITHEATER WALLS - NORTH

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SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
/ WARRANT NO.

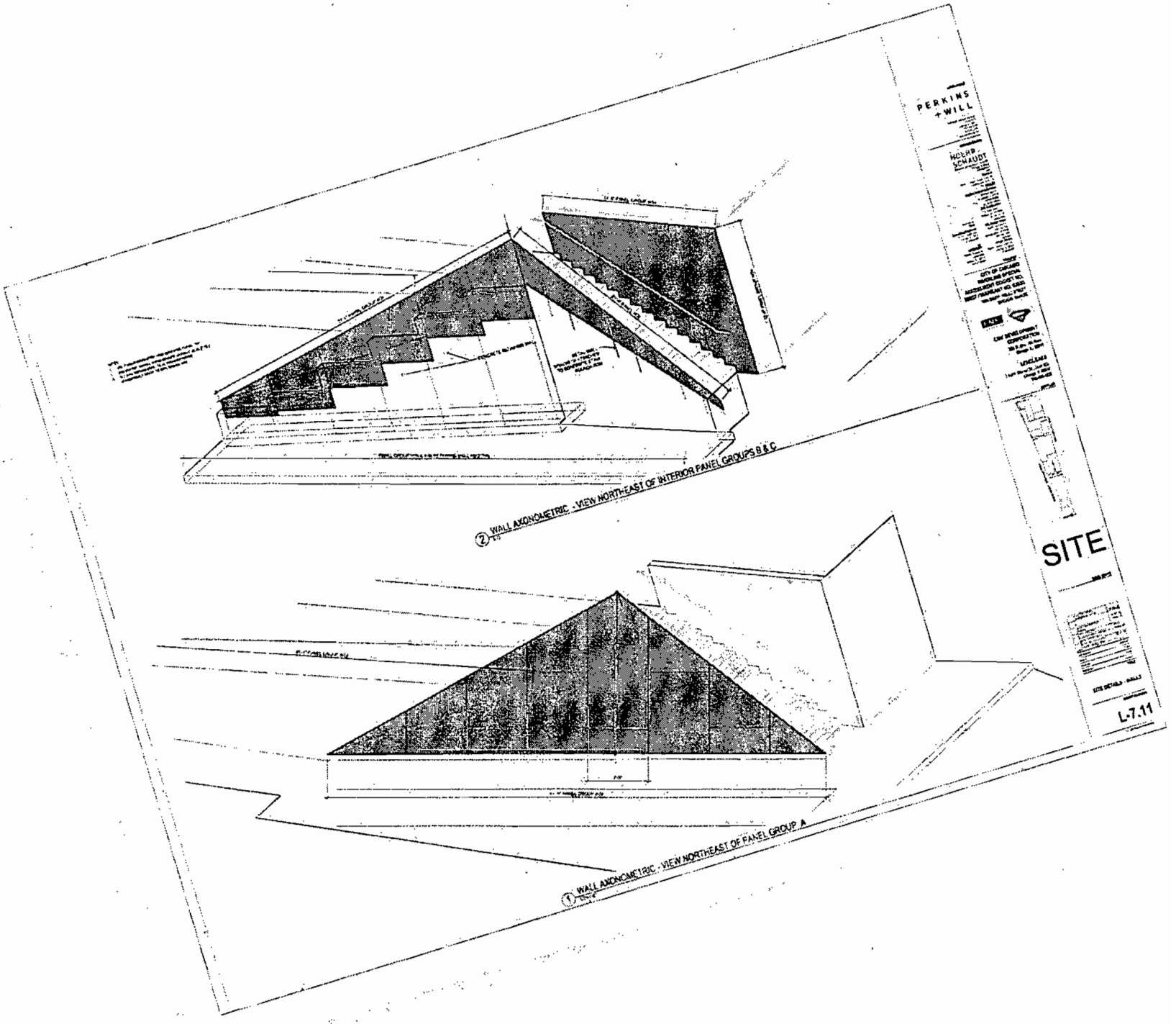
CMK DEVELOPMENT
CORPORATION

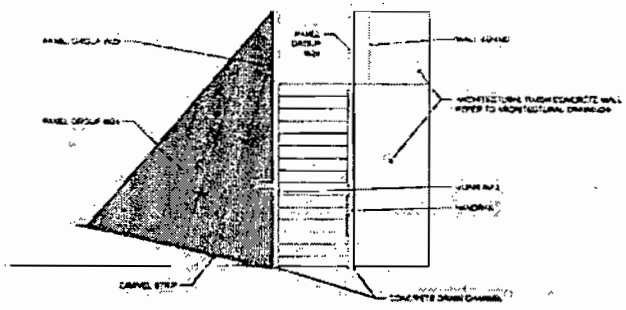
LENDLEASE

SITE

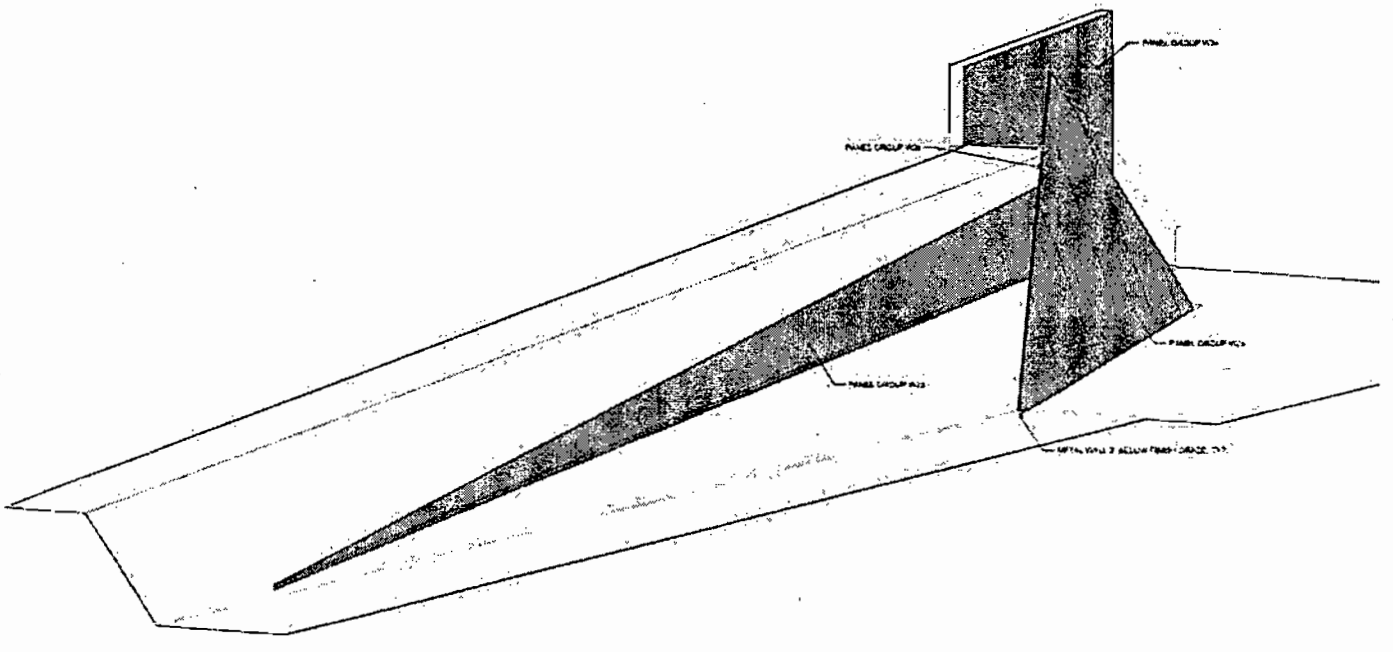
SITE DETAILS - WALLS

L-7.10


PERKINS
+WILL
SITE
L-7.11
2 WALL AXONOMETRIC - VIEW NORTHEAST OF INTERIOR PANEL GROUPS B & C
1 WALL AXONOMETRIC - VIEW NORTHEAST OF PANEL GROUP A



② STAIR ELEVATION - VIEW NORTH



① WALL PERSPECTIVE

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DISTRICT NO.
WARRANT NO.

GMK

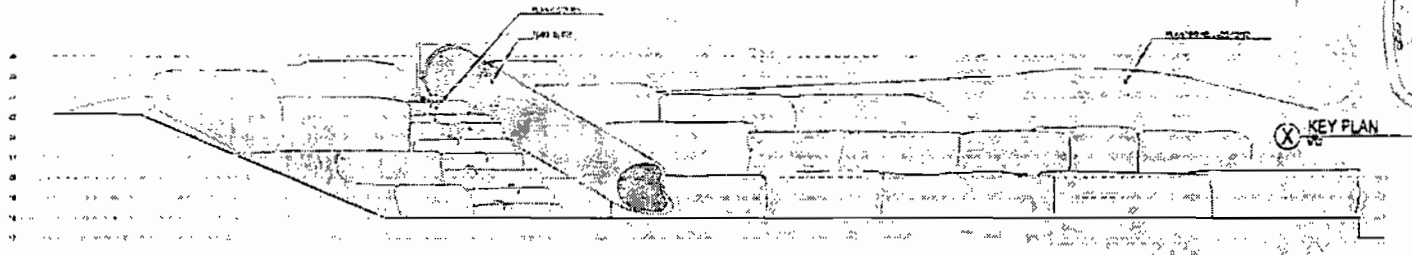
GMK DEVELOPMENT CORPORATION

LENDLEASE

SITE

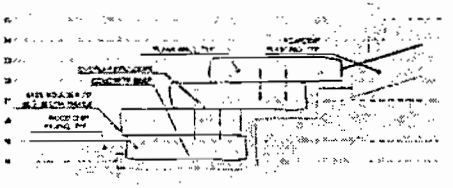
SITE DETAILS - WALLS

L-7.11.1

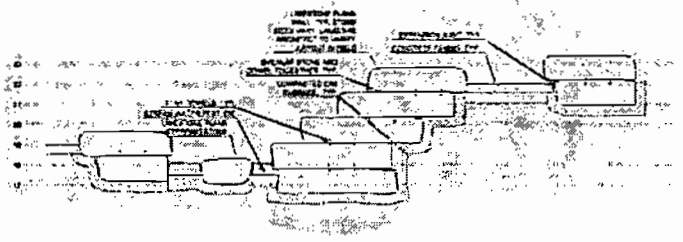


3 ELEVATION - PLANK WALL AT SOUTH PLAYGROUND

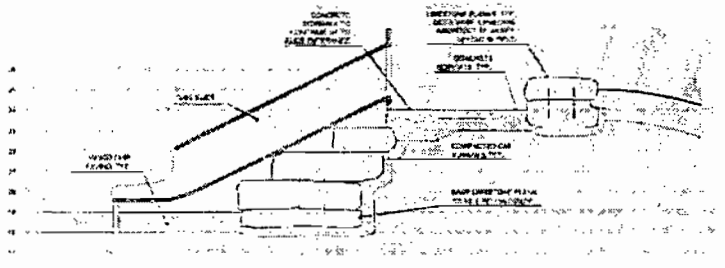
X KEY PLAN



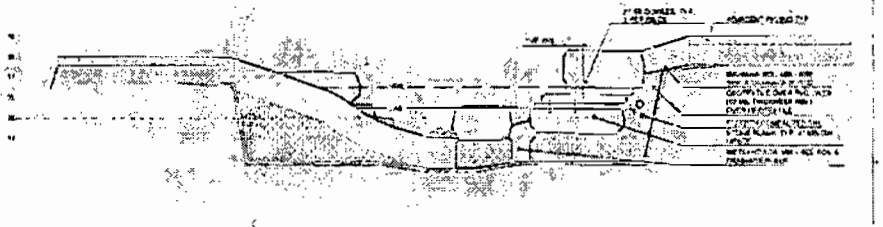
6 SECTION - PLANK WALL AT SOUTH PLAYGROUND



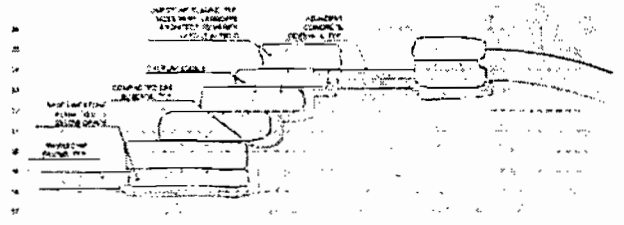
3 SECTION - PLANK WALL AT NORTH PLAYGROUND



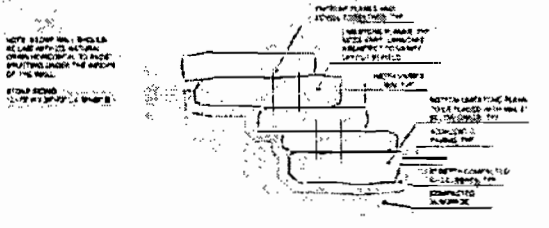
5 SECTION - PLANK WALL AT SOUTH PLAYGROUND



2 SECTION - WETLAND WALL AT BUILDING D



4 SECTION - PLANK WALL AT SOUTH PLAYGROUND



1 PLANK WALL, TYP.

PERKINS + WILL

KOERR SCHAUDT

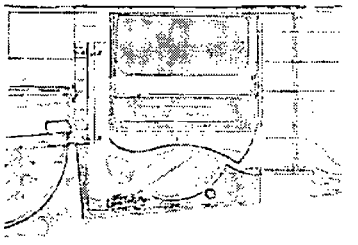
CITY OF CHICAGO

LEND LEASE

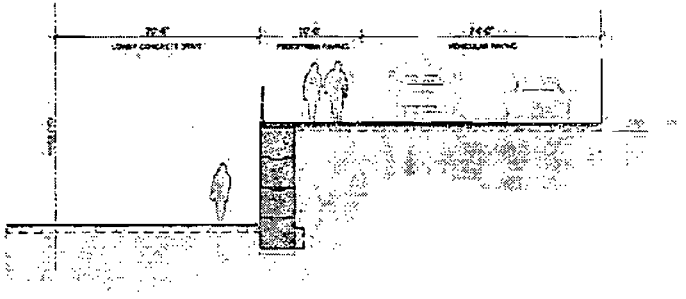
SITE

SITE DETAILS - WALLS

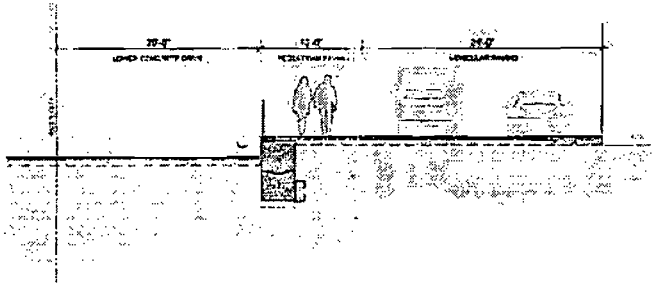
L-7.14



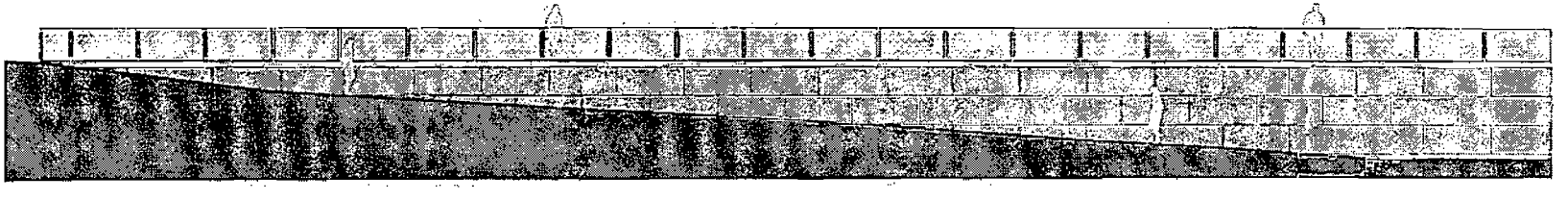
X KEY PLAN



3 SECTION - RETAINING WALL



2 SECTION - RETAINING WALL



1 ELEVATION - RETAINING WALL LOOKING SOUTH

PERKINS
+WILL

HOERR
SCHAUDT

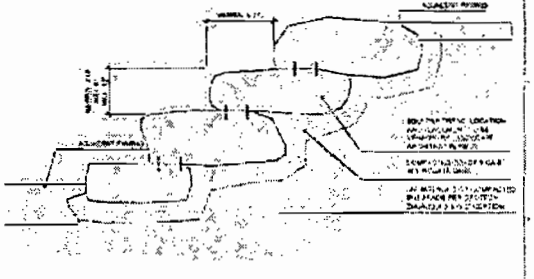
CITY OF CHICAGO

CBK DEVELOPMENT
CORPORATION

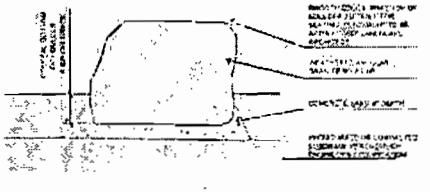
LEASE/LEASE

SITE

L-7.15



2 STONE PLANK STAIRS



1 STONE PLANK

PERKINS
+WILL

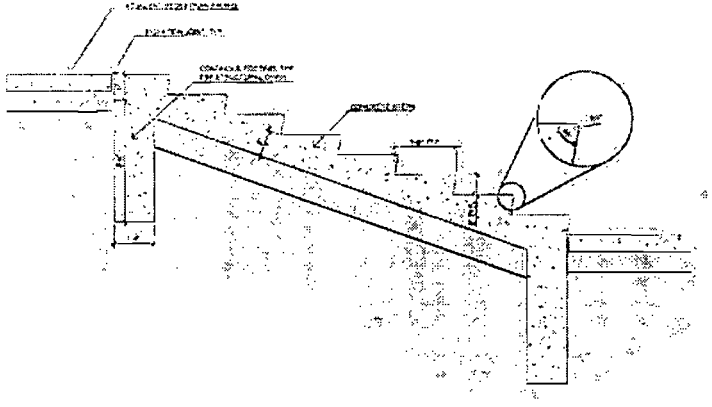
HOERR
SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.

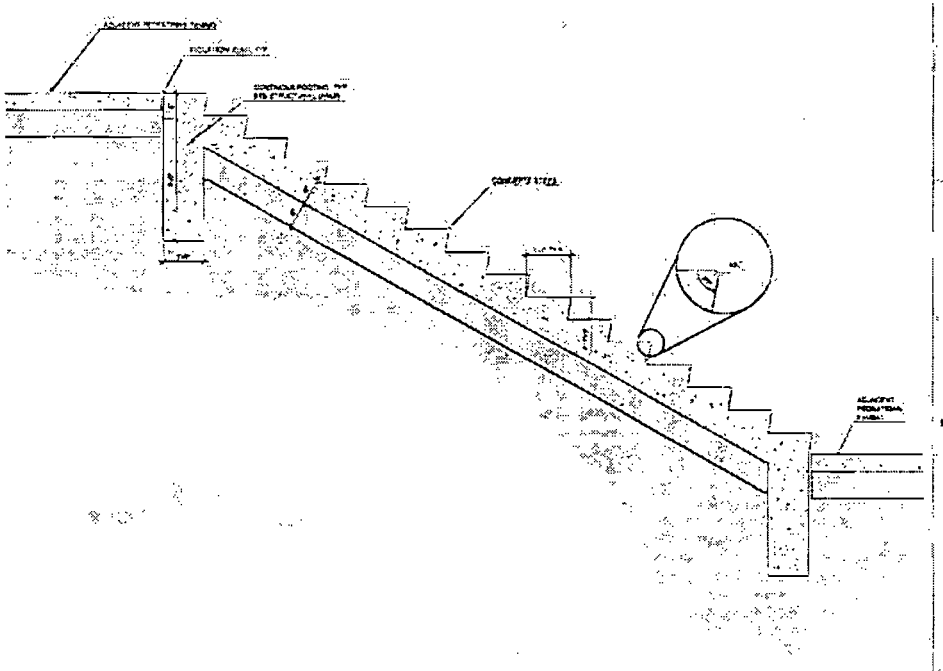
LENDLEASE

SITE

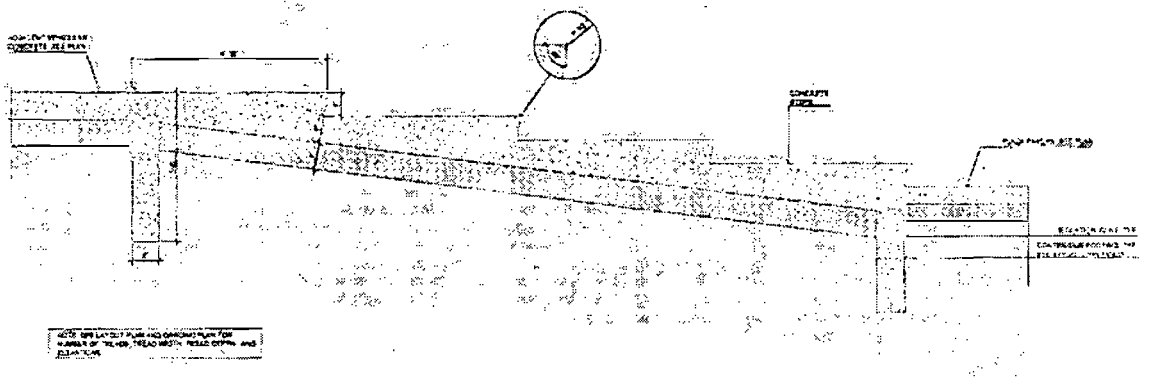
L-7.20



3 CONRETE STAIRS AT PLAYGROUND



2 CONRETE STAIRS AT POLK



1 MONUMENTAL CONCRETE STAIRS

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO
RAILROAD SPECIAL
ASSESSMENT DOCKET NO.
SHEET / WARRANT NO. 62830

CBK DEVELOPMENT CORPORATION

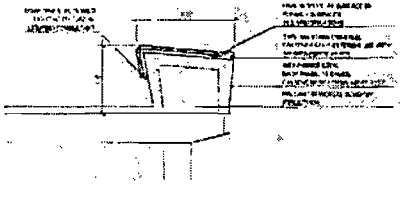
LENDLEASE

SITE

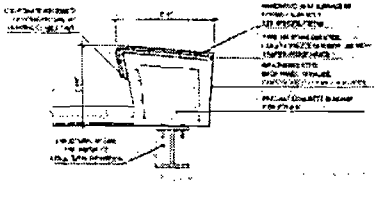
SITE DETAILS - STEPS

L-7.21

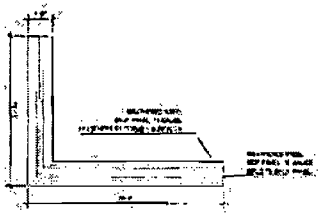
6 BENCH- SIDE ELEVATION AT PLAZA



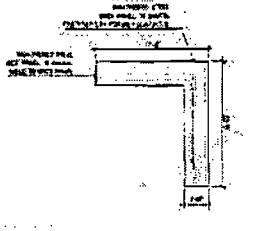
5 BENCH-SECTION AT POND EDGE



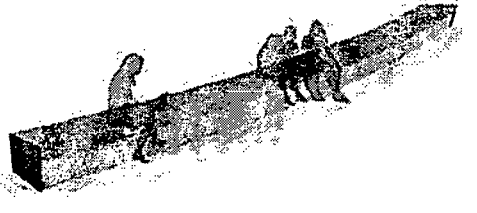
4 BENCH-SECTION AT PLAZA BRIDGE

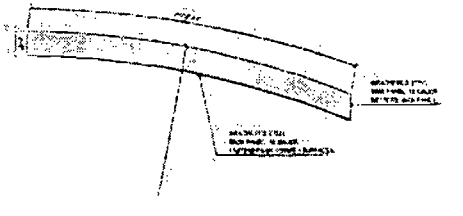


3 PLAZA BENCH 3



2 PLAZA BENCH 2





1 PLAZA BENCH 1

PERKINS + WILL

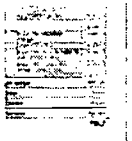
HOERR SCHAUDT

CITY OF CHICAGO

CRA DEVELOPMENT CORPORATION

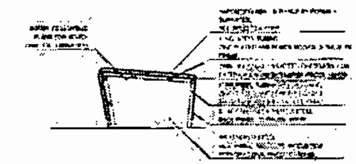
LOKALEASE

SITE

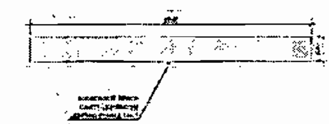


SITE DETAILS - BENCHES

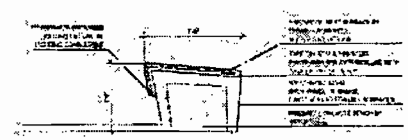
L-7.31



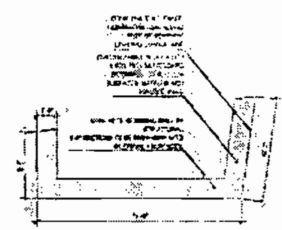
(4) POLK STREET - DOG RUN BENCH SECTION



(3) POLK STREET - DOG RUN BENCH PLAN



(2) POLK STREET - PLANTER BENCH SECTION



(1) POLK STREET - PLANTER BENCH PLAN

PERKINS
+WILL

HOERR
SCHAUDT

CITY OF CHICAGO
PINE-LINE SPECIAL
ASSESSMENT DOCKET NO.
SBB37 WARRANT NO. 82530

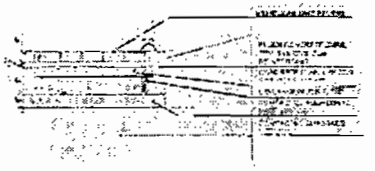
CMK DEVELOPMENT
CORPORATION

LENDLEASE

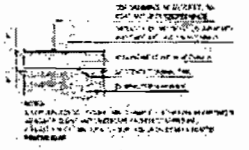
SITE

SITE DETAILS - BENCHES

L-7.32

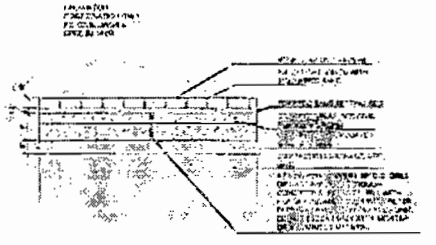


10 FLUSH CONCRETE CURB (C2)

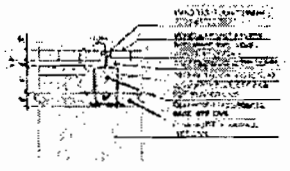


5 DECOMPOSED GRANITE (P6)

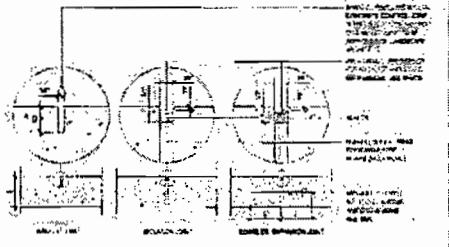
SEE CIVIL DRAWINGS



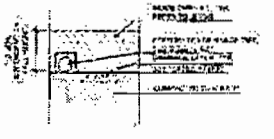
4 VEHICULAR UNIT PAVERS (P3)



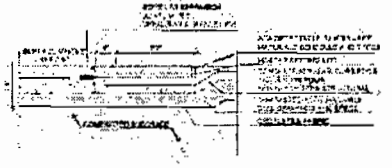
9 CONCRETE CURB (C1)



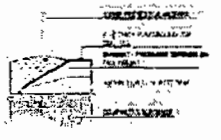
3 CONCRETE JOINTS



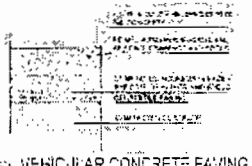
8 WOOD CHIP SURFACE (P12)



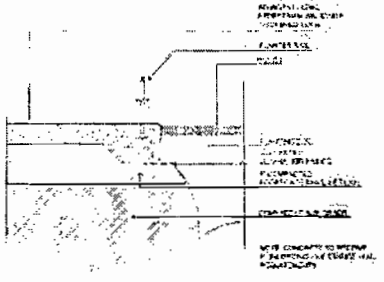
12 TRUNCATED DOME PAVER



7 RUBBER PLAY SURFACE (P7)



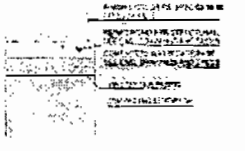
2 VEHICULAR CONCRETE PAVING (P2)



11 PLANTER CURB

SEE CIVIL DRAWINGS

6 RIP RAP (P5)



1 PEDESTRIAN CONCRETE PAVING (P1)

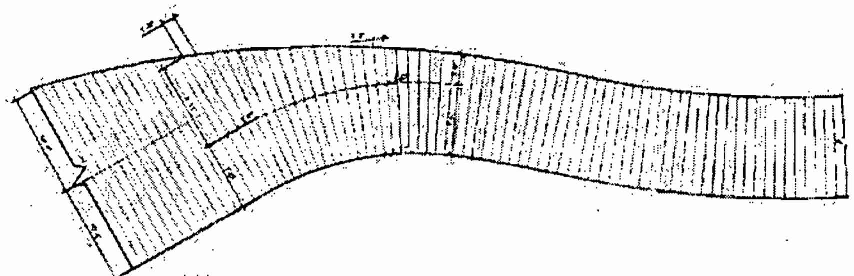
PERKINS +WILL

HOERR SCHAUDT

SITE

SITE DETAILS - PAVEMENT

L-7.40



2 CONCRETE BOARDWALK PLANK PATTERN EXAMPLE

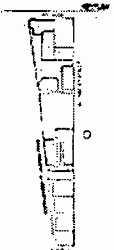
PERKINS
+WILL

NOERR
SCHAUDT

CITY OF CHICAGO
RATDLAKE SPECIAL
ASSESSMENT DOCKET NO.
58507 / WARRANT NO. 82530
CHICAGO ILLINOIS

GMK DEVELOPMENT
CORPORATION

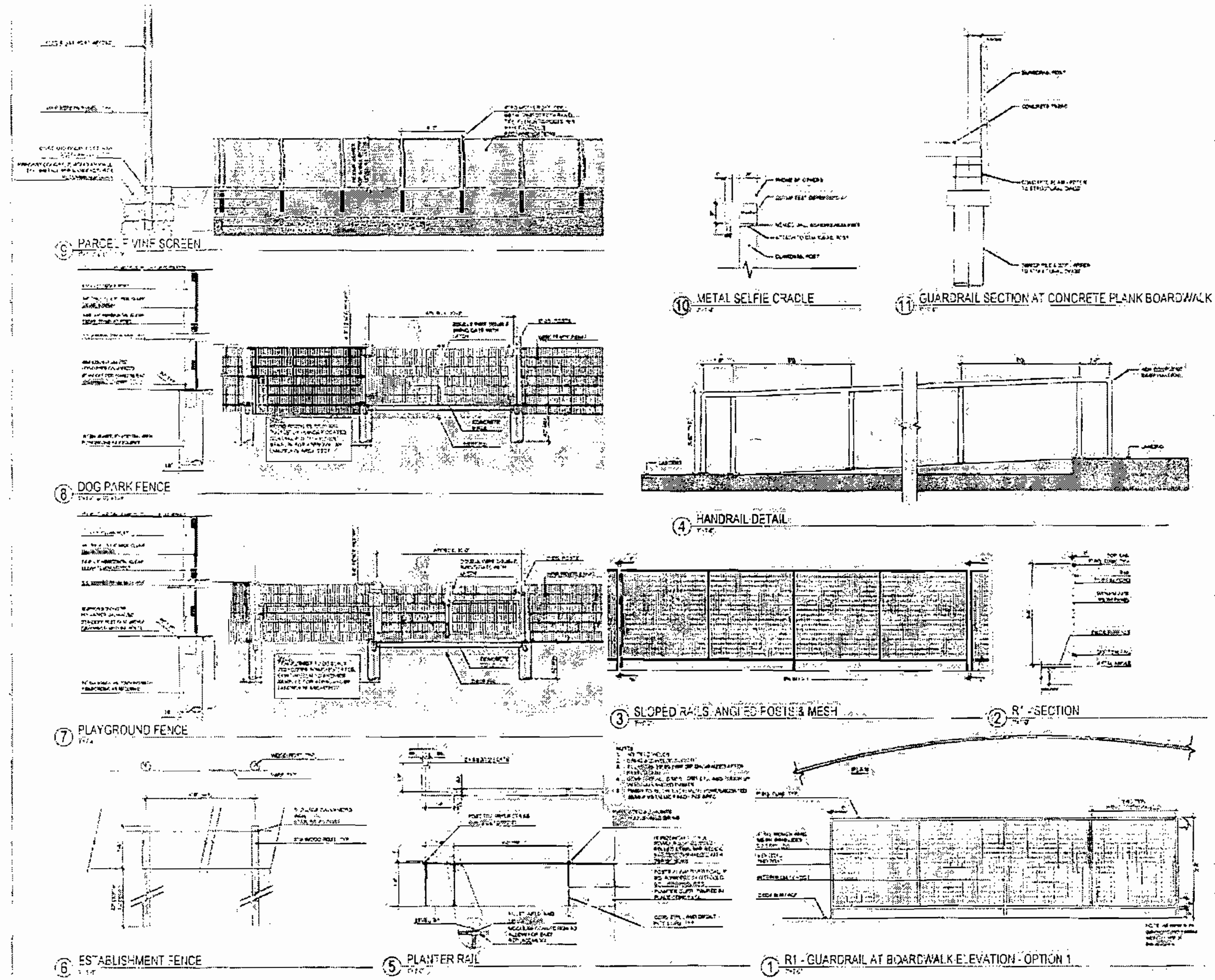
LENDLEASE



SITE

SITE DETAILS - PAVEMENT

L-7.41



PERKINS + WILL

HOERR SCHAUDT

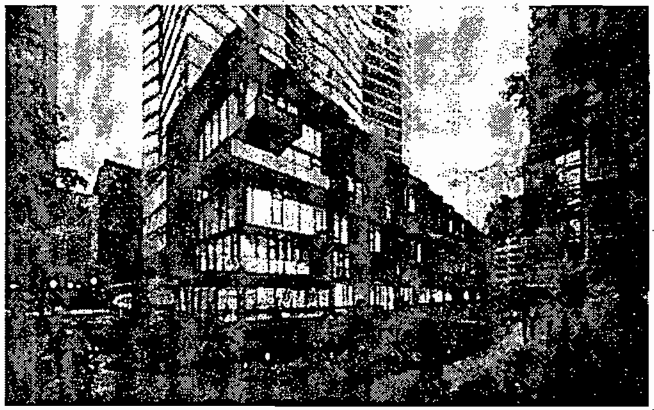
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DEVELOPMENT
WARRANT

CMK DEVELOPMENT CORPORATION

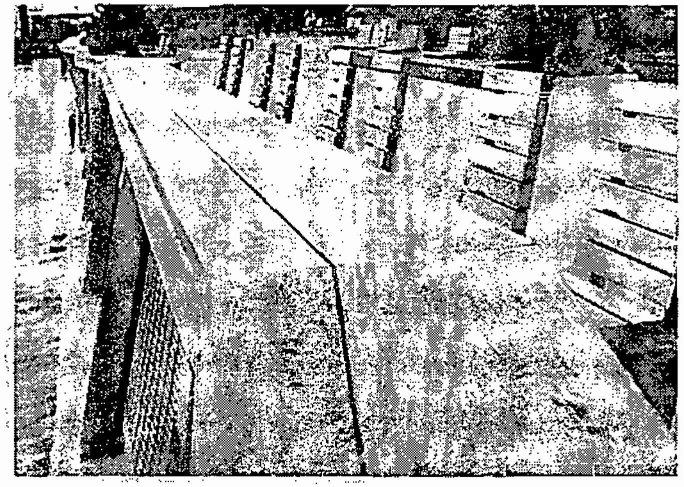
LENDLEASE

SITE

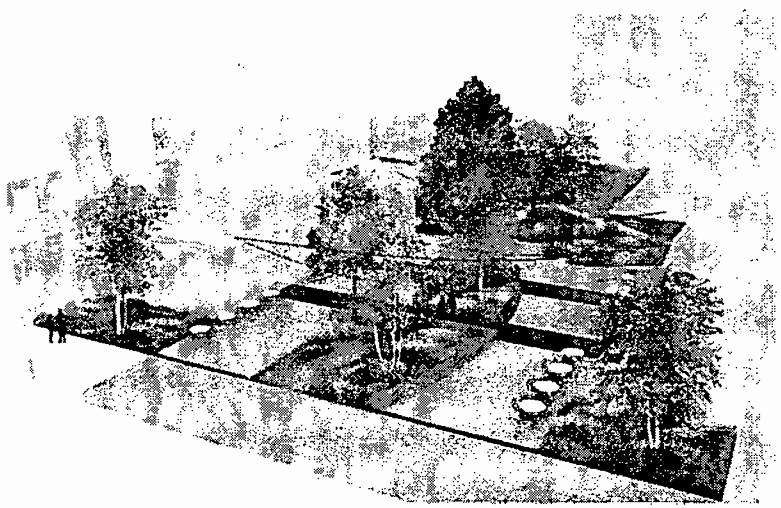
L-7.50



(4) RAILING WITH BAR TABLE / RAILING AT TERRACE. FOR REFERENCE ONLY



(3) RAILING WITH BAR TABLE. FOR REFERENCE ONLY



(5) OVERHEAD LIGHTING BETWEEN PLAZA. FOR REFERENCE ONLY

PERKINS
+WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RAYCLIUE SPECIAL
ASSESSMENT DOCKET NO.
[illegible] / WARRANT NO. [illegible]

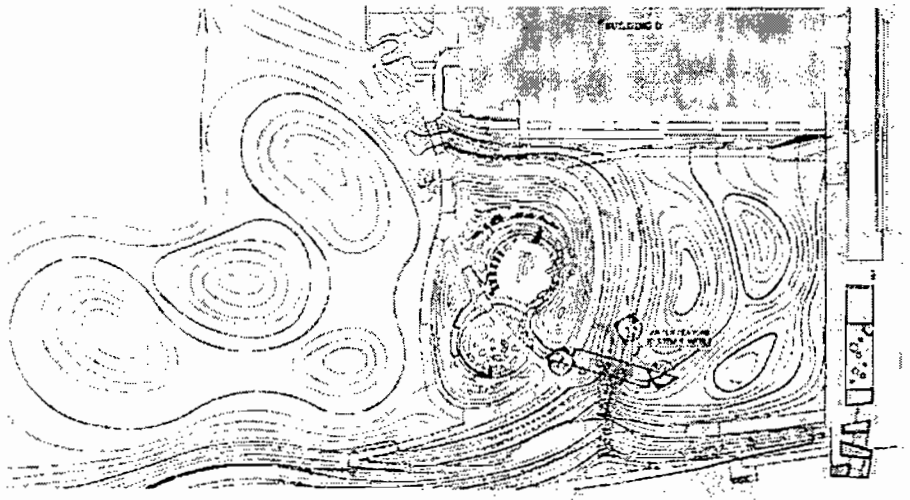
CRK DEVELOPMENT CORPORATION

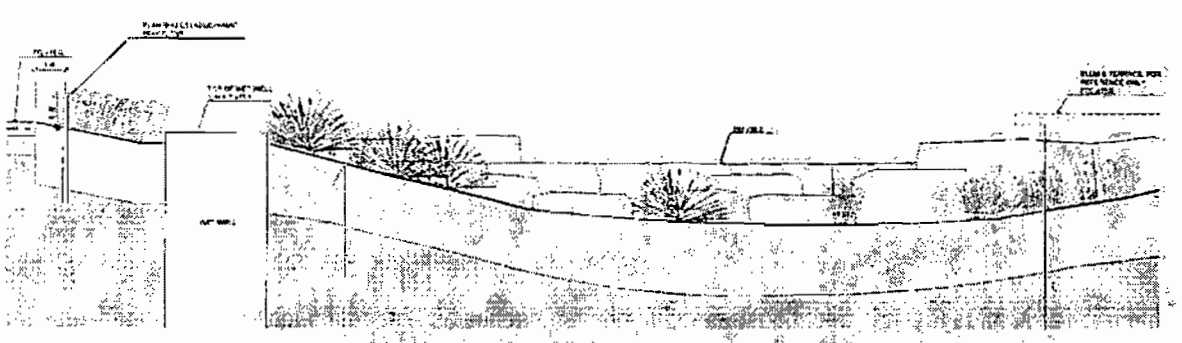
LENDLEASE

SITE

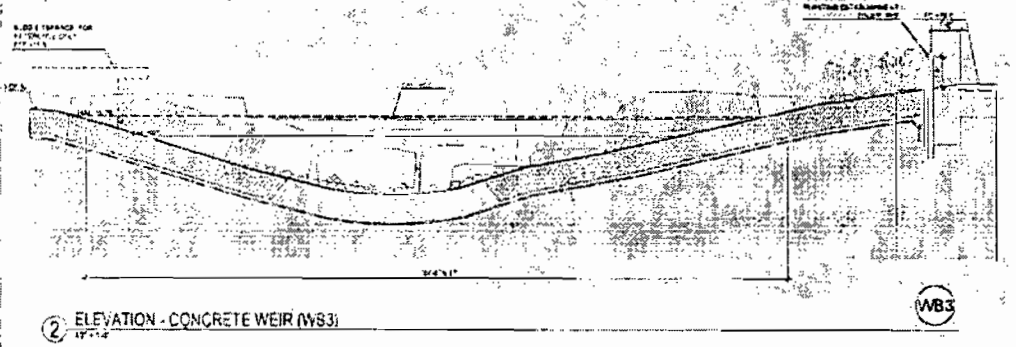
SITE DETAILS - RAILINGS

L-7.51

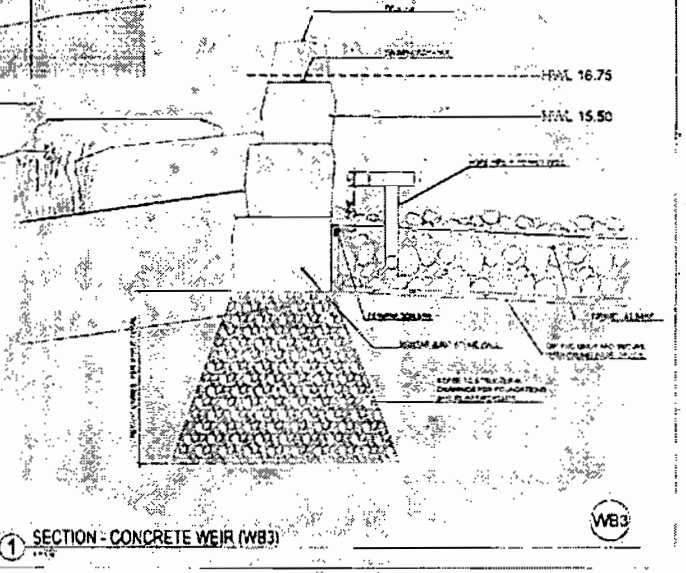




3 ELEVATION - CONCRETE WEIR (WB3)



2 ELEVATION - CONCRETE WEIR (WB3)



1 SECTION - CONCRETE WEIR (WB3)

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DOCKET NO.

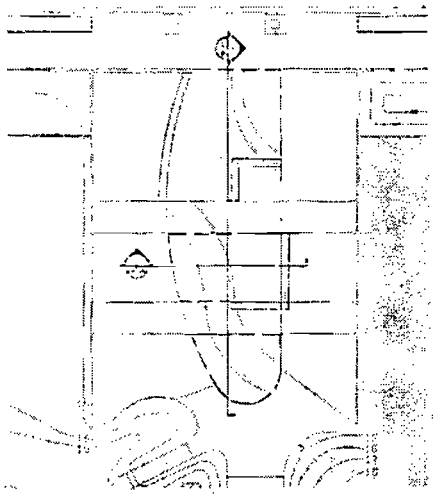
CMK DEVELOPMENT CORPORATION

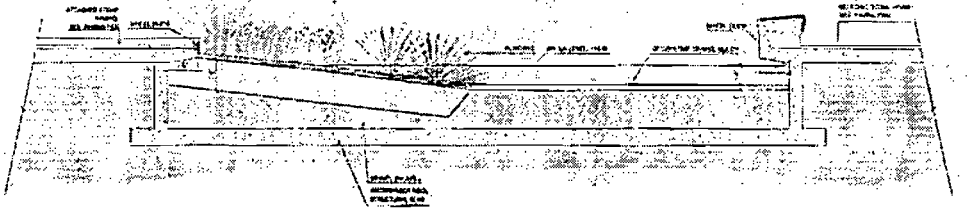
LENDLEASE

SITE

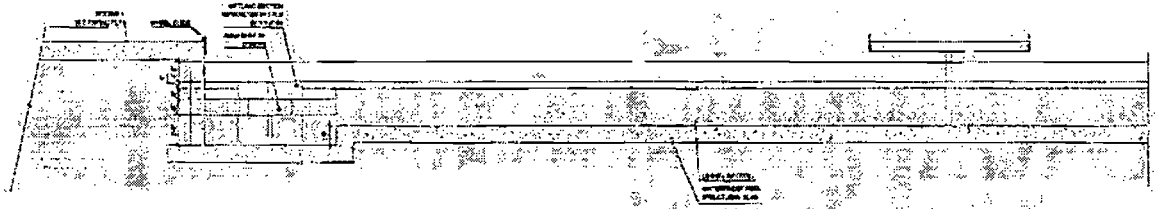
SITE DETAILS - WETLAND SYSTEM

L-7.70





② PLAZA - POOL EDGE



① PLAZA - POOL EDGE

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO

CBIX DEVELOPMENT CORPORATION

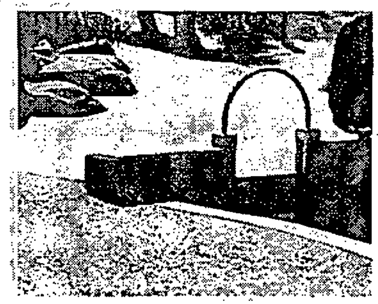
LENDLEASE

SITE

SITE DETAILS - WATERSCAPE

L-7.80

3 SPLASH PAD



2 WEIR GATE

1 STREAMS

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO
WAVELAND SPECIAL ASSESSMENT DISTRICT NO. / WARRANT NO.

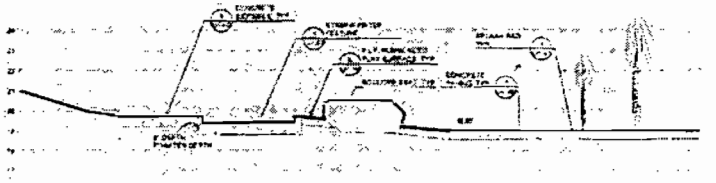
CMK DEVELOPMENT CORPORATION

LENDLEASE

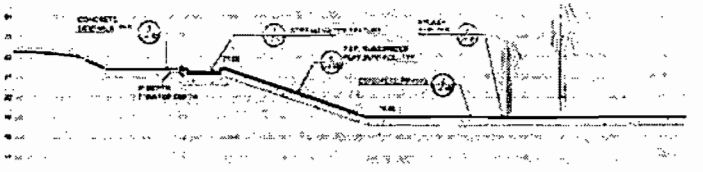
SITE

SITE DETAILS - WATERSCAPE PLAYGROUND

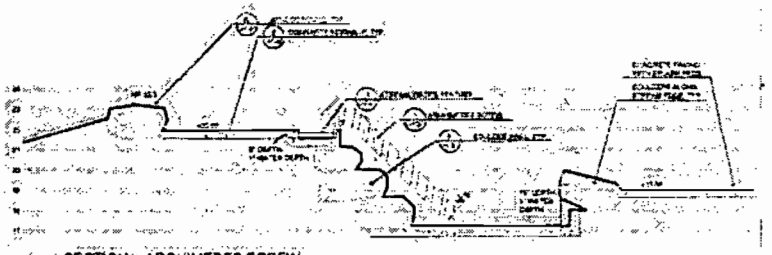
L-7.81



3 SECTION - SPLASH PAD AND STREAM

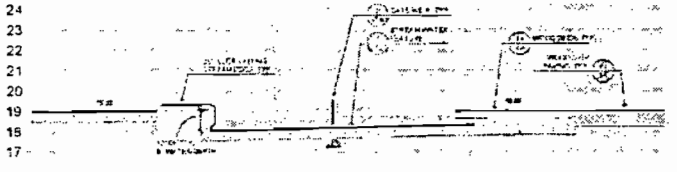


2 SECTION - SPLASH PAD AND PLAY SLOPE

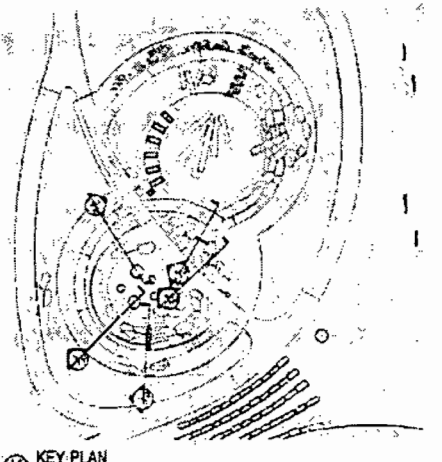


1 SECTION - ARCHIMEDES SCREW

5 SECTION - BRIDGE



4 SECTION - WIER GATE



X KEY PLAN

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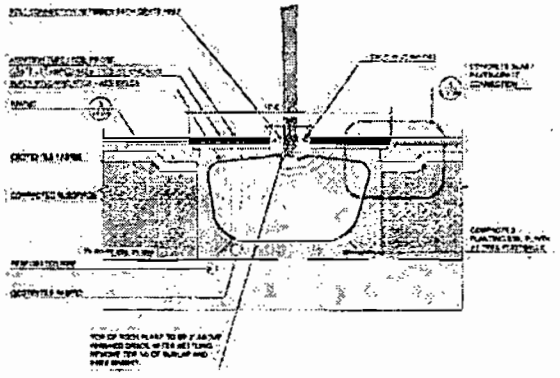
CITY OF CHICAGO

CDK DEVELOPMENT CORPORATION

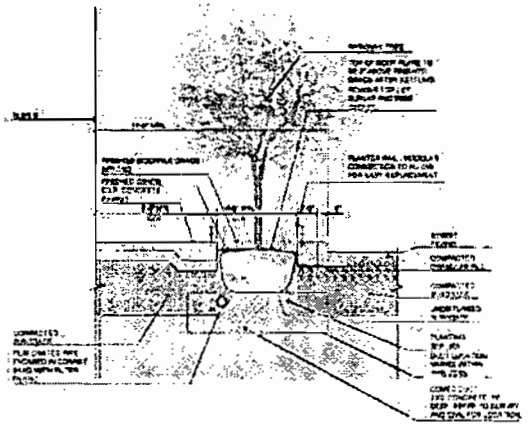
SITE

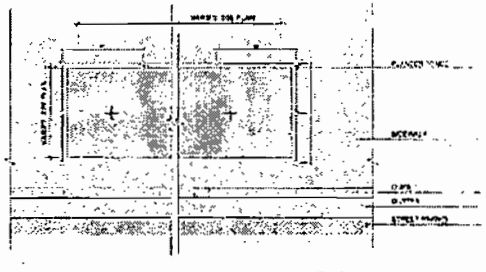
SITE DETAILS - WATERSCAPE STREAM

L-7.82



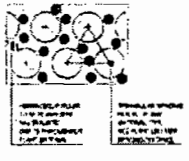
6 TREE GRATE PLANTING



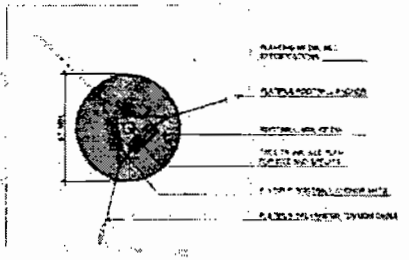


B - PLAN

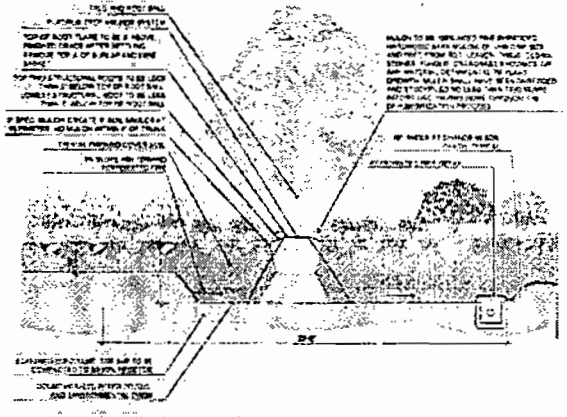
5 INFILTRATION PLANTER



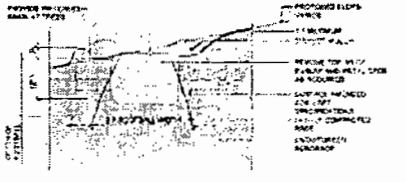
7 PLANT LAYOUT



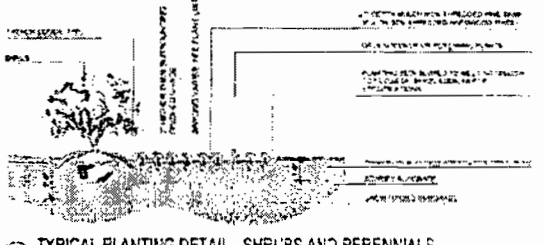
4 TYPICAL TREE BRACING PLAN



3 TREE AND SHRUB PLANTING



2 TREE PLANTED ON SLOPE



1 TYPICAL PLANTING DETAIL - SHRUBS AND PERENNIALS

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CBM DEVELOPMENT CORPORATION

SITE

L-8.00

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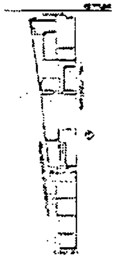
HOERR SCHAUDT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DOCKET NO. 58217 - WARRANT NO. 6530

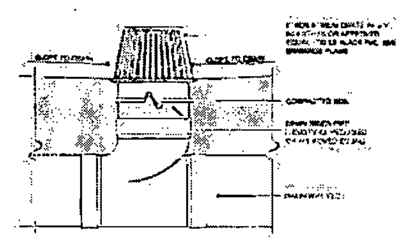
CMK DEVELOPMENT CORPORATION

LENDLEASE

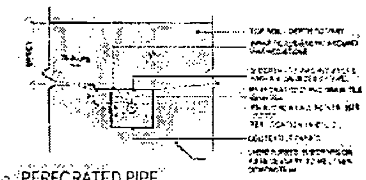


SITE

3 MITRED DRAIN OUTLET



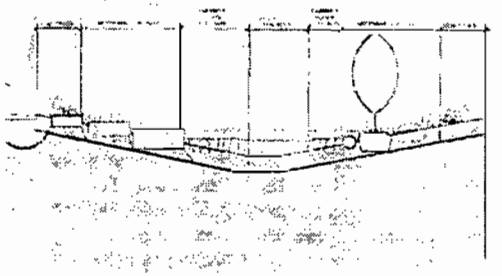
2 ATRIUM DRAIN



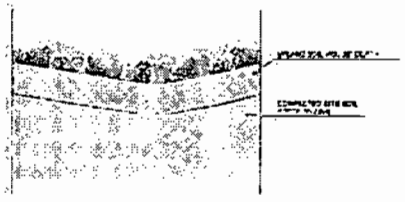
1 PERFORATED PIPE

SITE DETAILS - DRAINAGE

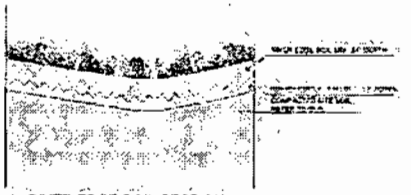
L-8.01



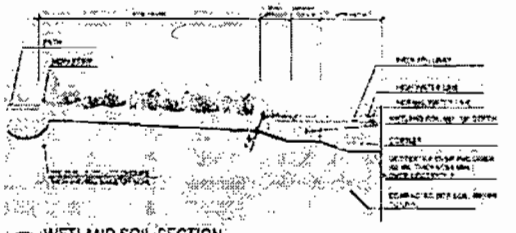
4 BLDG E WETLAND SECTION



3 UPLAND SOIL SECTION



2 RIVER EDGE SOIL SECTION



1 WETLAND SOIL SECTION

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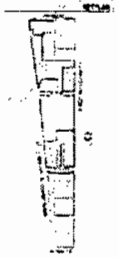
RIVERLANE SPECIAL
ASSESSMENT DOCKET NO.
[illegible] / WARRANT NO. [illegible]

GBK DEVELOPMENT CORPORATION

LOCKLEASE

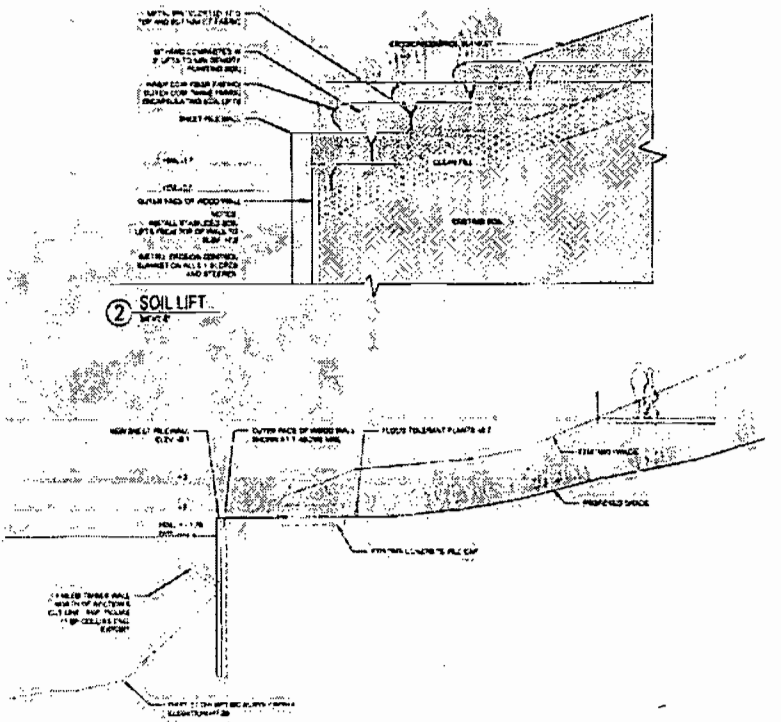


SITE

SITE DETAILS - SOIL

L-8.10

KEY PLAN



2 SOIL LIFT

1 RIVER EDGE SECTION

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DOCKET NO. ... / WARRANT NO. ...

CMS

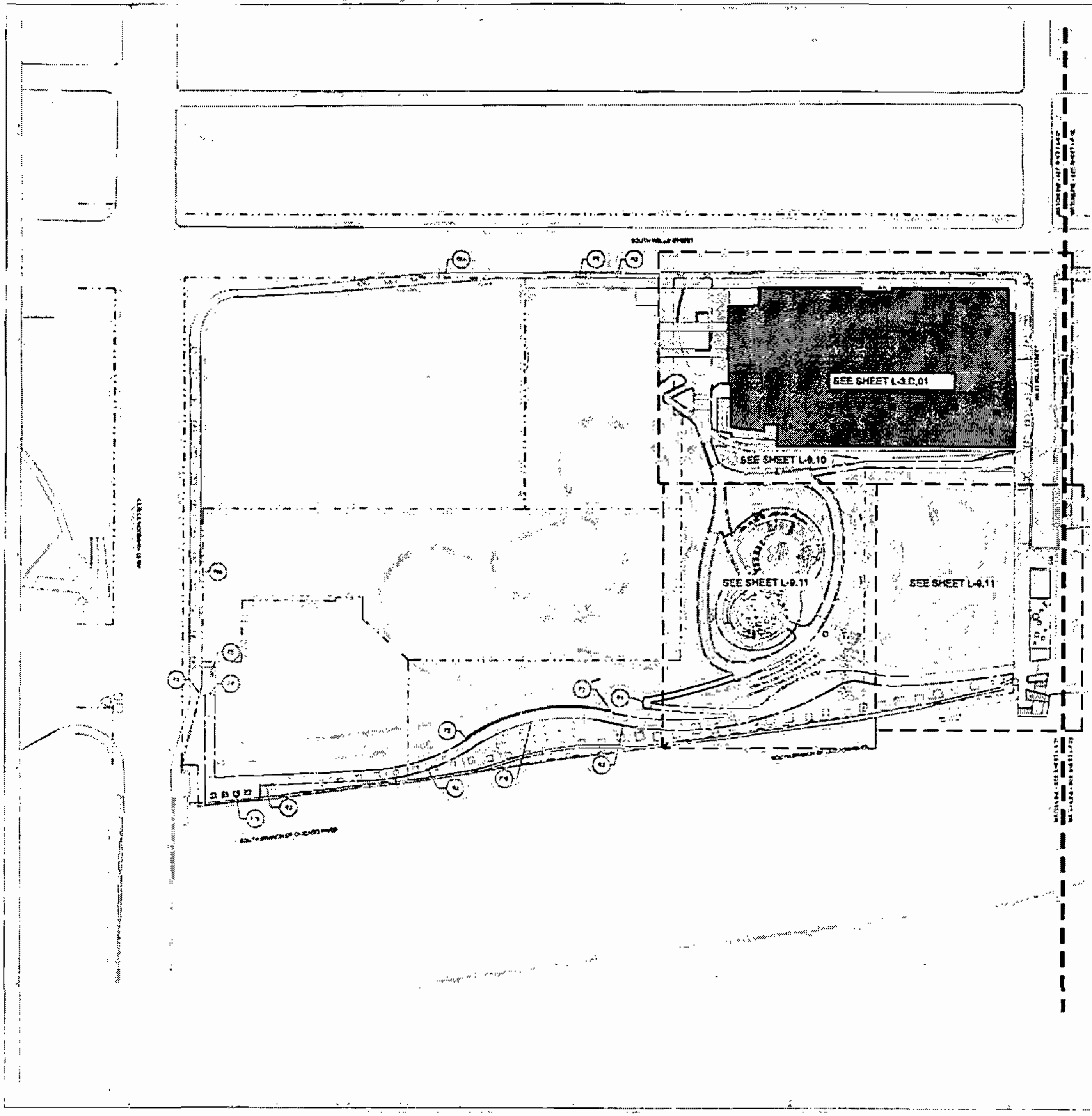
CMS DEVELOPMENT CORPORATION

LENDLEASE

SITE

SITE DETAILS - RIVER EDGE

L-8.11



SITE FURNISHINGS LEGEND

SITE FURNISHING NOTES

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+ WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
SHEET / WARRANT NO.
CHICAGO ILLINOIS

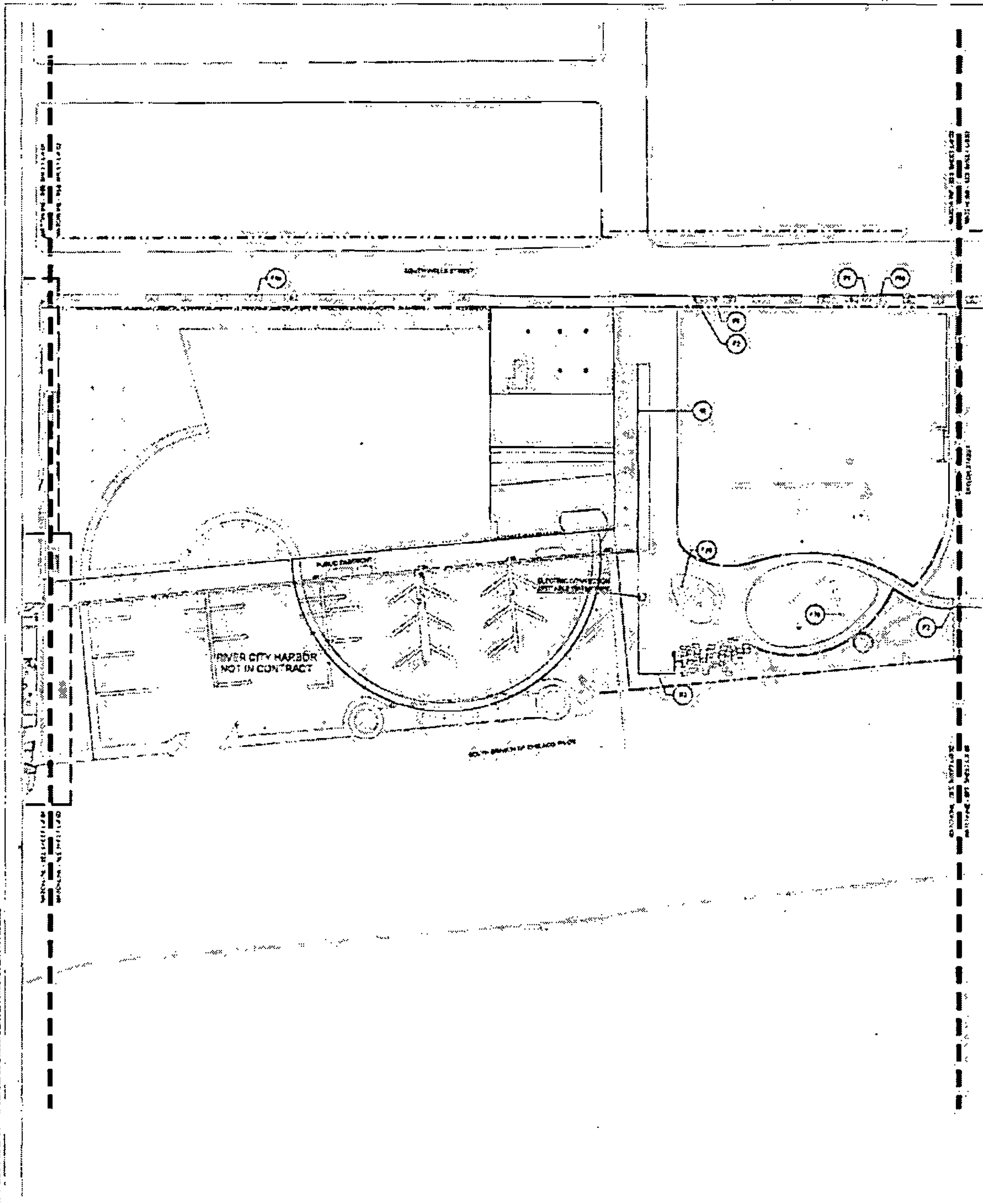
CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

SITE FURNISHINGS - NORTH

L-9.01



SITE FURNISHING LEGEND

SITE FURNISHING NOTES

PERKINS +WILL

HOERR SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.

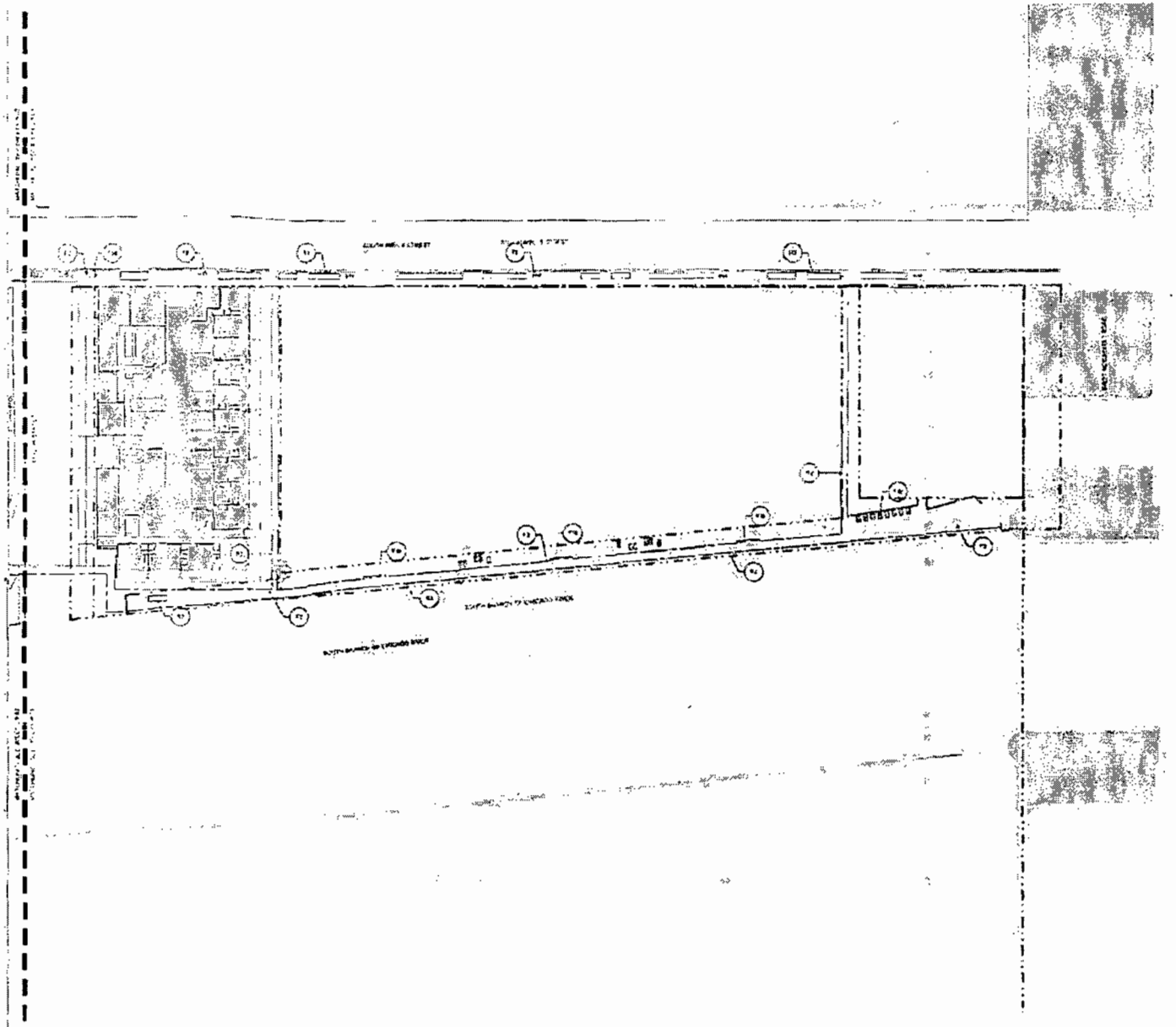
CMK DEVELOPMENT CORPORATION

LENDLEASE

SITE

SITE FURNISHINGS - MIDDLE

L-9.02



SITE FURNISHING LEGEND

SITE FURNISHING NOTES

1. REFER TO CIVIL DRAWINGS FOR THE LOCATION OF ALL CHECKPOINT GUIDELINES

PERKINS + WILL

HOERR SCHAJOT

CITY OF CHICAGO RIVERLINE SPECIAL ASSESSMENT DISTRICT NO. [illegible] / WARRANT NO. [illegible]

CBK DEVELOPMENT CORPORATION

LENDLEASE

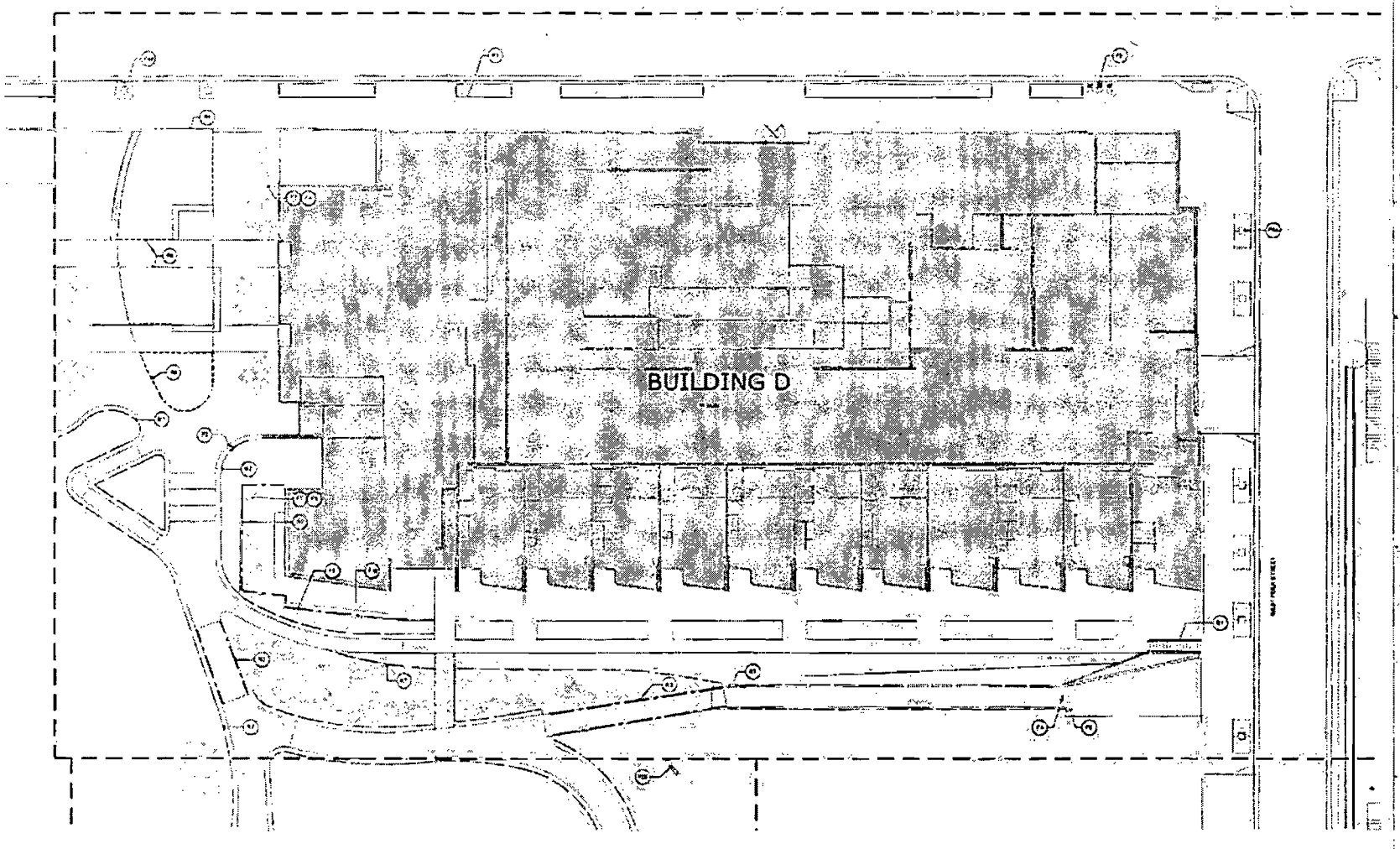
SITE

SITE FURNISHINGS - SOUTH

L-9.03

SITE FURNISHING LEGEND

SITE FURNISHING NOTES



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CITY OF CHICAGO
RIVERLINE SPECIAL

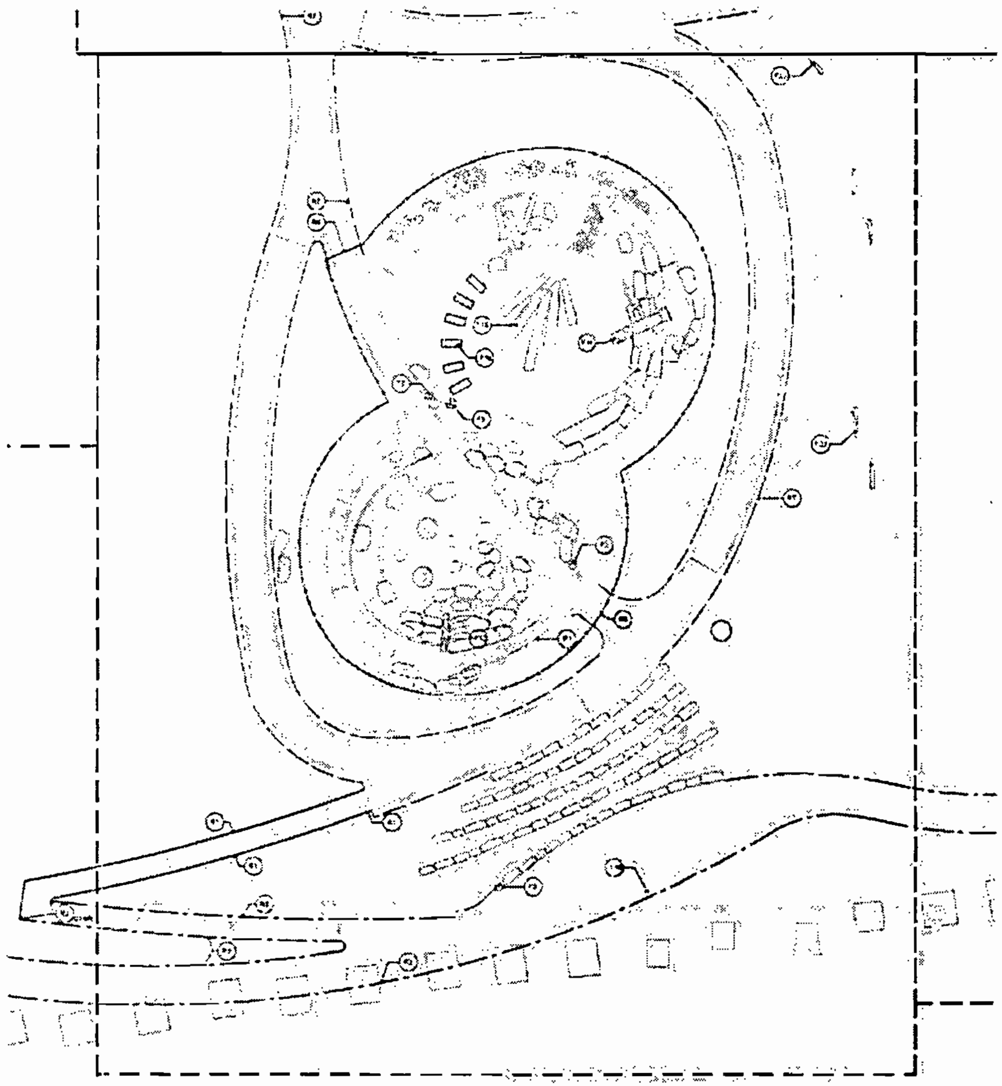
CBM DEVELOPMENT CORPORATION

LENDLEASE

SITE

SITE FURNISHING PLAN - PLAZA

L-9.10



SITE FURNISHING LEGEND

SITE FURNISHING NOTES

PERKINS + WILL

HOERR SCHAUDT

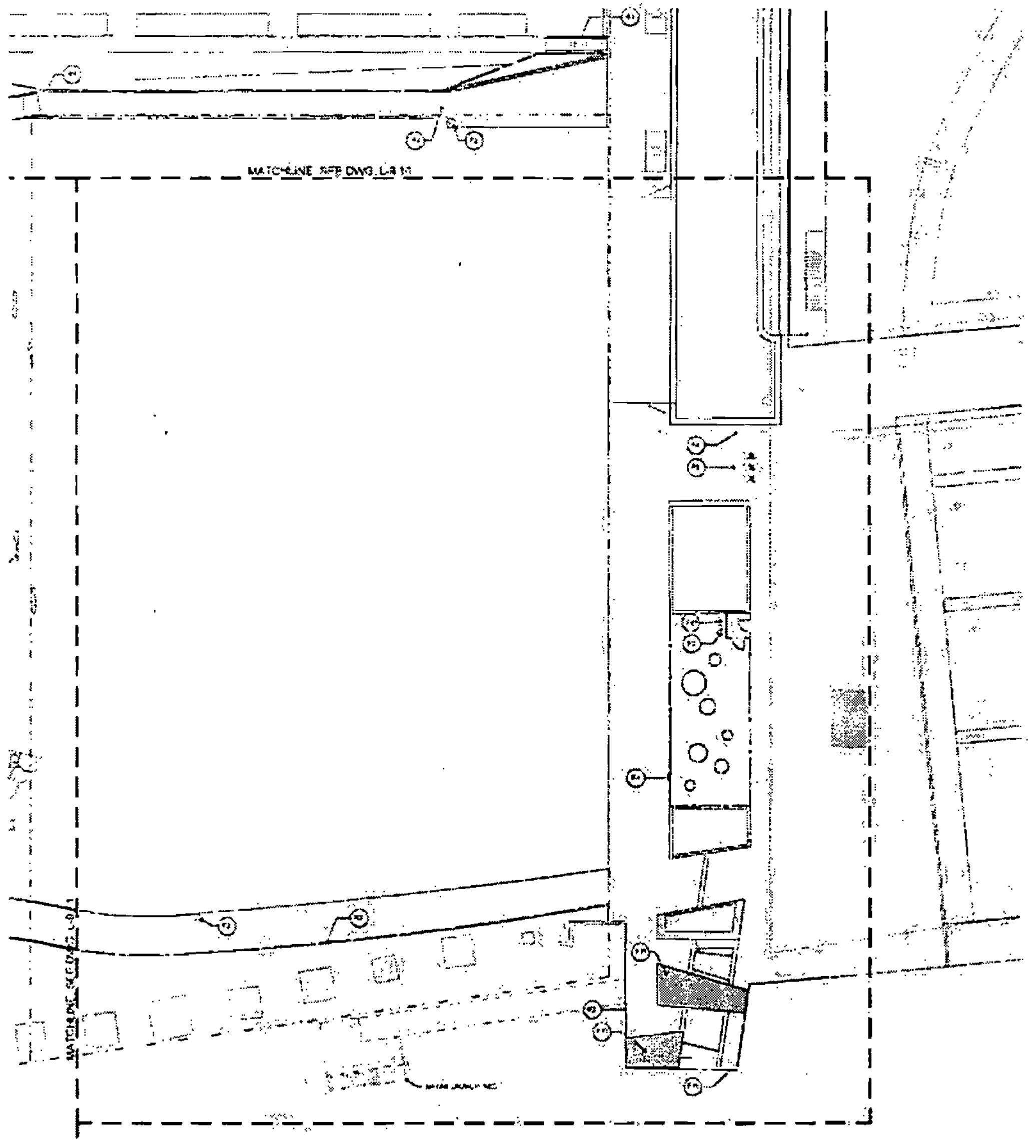
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.

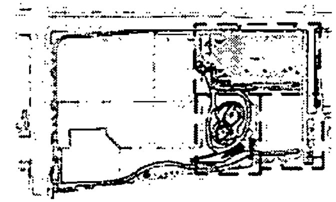
CMK DEVELOPMENT
CORPORATION

SITE

SITE FURNISHING PLAN - PLAYGROUND

L-9.11





SITE FURNISHING LEGEND

SITE FURNISHING NOTES

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CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
/ WARRANT NO.
CHICAGO, ILLINOIS

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CORPORATION

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SITE

SITE FURNISHINGS PLAN - POLK STREET

L-9.12

SITE FURNISHINGS

RAILINGS AND FENCES

KEY	CODE	PRODUCT	NAME / MODEL NUMBER / MATERIAL	COLOR / SIZE	MANUFACTURER	USE / AREA	QUANTITY	DETAIL
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[illegible]	[illegible]	Guardrail	Option 1 - [illegible] Option 2 - [illegible]	[illegible]	Custom	[illegible]	—	[illegible]
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[illegible]

SITE FURNISHINGS

SITE FURNISHINGS

KEY	CODE	PRODUCT	NAME / MODEL NUMBER / MATERIAL	COLOR / SIZE	MANUFACTURER	USE / AREA	QUANTITY	DETAIL
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PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL ASSESSMENT DOCKET NO.
[illegible]

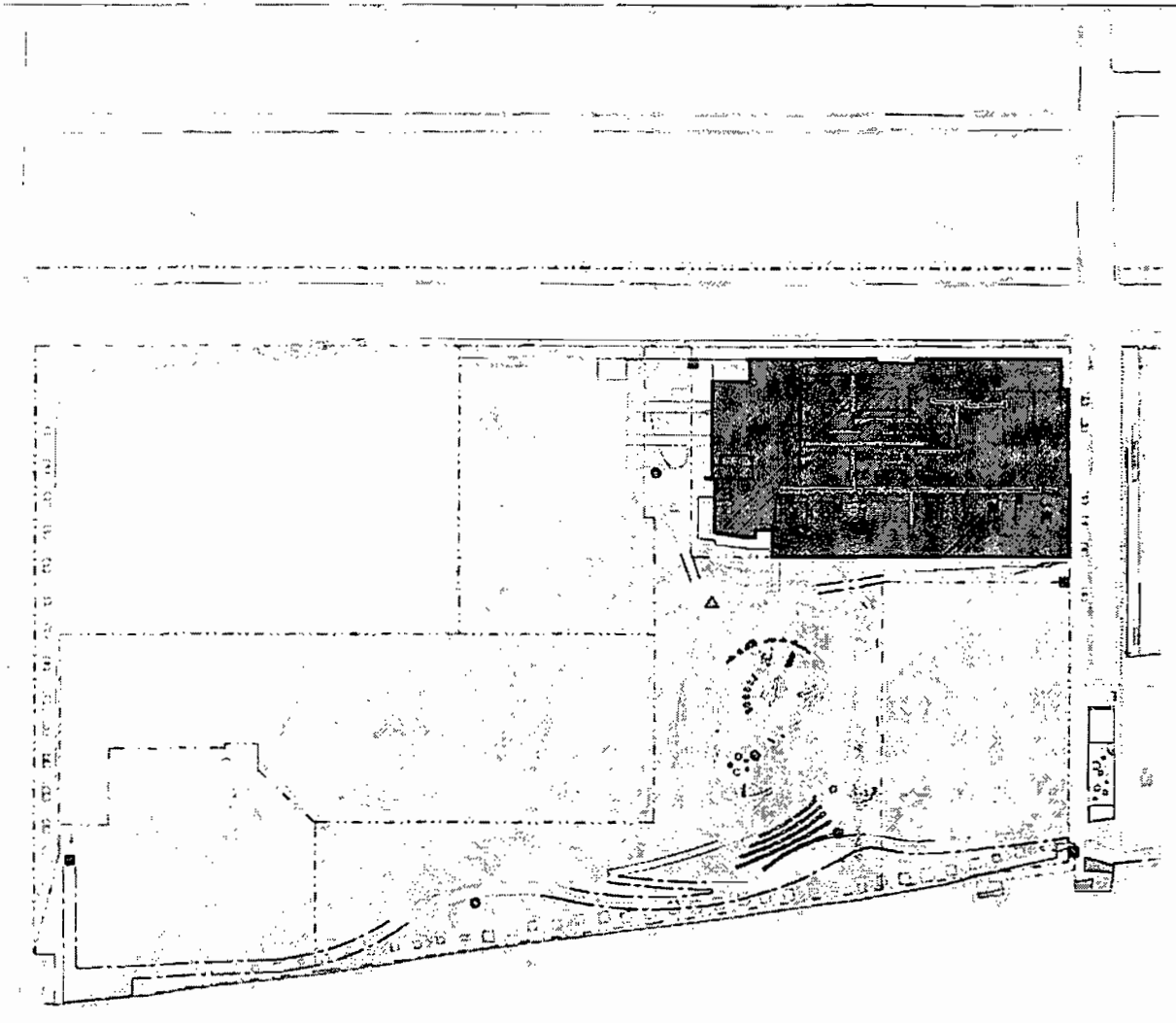
CMK DEVELOPMENT CORPORATION

LENDLEASE

SITE

SITE FURNISHING SCHEDULE

L-9.19



WAYFINDING AND SIGNAGE LEGEND:

WAYFINDING AND SIGNAGE NOTES:

PERKINS + WILL

HOERR SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL

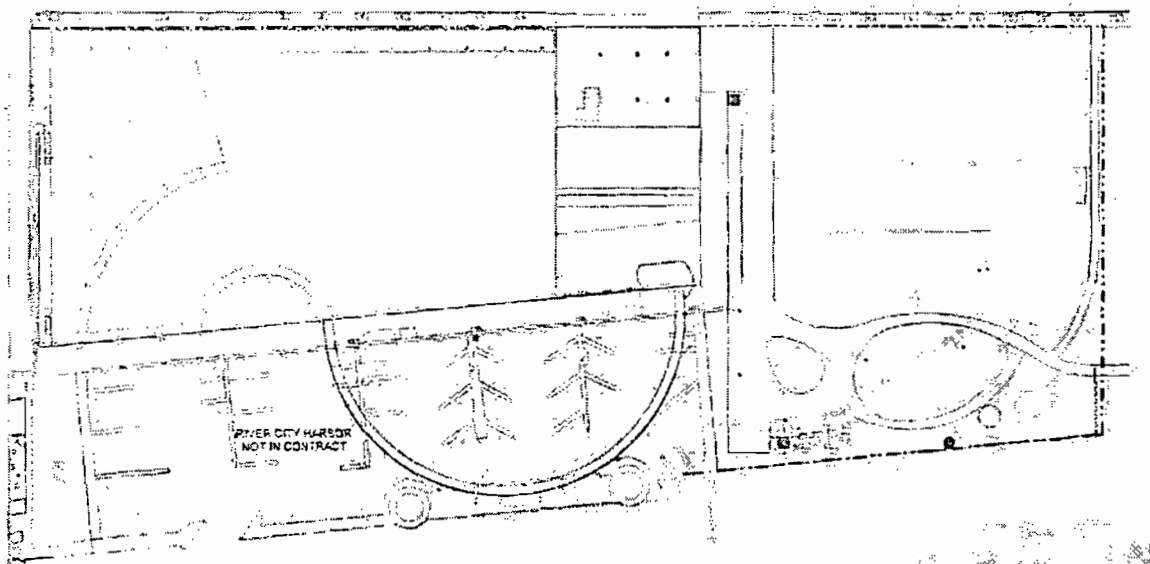
CRA DEVELOPMENT CORPORATION

LOKELEASE

SITE

WAYFINDING - NORTH

L-9.40



WAYFINDING AND SIGNAGE LEGEND

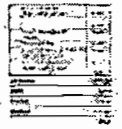
WAYFINDING AND SIGNAGE NOTES

PERKINS + WILL

ROBERT SCHMIDT

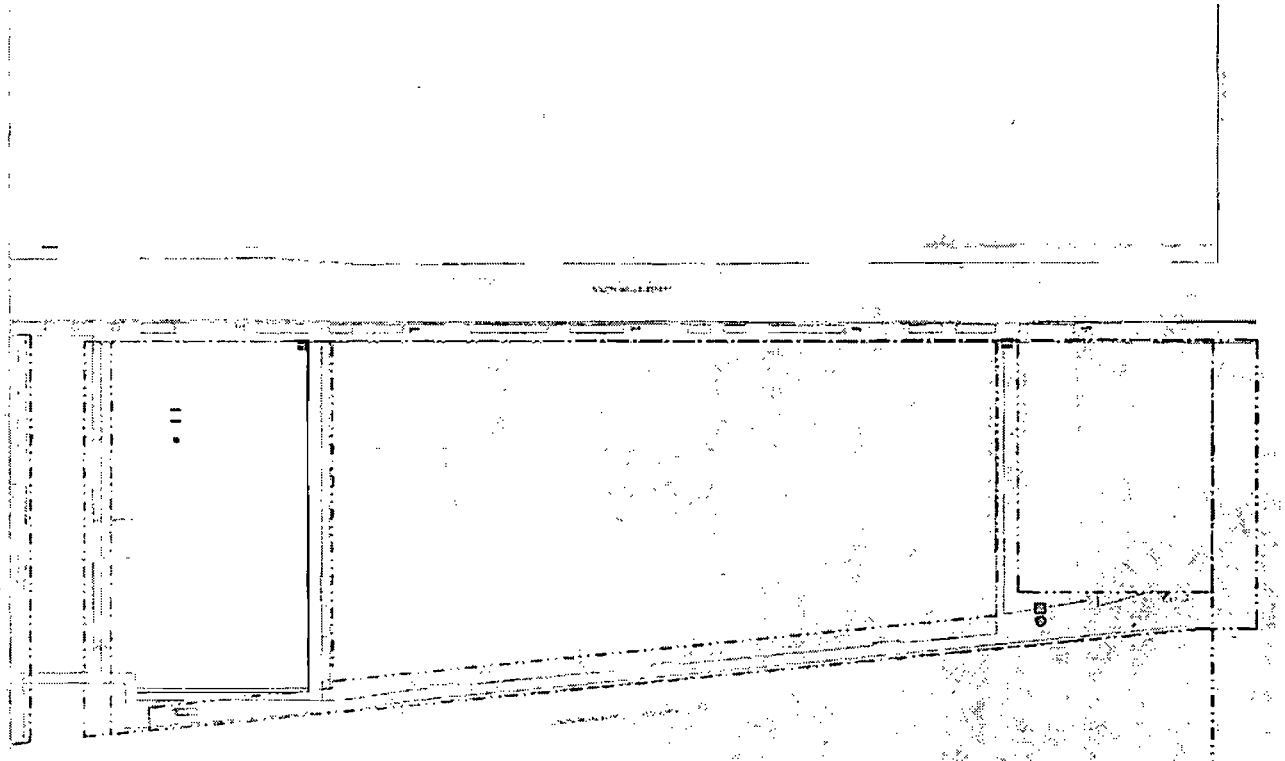
CNK DEVELOPMENT CORPORATION

SITE



WAYFINDING - RIVERLINE

L-9.41



WAYFINDING AND SIGNAGE LEGEND

WAYFINDING AND SIGNAGE NOTES

PERKINS + WILL

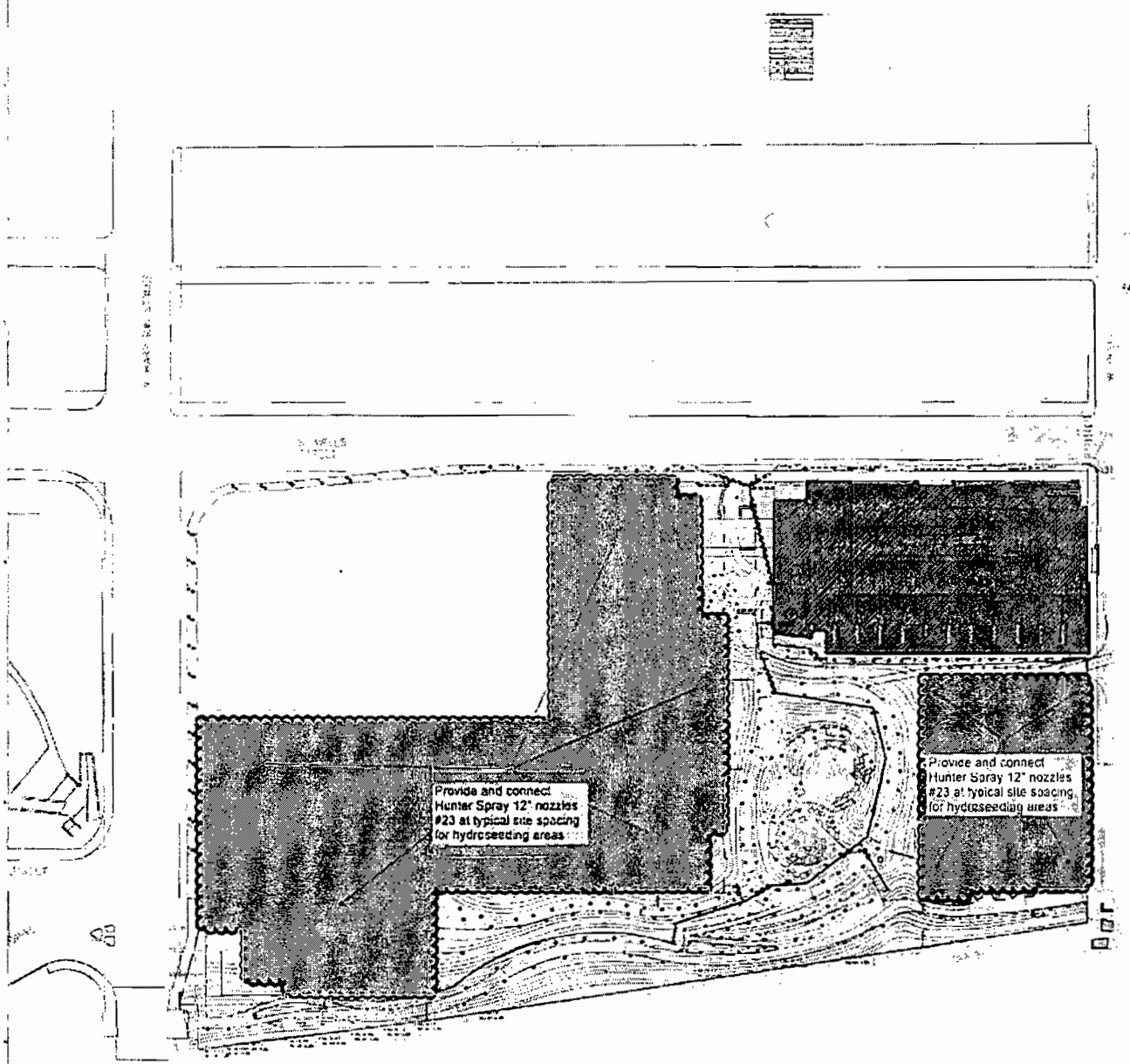
CITY OF CHICAGO

CBX DEVELOPMENT CORPORATION

SITE

WAYFINDING - SOUTH

L-9.42

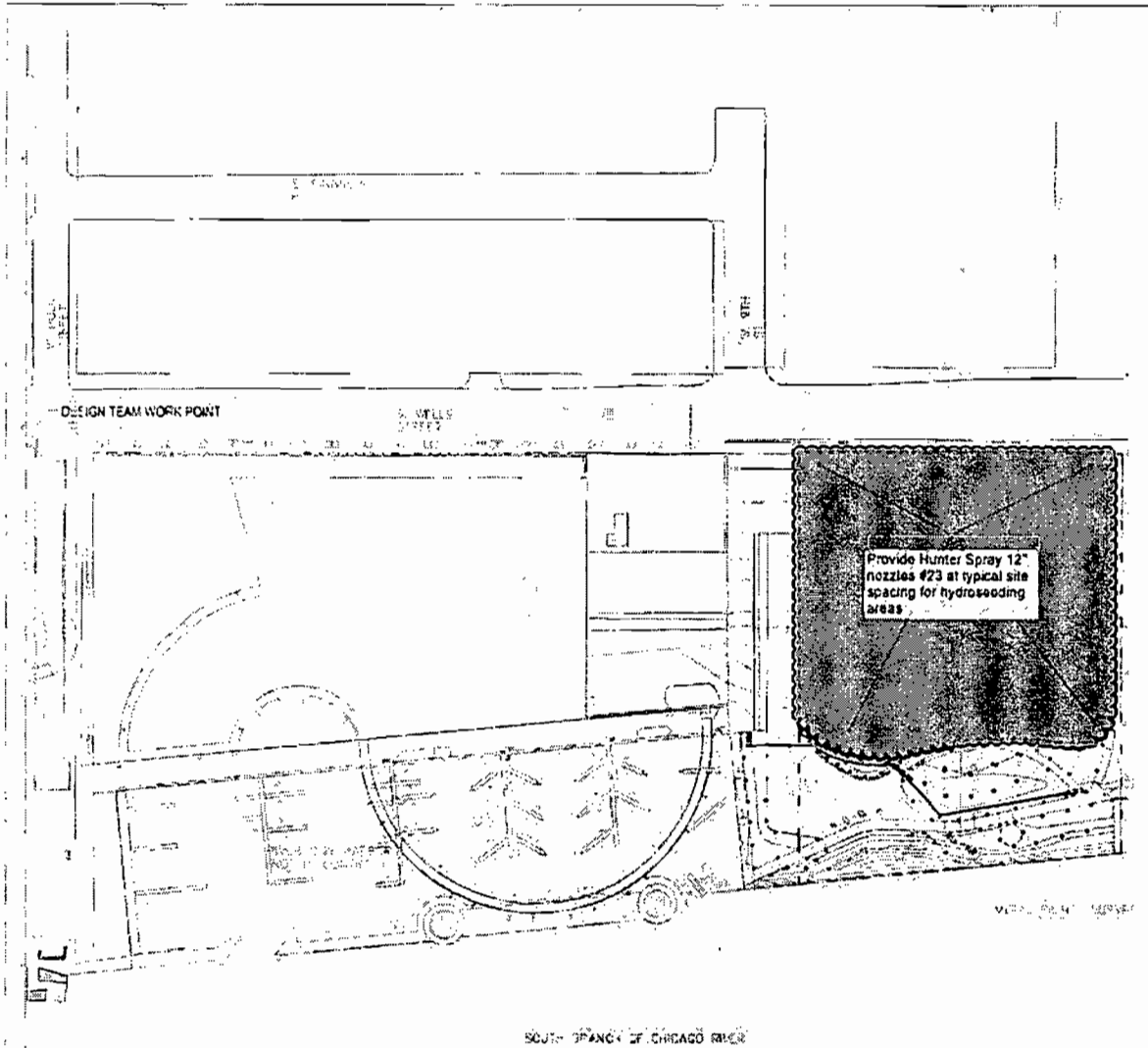


PERKINS
+WILL

HOERR
SCHAUDT

SITE

I-1.01



SOUTH BRANCH OF CHICAGO RIVER

KEY

GENERAL IRRIGATION NOTES

PERKINS + WILL

HOERR SCHAUDT

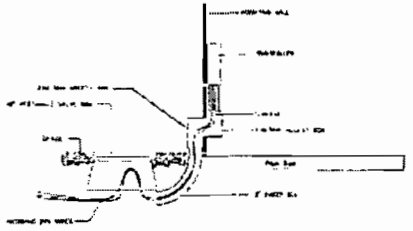
CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
WARRANT NO.

CMR DEVELOPMENT CORPORATION

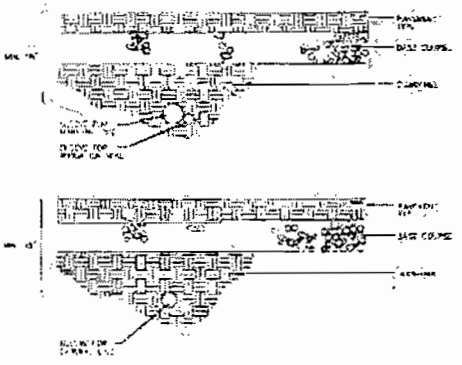
LENDLEASE

SITE

I-1.02

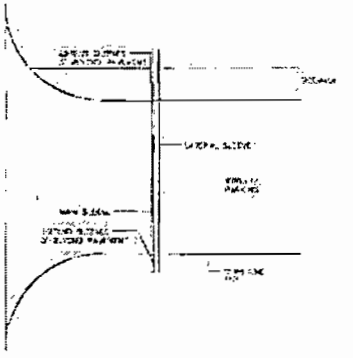


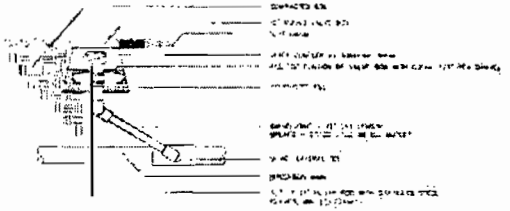
8 CONTROLLER MOUNTING



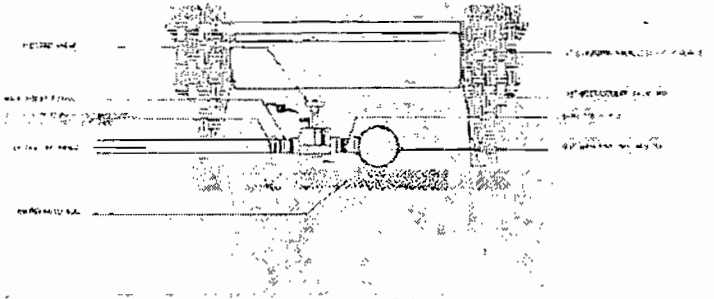
7 SLEEVING

NO SCALE

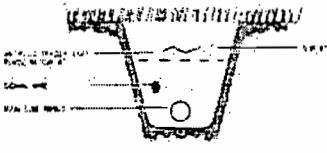




6 QUICK COUPLER VALVE

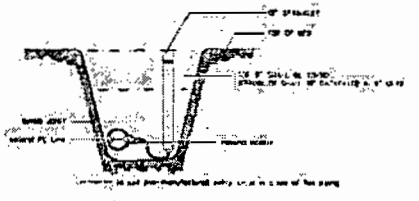


5 ELECTRIC VALVE / LATERAL TAP CONNECTION

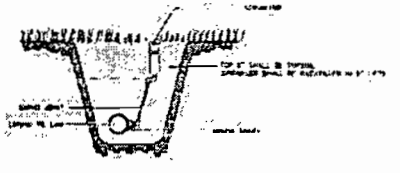


4 WIRE TRENCH

3 ISOLATION VALVE



2 12" SPRAY HEAD



1 4" SPRAY HEAD

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+WILL

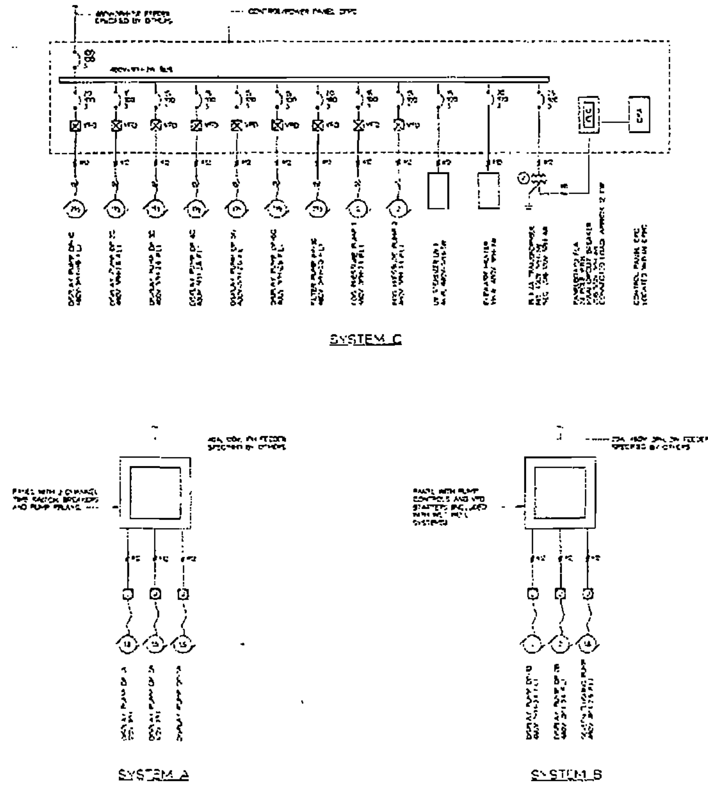
HOERR
SCHAUDT

CHICAGO DEVELOPMENT
CORPORATION

SITE

IRRIGATION DETAILS

I-1.04



S I N G L E   L I N E   D I A G R A M S

NO SCALE

S Y M B O L S

G E N E R A L   N O T E S

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58537 / WARRANT NO. 82530
1000 SOUTH WELLS STREET
CHICAGO, ILLINOIS

CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

FOUNTAIN ELECTRICAL
NOTES, SYMBOLS
AND DIAGRAMS

WE1.1

SPECIFICATION INDEX

GENERAL NOTES

PUMP SCHEDULE

PIPING MATERIALS

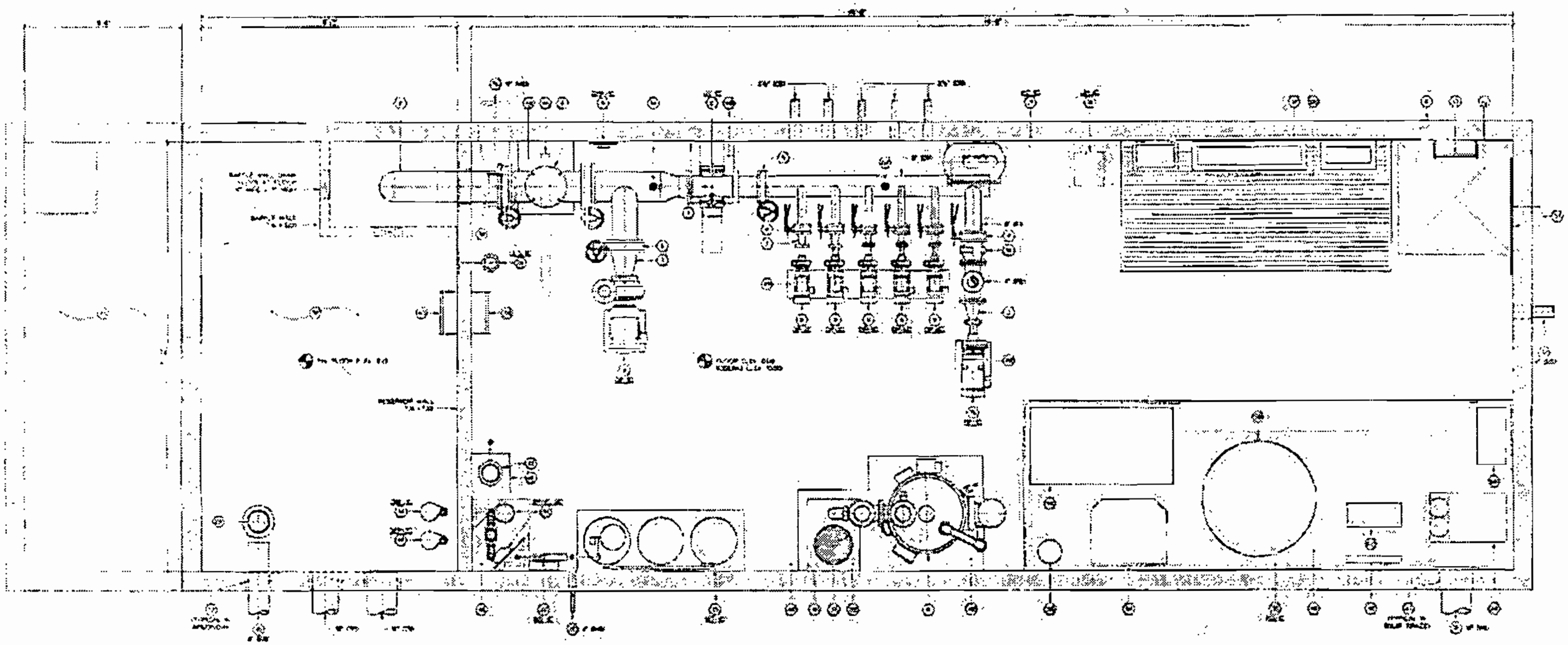
SYMBOLS

PERKINS +WILL

SITE

WP1.1

SITE
PERKINS + WILL
HOERR SCHAUDT



SCALE: 1/4" = 1'-0"

PERKINS
+ WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
/ WARRANT NO.
SOUTH WELLS STREET
CHICAGO, ILLINOIS

CMK DEVELOPMENT
CORPORATION

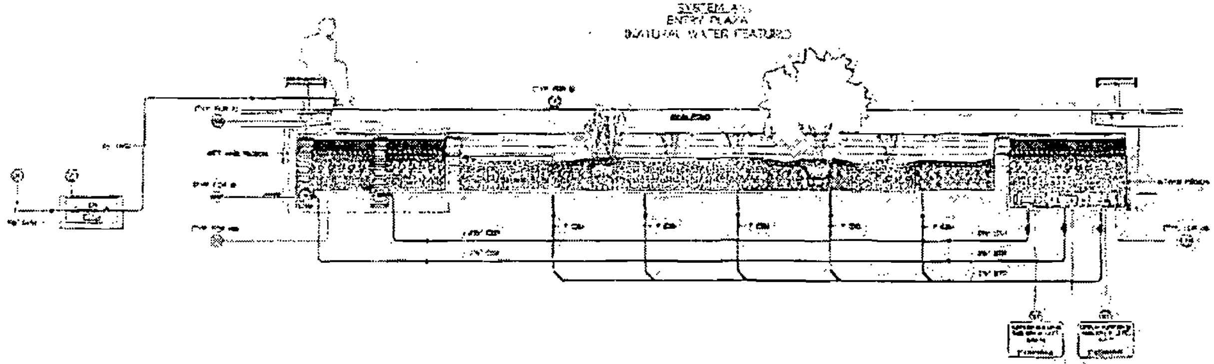
LONGLEASE

SITE

FOUNTAIN EQUIPMENT
SPACE PLAN

WP3.1

SYSTEM A-1
ENTRY PLAZA
SCULPTURAL WATER FEATURES



PERKINS
+WILL

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SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
SMDTV WARRANT NO. RVER

CMK DEVELOPMENT
CORPORATION

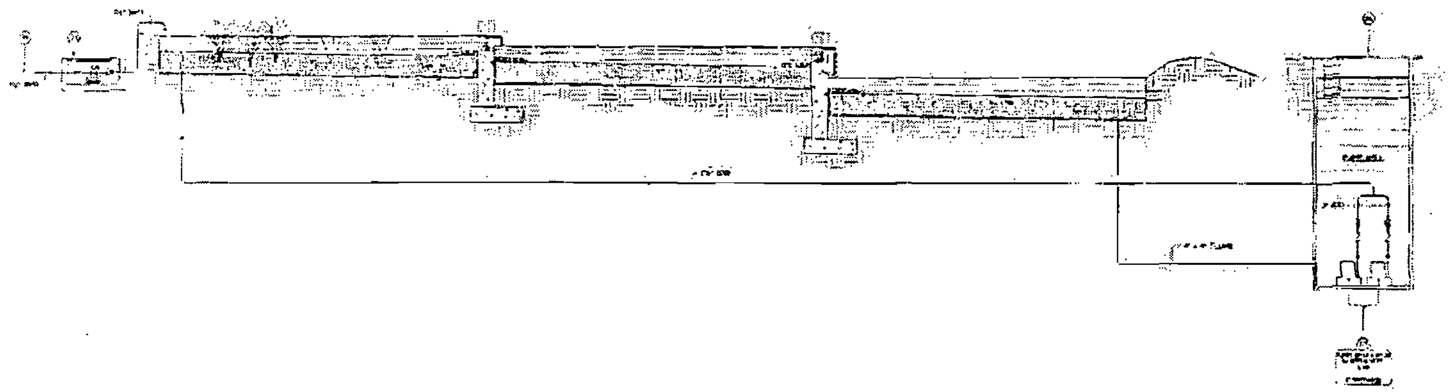
LENDLEASE

SITE

FOUNTAIN SCHEMATIC
PIPING DIAGRAM

WP4.1

SYSTEM B
WETLANDS (WET WELL)



PERKINS
+WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RIVERWALK SPECIAL
ASSESSMENT DOCKET NO.
53037 / WARRANT NO. 82530

CMA DEVELOPMENT
CORPORATION

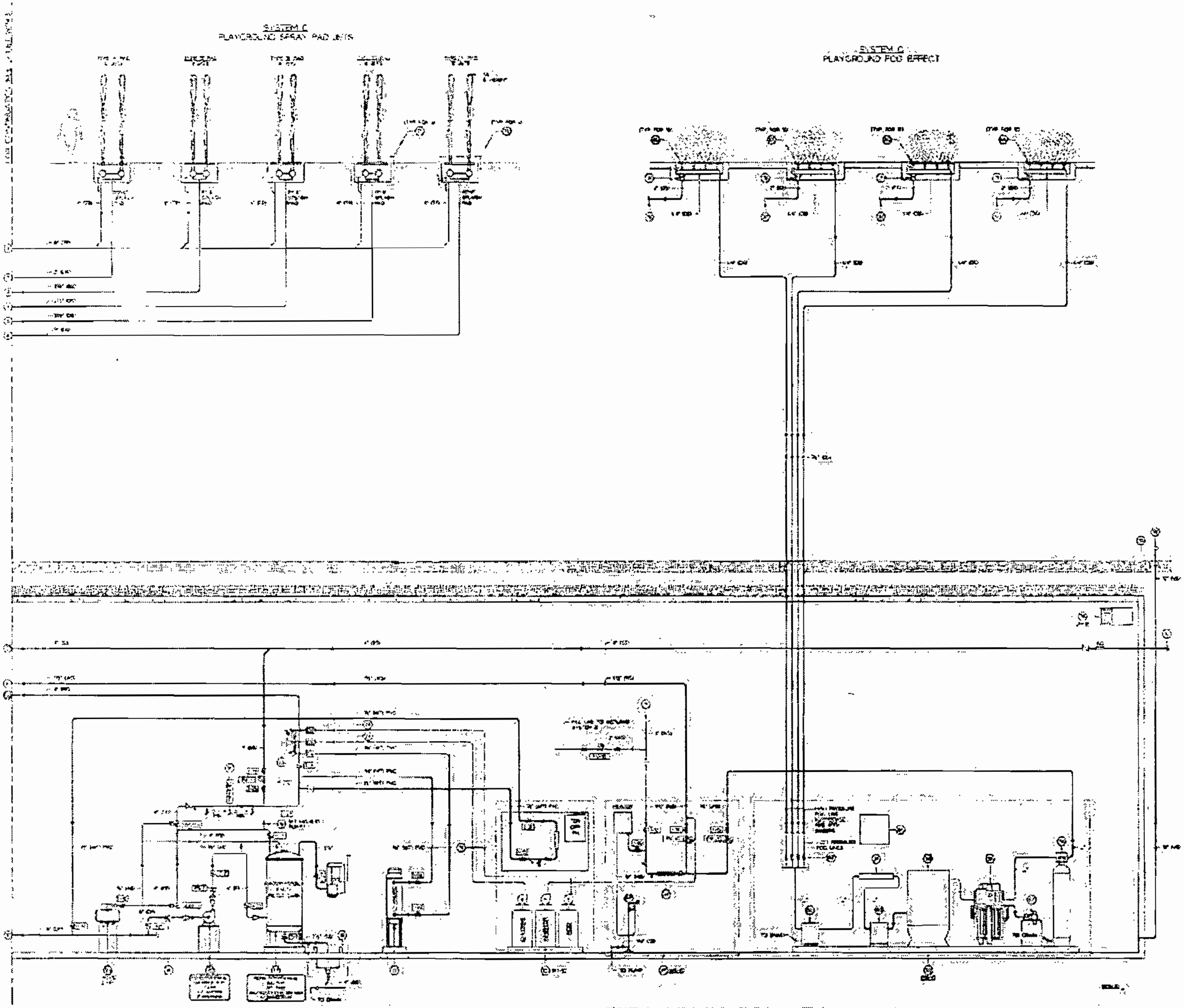
LENDLEASE

SITE

FOUNTAIN SCHEMATIC
PIPING DIAGRAM

WP4.2

SITE
PERKINS + WILL



PERKINS
+WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58837 / WARRANT NO. 82530

CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

FOUNTAIN SCHEMATIC
PIPING DIAGRAM

WP4.4

PERKINS
+WILL

HOERR
SCHAUDT

PROJECT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
66537 / WARRANT NO. 62530
1200 SOUTH WELLS STREET
CHICAGO ILLINOIS

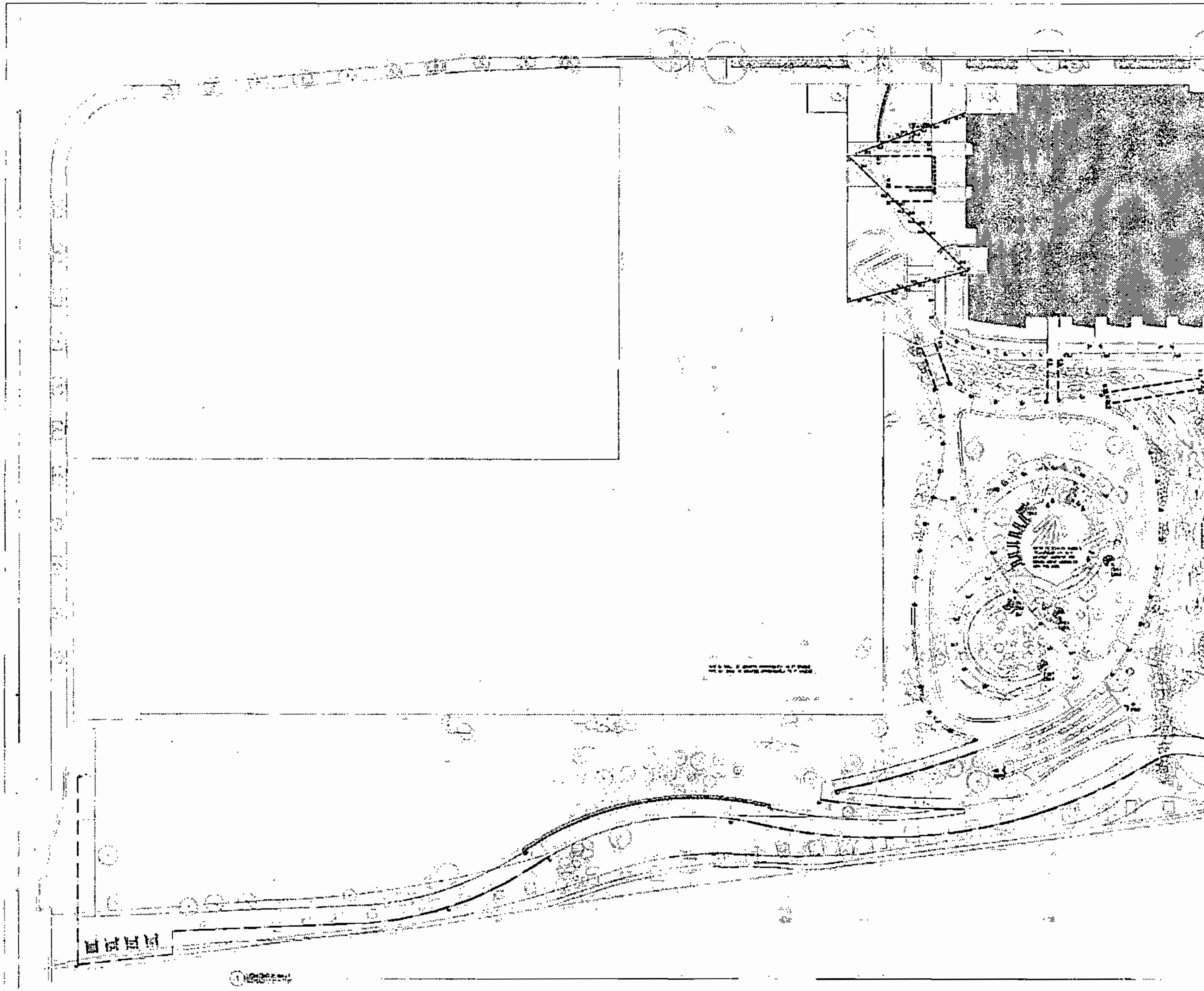
CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

FIXTURE SCHEDULE

LD0.01



PERKINS
+WILL

HOERR
SCHAUDT

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
58637 / WARRANT NO. 82538
CHICAGO ILLINOIS

CMK

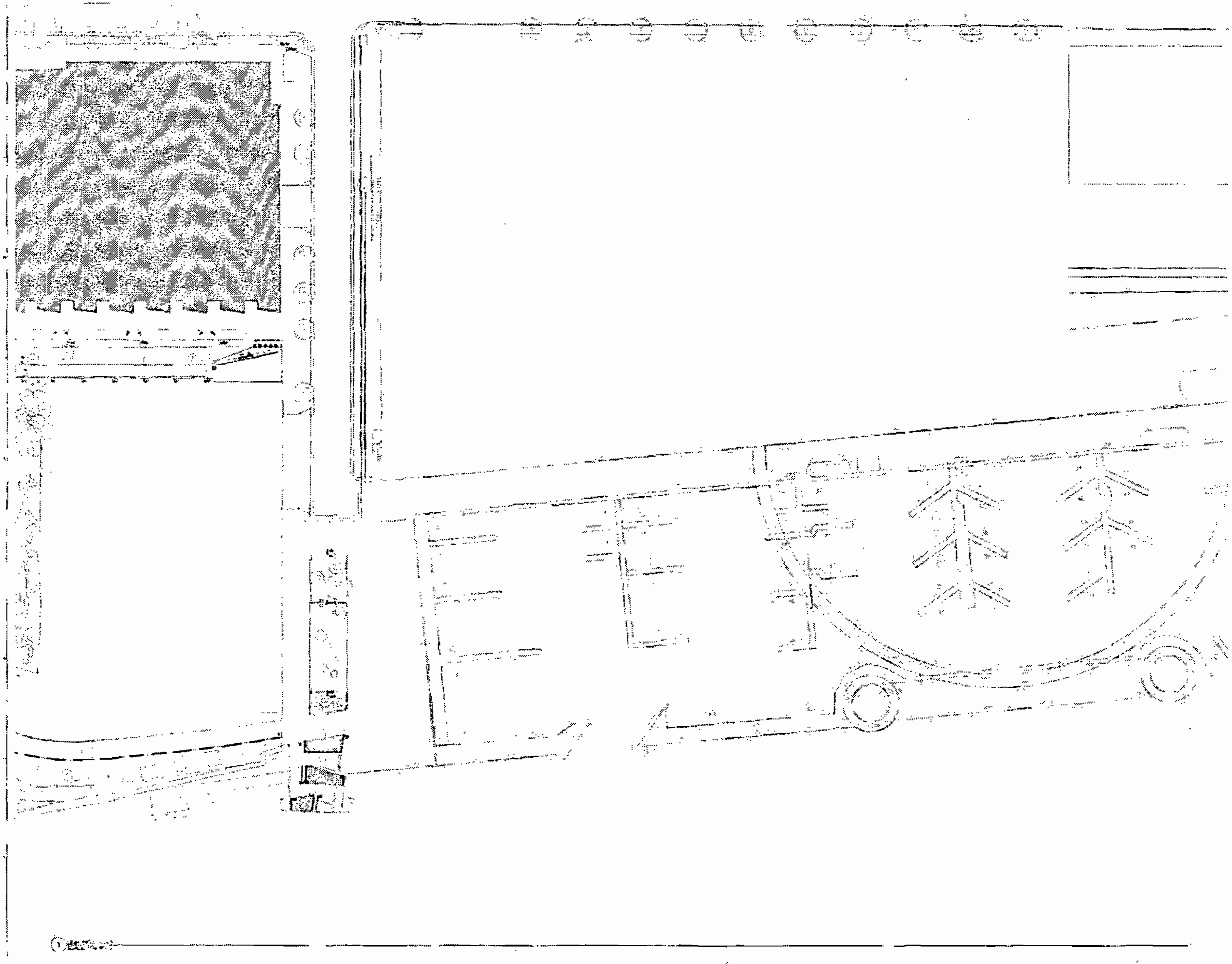
CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

LIGHTING PLAN - 1

LD1.01



PERKINS+WILL

CITY OF CHICAGO
RIVERLINE SPECIAL
ASSESSMENT DOCKET NO.
[illegible] / WARRANT NO. [illegible]
[illegible] SOUTH WELLS STREET
CHICAGO, ILLINOIS

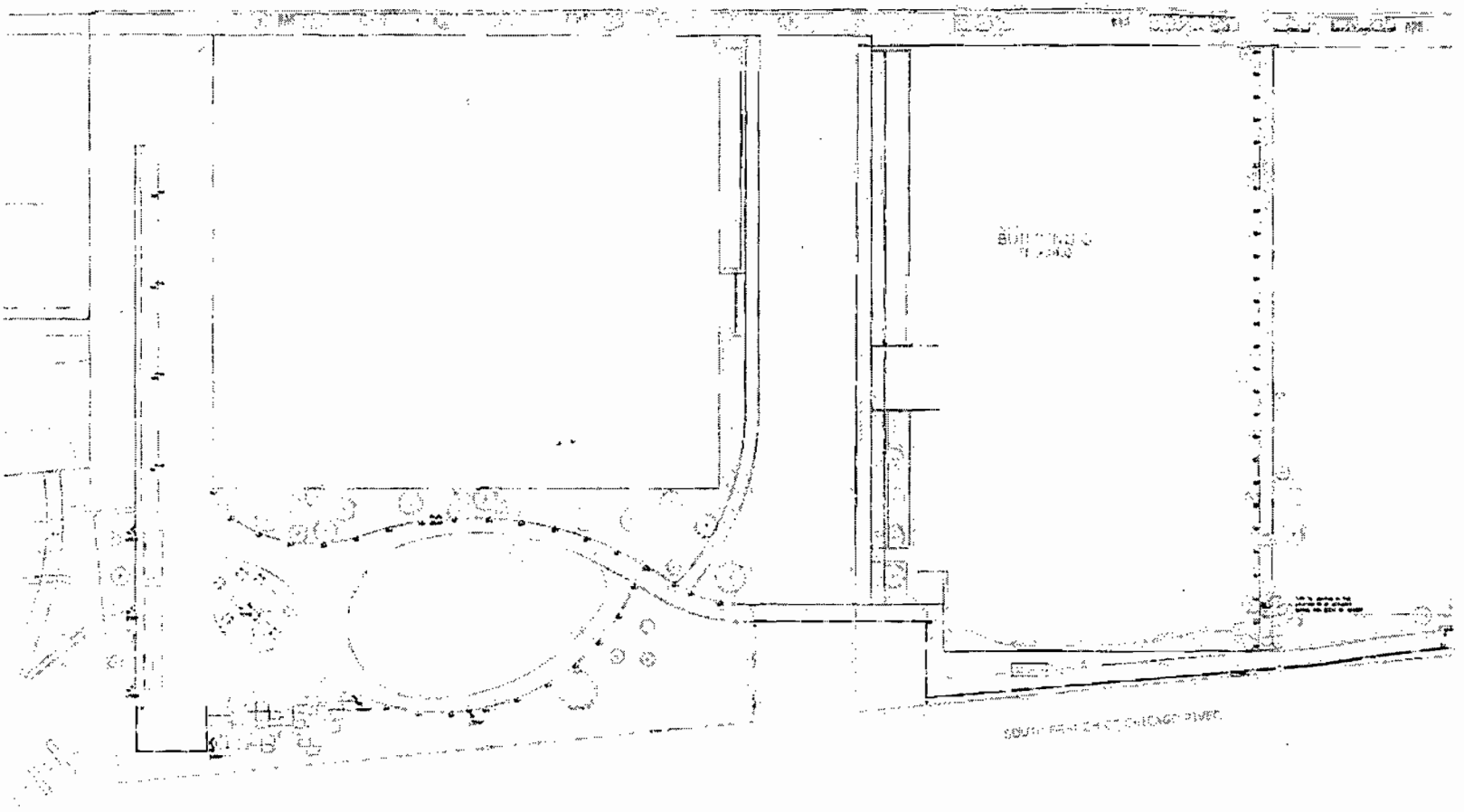
CMK DEVELOPMENT
CORPORATION

LENDLEASE

SITE

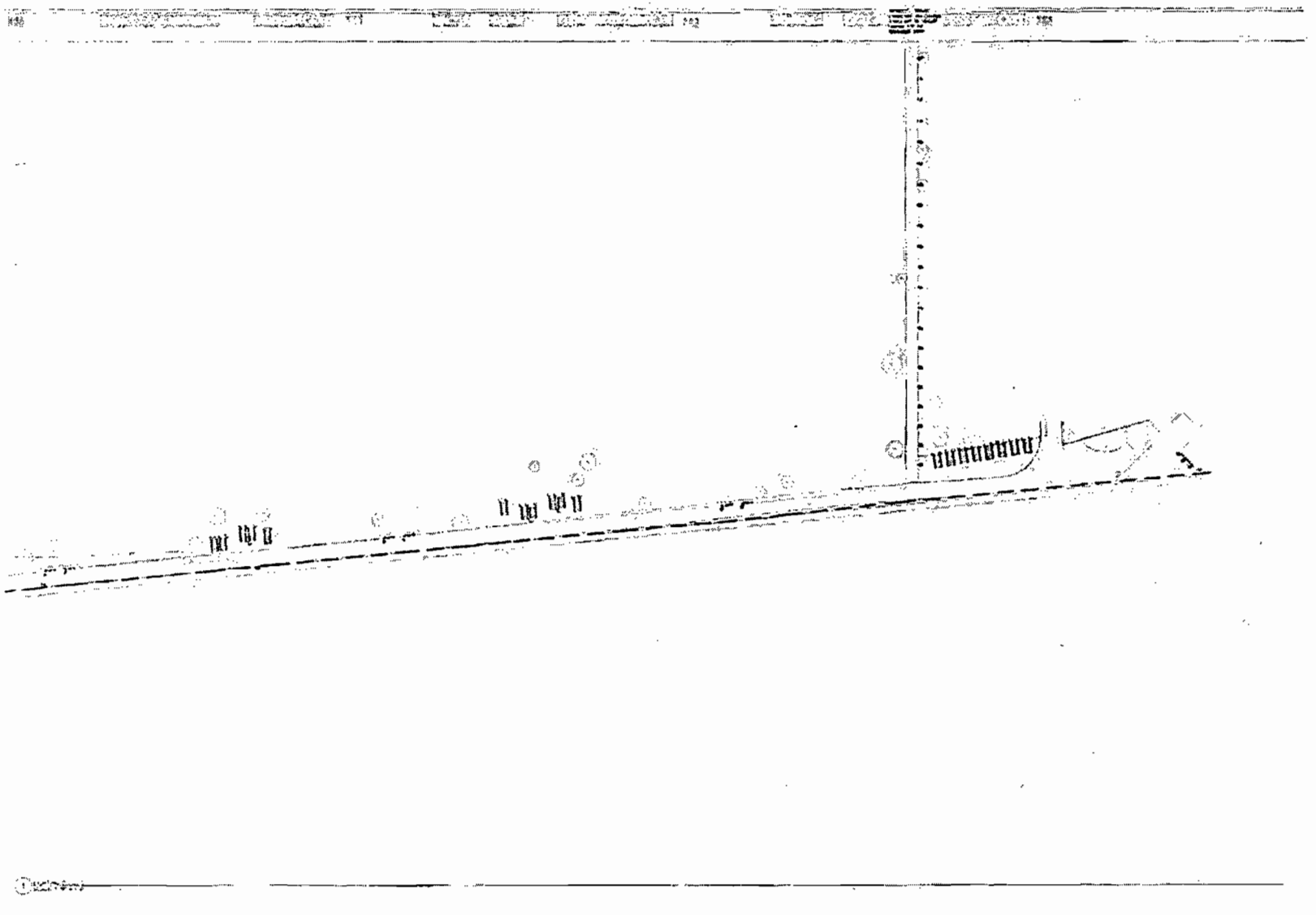
LIGHTING PLAN - 2

LD1.02



SITE

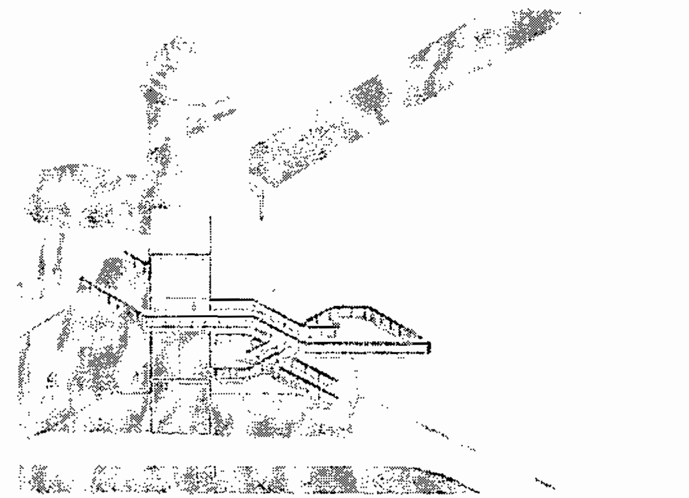
LD1.03



PERKINS + WILL

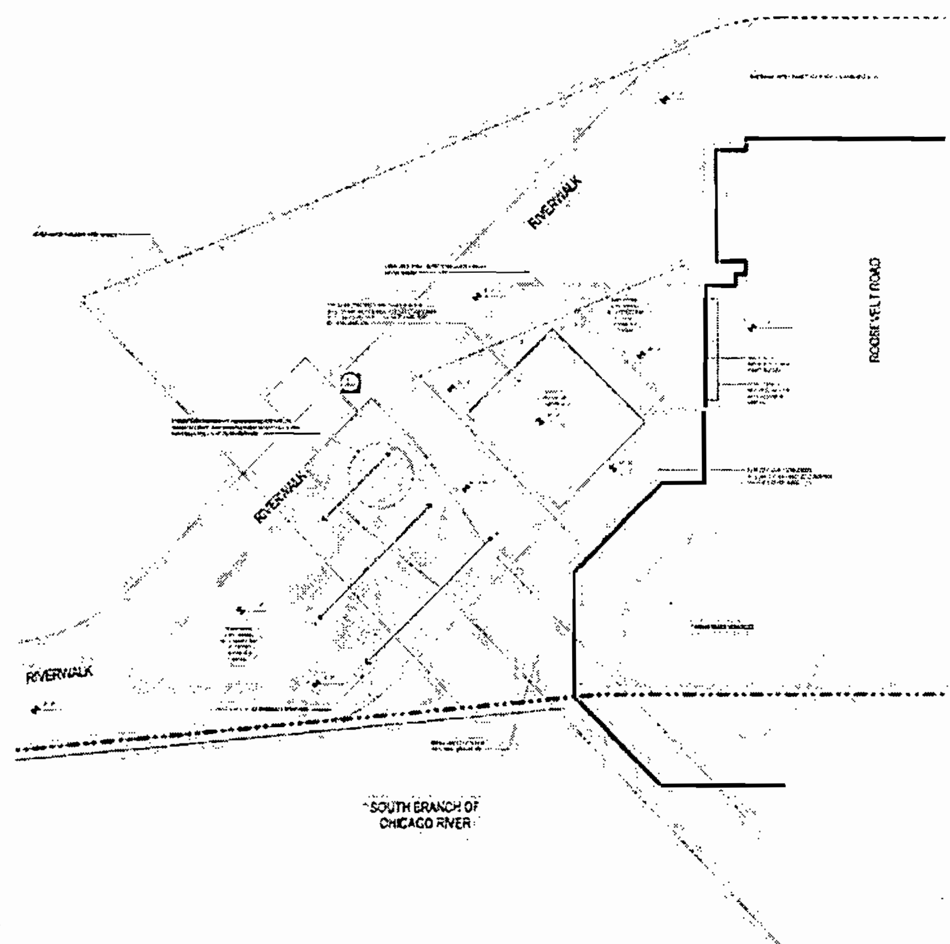
SITE

LD1.04



(3) NE AXON

(2) AXON



(1) ROOF PLAN

PERKINS
+WILL

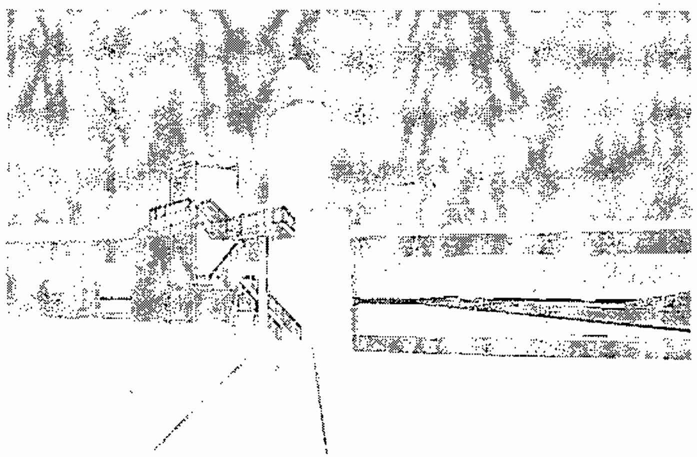
CITY OF CHICAGO
RIVERWALK SPECIAL
ASSESSMENT DOCKET

CMK DEVELOPMENT
CORPORATION

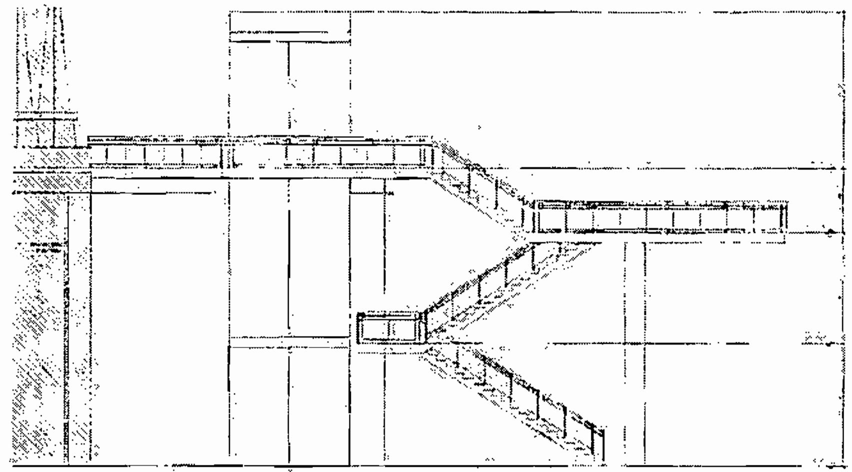
LEND LEASE

VERTICAL
CONNECTOR TO
ROOSEVELT RD

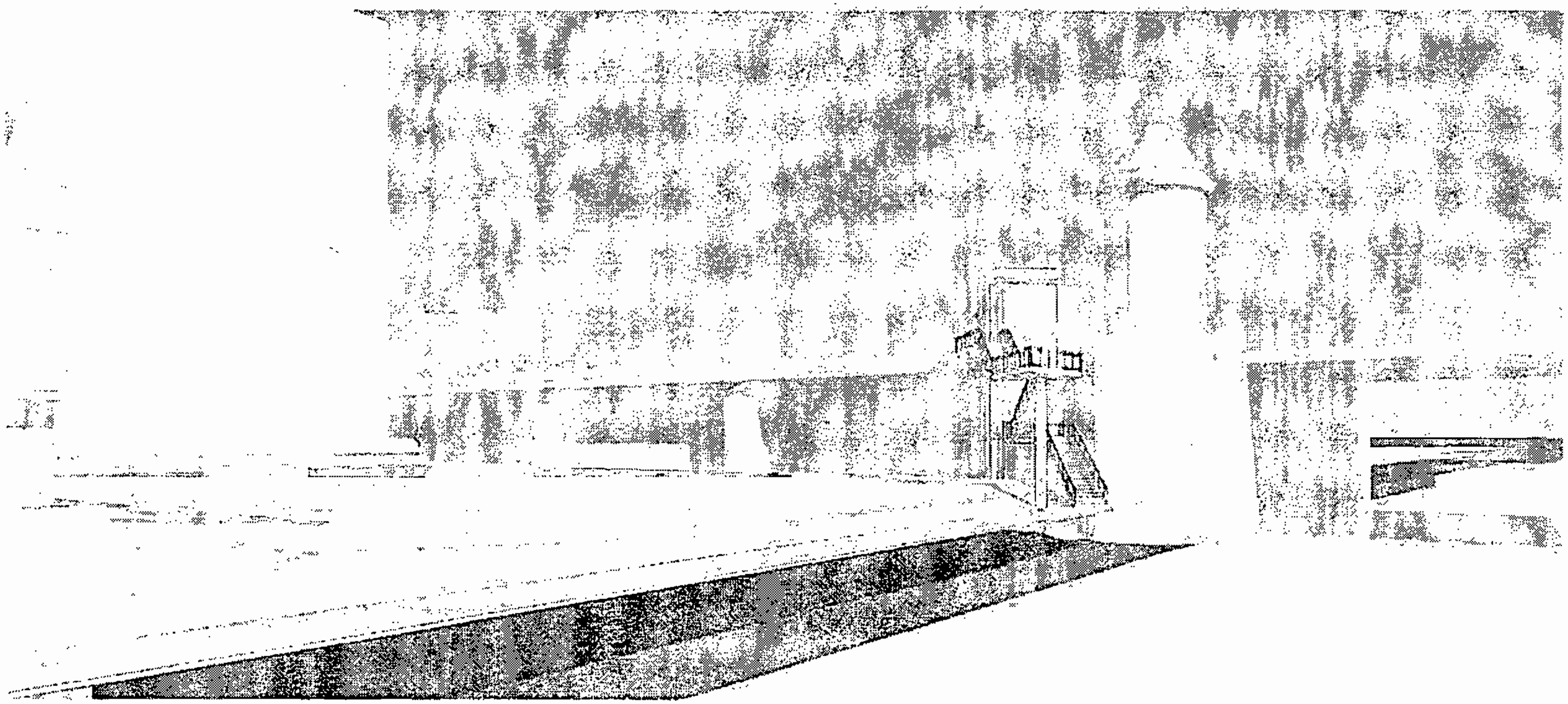
OS.G10-01



2 PERSPECTIVE FROM RIVERWALK



3 NORTH WEST ELEVATION



1 PERSPECTIVE FROM RIVER

PERKINS +WILL

CITY OF CHICAGO
RIVERSIDE SPECIAL
ASSESSMENT DOCKET
NO. 58037 WARRANT
NO. 52330

CMK DEVELOPMENT
CORPORATION

VERTICAL
CONNECTION TO
ROOSEVELT RD

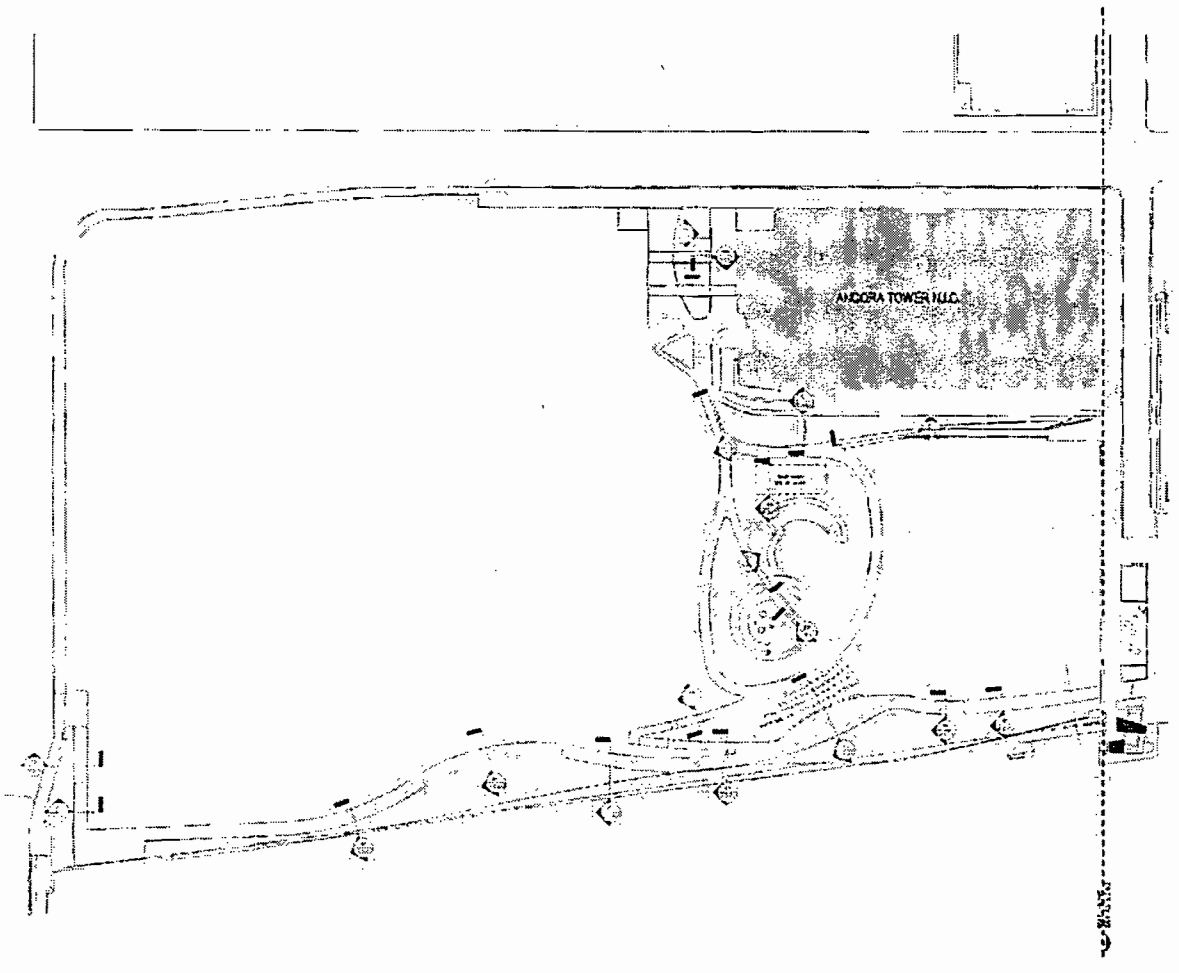
OS.G10-02

PERKINS
+WILL

SITE

STRUCTURAL
GENERAL NOTES AND
DETAILS

S-0.00



A2 STRUCTURAL SITE PLAN

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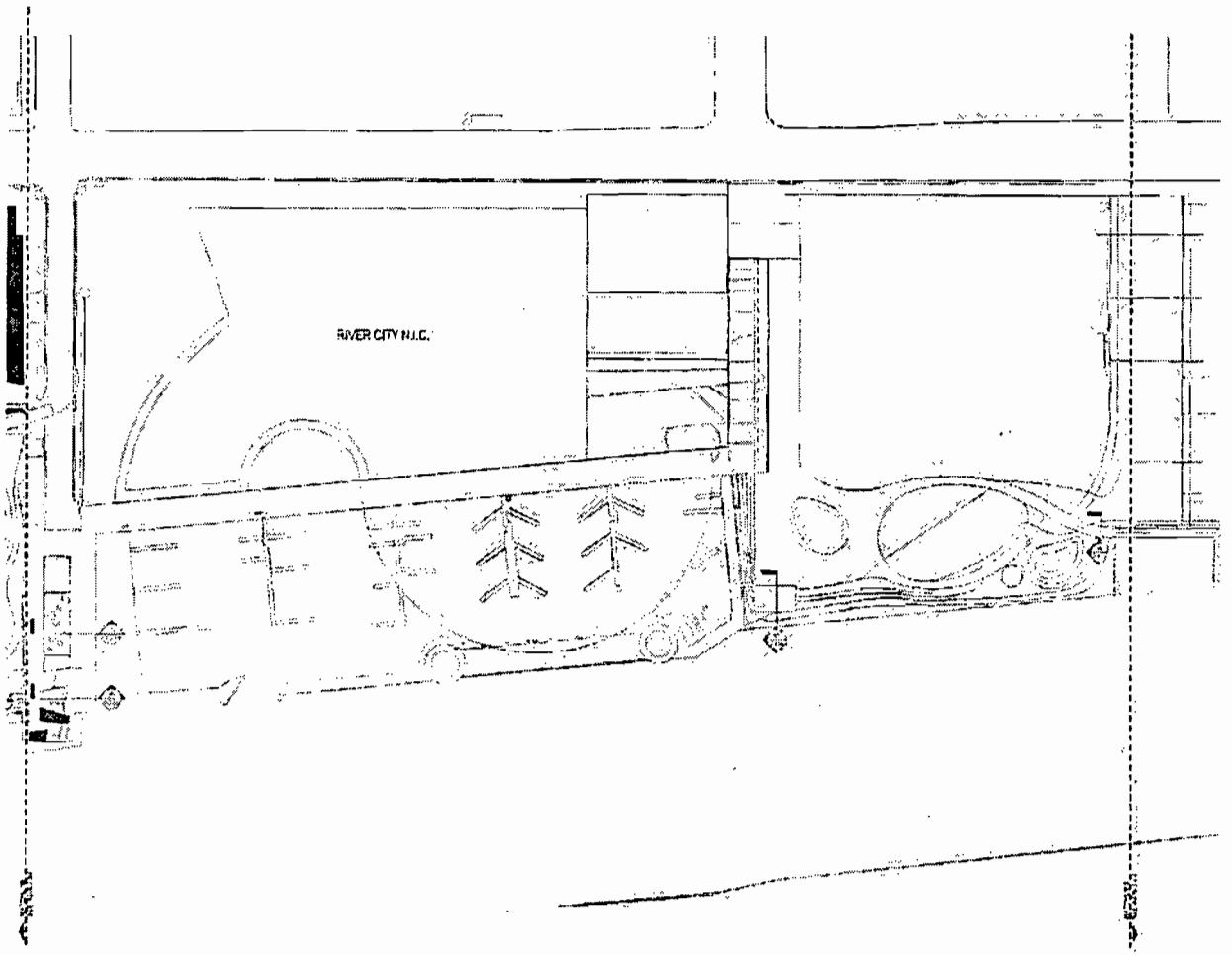
+WILL

HOERR
SCHAUDT

SITE

STRUCTURAL PLAN
NORTH SITE

S-2.01



A2 STRUCTURAL SITE PLAN

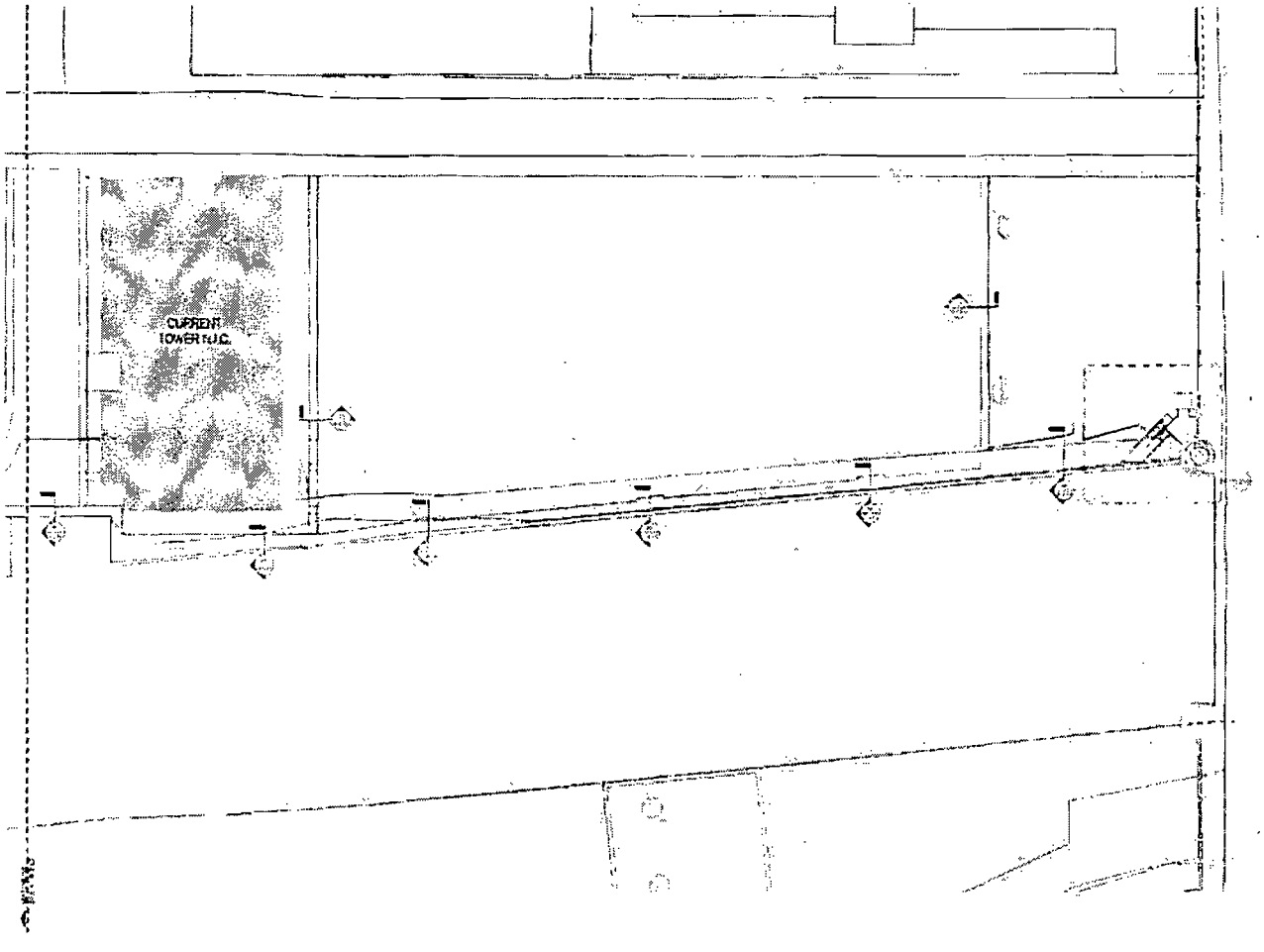
PERKINS + WILL

HOERR SCHAUDT

SITE

STRUCTURAL PLAN
MIDDLE SITE

S-2.02



A1 STRUCTURAL SITE PLAN

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+WILL

HOERR
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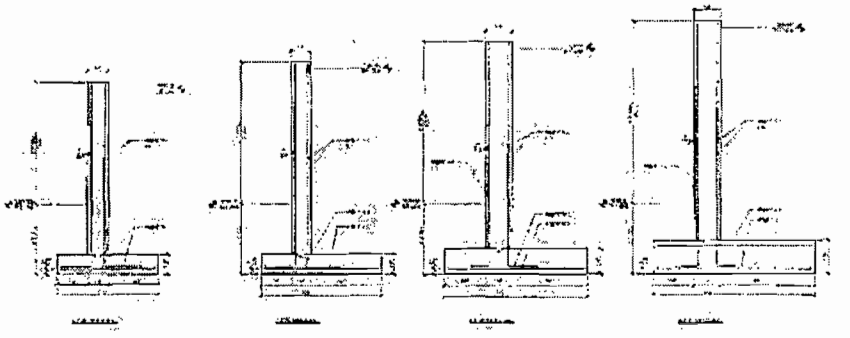
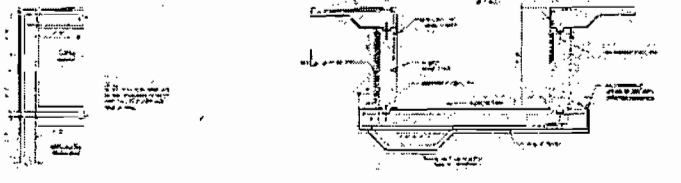
SITE

STRUCTURAL PLAN
SOUTH SITE

S-2.03



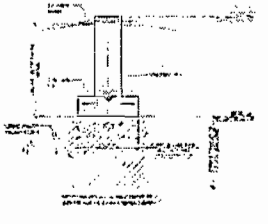
E5 RECTANGULAR WALLS



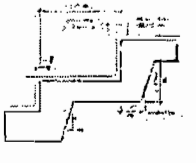
C1 LAP SPLICE SCHEDULE - WALL

D1 ELEVATOR PIT

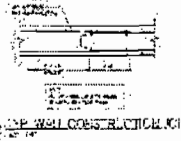
C2 TYP. WALL FND. CORNER BAR DETAIL



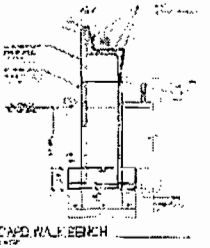
B4 TYP. WALL FTG. DETAIL



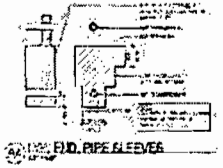
A3 TYP. STEP FTG.



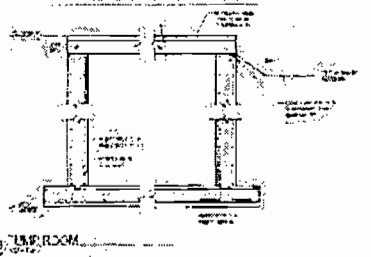
B2 TYP. WALL CONSTRUCTION JOINT



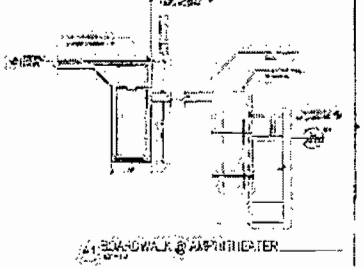
B1 BOARDWALK BENCH



A4 TYP. END, PIPE & SLEEVES



A3 TMP. ROOM



A1 BOARDWALK @ PARK THEATER

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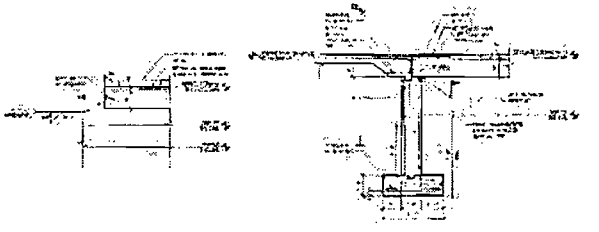
SITE

STRUCTURAL SECTIONS & DETAILS

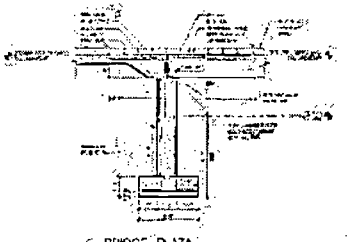
S-3.01



E3 PRECAST BRIDGE EDGE DETAIL

E2 BRIDGE PRECAST ABUTMENT

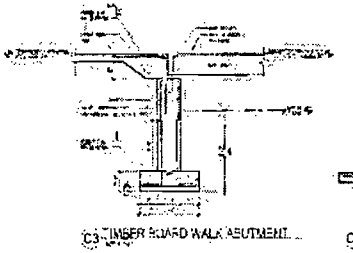
C1 TYP. SLAB CONSTRUCTION JOINT



D3 BRIDGE PLAZA

D2 TYP. CONTRACTION JOINT

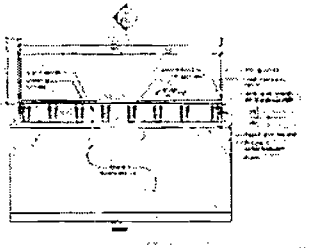
D1 TYP. BOARDWALK ON GRADE



C3 TIMBER BOARDWALK ABUTMENT

C2 TYP. RAMP DETAIL

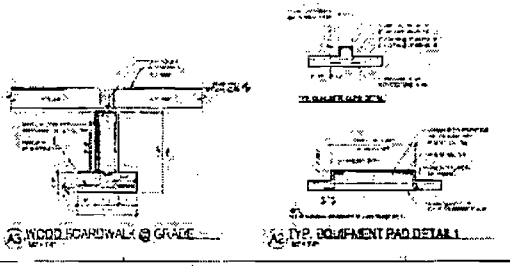
C1 RAISED CONC. WALK ON GRADE



B3 WOOD BOARDWALK @ GRADE

B2 TYP. STAIR GUARDRAIL DETAIL

B1 TYP. ELEVATED TIMBER BOARDWALK



A3 WOOD BOARDWALK @ GRADE

A2 TYP. EQUIPMENT PAD DETAIL 1

A1 TYP. TIMBER BOARDWALK PLAN

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SITE

STRUCTURAL SECTIONS & DETAILS

S-3.02

A1 FOUNDATION PLAN
C1 FRAMING PLAN
A2 TYP. COL. TRANSFER GIRDER
A3 TYP. BEAM OVER COL.
B1 TYP. COMPOSITE BEAM DETAIL
B2 TYP. BEAM TO BEAM CONN.
C2 TYP. FULL MOMENT CONN. @ ROOF
C3 TYP. BEAM TO BEAM MOMENT CONN.
D1 TYP. FULL MOMENT CONN. @ COL.
SITE
PERKINS + WILL
S4.01

HOERR SCHAUDT
landscape architects

Specifications

RIVERLINE
2016-12-05
Issue For Special Assessment District

1000 SOUTH WELLS STREET
CHICAGO, ILLINOIS, 60607

General Contractor:
LendLease

Landscape Architect:
Hoerr Schaudt Landscape Architects

Ecology Consultant:
Applied Ecological Services

Water Features Consultant:
CMS Collaborative

Irrigation Consultant:
FRS Design Group

Civil Engineer Consultant:
Spaceco

Structural Engineer
C. E. Anderson & Assoc.

December 5, 2016

WWW.HOERRSCHAUDT.COM 850 W. JACKSON BOULEVARD SUITE 800 CHICAGO ILLINOIS 60607 TEL 312.492.6501 FAX 312.492.7101

TABLE OF CONTENTS

06 15 00 Exterior Carpentry and Millwork
06 80 00 Composite Decking System

DIVISION 07 – THERMAL AND MOISTURE PROTECTION
07 92 00 Joint Sealants

DIVISION 09 – FINISHES
09 90 00 Painting

DIVISION 12 – FURNISHINGS
12 93 00 Site Furnishings

DIVISION 1 – SPECIAL CONSTRUCTION
13 12 13 Exterior Fountains

DIVISION 31 – EARTHWORK
31 10 00 Site Clearing
31 20 00 Excavation and Backfill
31 25 00 Erosion Control Fabric
31 25 13.01 Soil Lifts
31 25 13.02 Fiber Roll
31 25 13.03 Live Stakes and Posts

DIVISION 32 –EXTERIOR IMPROVEMENTS
32 14 00 Unit Paving
32 18 16 PebbleFlex Play Surface
32 31 19 Metal Fences
32 84 00 Planting Irrigation
32 91 00 Planting Soil
32 92 00 Lawns and Grasses
32 92 30 Native Seeding
32 93 00 Planting

DIVISION 33 –UTILITIES
33 46 00 Subdrainage
33 47 13 Pond Liner System

00 05 00
AGREEMENT FORMS

PART 1 – GENERAL

1.1 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A. OWNER – CONTRACTOR AGREEMENT:

1. The form of the Contract shall be the Standard Form of Agreement between the Owner and the Contractor, the American Institute of Architects Document A101/CMa, 1992 edition.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

00 06 00
BONDS AND CERTIFICATES

PART 1 – GENERAL

1.1 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A. PERFORMANCE/PAYMENT BONDS:

The forms of Bonds shall be Performance Bond and Labor and Material Payment Bond, The American Institute of Architects Document A312, 1997 Edition.

B. CERTIFICATE OF INSURANCE:

The form of the Certificate shall be Acord Certificate of Insurance Form 25-S, current edition, with limits and additional coverage in accordance with the Supplementary Conditions and sample Certificate bound herein.

1. A copy of the Contractor's Insurance Certificate shall accompany his bid, and a final copy shall be submitted prior to commencement of work at the site.

C. SUBSTANTIAL COMPLETION:

The form of "Substantial Completion" shall be American Institute of Architects Document G704, 1997 Edition.

D. BID BOND:

The form of Bid Bond may be the American Institute of Architects Document A310, 1997 Edition, or the Bonding Company Standard Form.

E. CONSENT OF SURETY TO REDUCTION IN OR PARTIAL RELEASE OF RETAINAGE:

The Form of "Consent of Surety to Reduction in or Partial Release of Retainage" shall be the American Institute of Architects Document G707, 1997 Edition.

F. LIST OF SUBCONTRACTORS:

The form of "List of Subcontractors" shall be the American Institute of Architect Document G805, 1997 Edition.

G. APPLICATION FOR PAYMENT:

Application and Certificate for Payment, American Institute of Architects Document G702, 1997 Edition.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

ACORD. CERTIFICATE OF INSURANCE

ISSUE DATE (MM/DD/YY)

PRODUCER

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A

COMPANY LETTER B

COMPANY LETTER C

COMPANY LETTER D

COMPANY LETTER E

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE	POLICY EXPIRATION DATE	LIMITS	
	GENERAL LIABILITY				GENERAL AGGREGATE	$2,000,000
	x COMMERCIAL GENERAL LIABILITY				PRODUCTS-COMP/OP AGG.	$1,000,000
	CLAIMS MADE x OCCUR				PERSONAL & ADV. INJURY	$1,000,000
	OWNER'S & CONTRACTOR'S PROT				EACH OCCURRENCE	$2,000,000
	x PER PROJECT AGGREGATE				FIRE DAMAGE (Any one fire)	$1,000,000
					MED. EXPENSE (Any one person)	$1,000,000
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	$2,000,000
	x ANY AUTO				BODILY INJURY (Per person)	$1,000,000
	ALL OWNED AUTOS				BODILY INJURY (Per accident)	$1,000,000
	SCHEDULED AUTOS				PROPERTY DAMAGE	$1,000,000
	HIRED AUTOS					
	NON-OWNED AUTOS					
	GARAGE LIABILITY					
	EXCESS LIABILITY				EACH OCCURRENCE	$1,000,000
	x UMBRELLA FORM				AGGREGATE	Value of Project
	OTHER THAN UMBRELLA FORM					
	X INCL				x STATUTORY LIMITS	
	x **WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY**				EACH ACCIDENT	$500,000
					DISEASE-POLICY LIMIT	$500,000
					DISEASE-EACH EMPLOYEE	$500,000
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

1 Lend Lease and their consultants are named as additional insureds as their interests may appear

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 60 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT. BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OF LIABILITY OF ANY KIND UPON THE COMPANY ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

(Original Signature Required)

00 07 00
GENERAL CONDITIONS

PART 1 – GENERAL

1.1 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A. AIA Document A201-2007, General Conditions of the Contract for Construction, is the General Conditions of the Contract. A copy of the General Conditions is included in the Project Manual.

B. Each article of the General Conditions remains in effect unless expressly amended or deleted by other contract documents.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

00 08 50
DRAWING INDEX

PART 1 – GENERAL

1.1 GENERAL

(FOR REFERENCE ONLY)

WP 4.4

IRRIGATION
I-1.01
I-1.02
I-1.03
I-1.04

LIGHTING
LD 1-01
LD 1-02
LD 1-03
LD 1-04

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

00 73 00
INSURANCE REQUIREMENTS

PART 1 – GENERAL

1.1 INSURANCE REQUIREMENTS

1. The Consultant/Vendor/Contractor shall provide a Certificate of Insurance to be issued indicating the scope of services or purchase order number and showing the following required coverage in no less than the minimum coverage limits listed below. The insurance companies providing coverage must have a current A.M. Best rating of B++;VII or better and be duly authorized by the Department of Insurance of the State of Illinois to do business in Illinois. The Consultant/Vendor/Contractor must agree to maintain such insurance for the duration of the contract or the term for which services will be rendered.

   A. Worker's Compensation - Statutory Limits (Illinois)
   (Including Occupational Disease)

   Employer's Liability (Part B) - $500,000 per occurrence

   B. Commercial General Liability
   (including Products & Completed Operations)

   Combined Single Limit - $2,000,000 per occurrence
   OR
   Bodily Injury: $1,000,000 per occurrence, and
   Physical Damage: $1,000,000 per occurrence

   C. Commercial Automobile Liability
   Combined Single Limit - $2,000,000 per occurrence
   OR
   Bodily Injury: $1,000,000 per occurrence, and
   Physical Damage: $1,000,000 per occurrence

2. With respect to Commercial General Liability and Automobile Liability insurance, LendLease and CMK shall be named as an additional insured for any liability incurred by the Owner arising from activities of the Consultant/Vendor/Contractor.

3. The Consultant/Vendor/Contractor shall furnish the Owner with the original Certificate(s) of Insurance and a copy of the declaration page evidencing the required coverage to be in force on the date of this agreement, and renewal Certificates of Insurance if coverage has an expiration or renewal date occurring during the term of this agreement. All certificates shall provide that the Owner be given thirty (30) days written notice prior to any change, substitution, or cancellation before the stated expiration date.

4. The receipt of any certificate does not constitute agreement by the Owner that insurance requirements have been met. Failure of the Owner to obtain certificates or other insurance evidence from the Consultant/Vendor/Contractor shall not be deemed a waiver by the Owner.

5. Assigned Subcontractors must comply with the same insurance coverage requirements as the Consultant/Vendor/Contractor. Subcontractors shall secure a Certificate of Insurance naming Greater Des Moines Botanical Center as an additional insured and

shall submit such Certificate(s) of Insurance through the Consultant/Vendor/Contractor. The bid and/or purchase order number must be indicated on the Certificate.

6. Contractor shall complete Owner Insurance Information form accompanying the bid form.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

01 01 00
SUMMARY OF WORK

PART 1 - GENERAL

A. REFERENCE: Refer to the Drawings, other Sections of these Specifications and the Conditions of the Contract, which apply to each Division and Section of the Project Specifications.

B. WORK COVERED BY CONTRACT:

1. Construct the work under a guaranteed maximum price contract.

C. DEFINITIONS. The following terms are used throughout the contract documents. The work will be governed in accord with the definitions.

1. Fabricated: Fabricated pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.
2. Manufactured: Manufactured means standard units, usually mass produced by an established manufacturer of the respective item.
3. Provide: Provide means furnish and install.
4. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by the Contractor in his own shop.

D. TIME OF COMPLETION:

1. The Contractor shall meet the required schedule for substantial and final completion and shall make all allowances necessary for severe and inclement weather conditions and coordination with adjacent work to ensure timely completion.

2. Such allowances shall include providing increased workforce, extended working hours, weekend work etc. at no additional cost to the Owner.

E. ADJACENT WORK:

1. The contractor shall coordinate with concurrent adjacent work at Hayden Clark Alumni Hall, Westlake Hall and Holmes Hall. The contractor shall coordinate with the adjacent contractor all work involving overlap of scope. Such coordination shall not impede the progress of the work under this contract or of adjacent work.

F. PARTIAL OWNER OCCUPANCY AND USE OF EQUIPMENT:

1. COMPLETION AND OCCUPANCY: The Owner may, upon seven days written notice to Contractors, occupy and have use of such areas of the project as he deems expedient, without relieving the Contractors of their obligation to complete the work. Such action may occur after scheduled date for completion, and shall not be considered as "acceptance" of these areas.

2. TEMPORARY OR TRIAL USAGE by the Owner of any mechanical device, machinery, apparatus, equipment or any work or materials provided under the Contract, before final completion and acceptance, shall not be construed as evidence or acceptance of same.

   a. Owner shall have the right to such temporary or trial usage, for such time as the Architect deems reasonable. Contractor shall make no claim for damage for injury to or breaking of any parts of such work which is caused by weakness, or inaccuracy of structural parts or by defective material or workmanship.
   b. Contractor shall, without extra cost to the Owner, provide approved operators to make such trial usage, under Architect's observation.

G. CONTRACT LIMIT LINES:

1. The Contractor shall limit his area of activity to the immediate area of the work within the "Contract Limit Lines", as indicated by the Drawings, or "Property Lines" in the absence of any contract limit lines, except where specifically required by the Contract Documents for the performance of the work, or as defined by Owner's Representative.

H. CONTRACTOR'S USE OF THE SITE

1. No access is allowed into other Owner's buildings without prior authorization.

I. TAXES:

1. Contractor shall pay all Federal and State Unemployment Insurance and Old Age Benefits as required by law.

J. HAZARDOUS MATERIALS IN PRODUCTS:

1. All products provided by the Contractor and all suppliers for the work of this Contract shall contain no asbestos, lead paint, or other hazardous materials. The Contractor shall submit a letter stating that all materials installed as part of the construction are asbestos free Contractor's letter shall be submitted along with Warranties and the Operations & Maintenance Manuals at the end of the project.

K. HOTWORK POLICY

1. The Contractor and all Subcontractors are to comply with the Greater Des Moines Botanical Center "Hotwork Policy".

L. BRAZING OR SOLDERING POLICY

1. The Contractor and all Subcontractors are to comply with the Greater Des Moines Botanical Center "Brazing or Soldering Pipe/Propane, MAPP, Acetylene, or 0-2 Acetylene Torch Policy".

M. KEY POLICY

1. The Contractor and all Subcontractors are to comply with the Greater Des Moines Botanical Center "Key Policy for Vendors and Contractors" revised 3/08/06 as included at the end of this section.

N. SMOKING

1. Greater Des Moines Botanical Center is a smoke free environment. All smoking shall be restricted to the outside of ALL Greater Des Moines Botanical Center owned buildings and building areas. The Contractor shall furnish and post "NO SMOKING" signs at appropriate locations throughout the building area and other enclosed spaces on site where construction operations are conducted.

O. LOCK, TAG, AND TRY PROCEDURES

1. The Contractor and all Subcontractors are to comply with the Greater Des Moines Botanical Center "Lock, Tag, and Try Procedures" dated 5/11/05 as included at the end of this section.

PART 2 - PRODUCTS: Not used.

PART 3 - EXECUTION: Not used.

END OF SECTION

01 03 50
MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices.
2. Division 1 Section "Schedules and Reports" for requirements for the Contractor's Construction Schedule.
3. Division 1 Section "Applications for Payment" for administrative procedures governing Applications for Payment.

1.3 MINOR CHANGES IN THE WORK

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions.

1.4 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

2. Within 20 days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.

    a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
    d. Owner's tax free status applies to Change Order proposals as well as bid work.

B. Contractor-Initiated Proposals: When latent or unforseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Comply with requirements in Section "Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

01 04 00
COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Cleaning and protection.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Grades, Lines, and Levels" specifies procedures for field engineering services, including establishment of benchmarks and control points.
2. Division 1 Section "Project Meetings" for progress meetings, coordination meetings, and pre-installation conferences.
3. Division 1 Section "Schedules and Reports" for preparing and submitting the Contractor's Construction Schedule.
4. Division 1 Section "Materials and Equipment" for coordinating general installation.
5. Division 1 Section "Contract Closeout" for coordinating contract closeout.

1.3 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 SUBMITTALS

A. Staff Names: Within 15 days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

01 05 10
GRADES, LINES AND LEVELS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDES:

A. Provide and pay for field engineering services required for Project.

1. Survey work required in execution of Project.
2. Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

B. Locate and identify existing control points and property line corner stakes indicated on the drawings.

1.2 RELATED REQUIREMENTS:

A. Specified Elsewhere:

1. Division 0 - Bidding Requirements
2. Division 1 - General Requirements
3. 010100 - Summary of Work
4. 017839 - Project Record Documents

1.3 QUALIFICATIONS OF SURVEYOR OR ENGINEER:

A. Registered professional engineer of the discipline required for the specific service on the Project, licensed in the state in which the Project is located.

1.4 SURVEY REFERENCE POINTS:

A. Existing basic horizontal and vertical control points for the Project are those designated on drawings.

B. Locate and protect control points prior to starting site work, and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to Architect/Engineer.
2. Report to Architect/Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
3. Require surveyor to replace Project control points which may be lost or destroyed.

a. Establish replacements based on original survey control.

1.5 PROJECT SURVEY REQUIREMENTS:

A. Establish a minimum of two permanent bench marks on site, referenced to data established by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:

1. Site improvements.

a. Stakes for grading, fill and topsoil placement.
b. Utility slopes and invert elevations.

2. Controlling lines and levels required for mechanical and electrical trades.

C. From time to time, verify layouts by same methods.

1.6 RECORDS:

A. Maintain a complete, accurate log of all control and survey work as it progresses.

1.7 SUBMITTALS:

A. Submit name and address of Surveyor and professional engineer to Architect/Engineer.

B. On request of Architect/Engineer, submit documentation to verify accuracy of field engineering work.

C. Submit certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance, or nonconformance, with Contract Documents.

PART 2 - PRODUCTS: Not Applicable.

PART 3 - EXECUTION: Not Applicable.

END OF SECTION

01 06 00
REGULATORY REQUIREMENTS

PART 1 - GENERAL

A. LAWS, ORDINANCES AND STATUTES:

1. Each Contractor, Subcontractor, material dealer, and any other Trade who provides labor, material or services of any kind, or who does work of any kind in connection with this Project for any trades, must comply at all times, in all respects with all applicable provisions of all Federal, State, County and Municipal laws, ordinances, and statutes.

B. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970:

1. The construction of this project shall comply with and meet all requirements of the Occupational Safety and Health Act of 1970, Public Law No. 91-596, 91 St. Congress, S.2193, December 29, 1970, including all amendments and bulletins.
2. Part 1910 – Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
3. Part 1926 –Safety and Health Regulations for Construction, Chapter XVII of Title 29, Code of Federal Regulations.

C. SAFETY GLAZING MATERIALS ACT:

1. The Glazing Contractors are hereby advised that this project will be subject to the Consumer Product Safety Commission, Safety Standards for Architectural Glazing Materials (42 FR 1428; 16 CFR Part 1201) effective July 6, l978 and amendments.

D. MATERIAL SAFETY DATA SHEETS (MSDS)

1. Contractor shall keep a file of applicable MSDS sheets on site at all times.

PART 2 - PRODUCTS: Not used.

PART 3 - EXECUTION: Not used.

END OF SECTION

01 09 50
REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic contract definitions are included in the Conditions of the Contract.

B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.

D. "Approved": The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, who performs a particular construction activity including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "Installer," means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.

    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

J. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. "Architect". Shall be taken to mean the Landscape Architect throughout this document.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's format and "MasterFormat" numbering system.

B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and

phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with 2 or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different but apparently equal to the Architect for a decision before proceeding.

    1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Inc.'s "Encyclopedia of Associations," which is available in most libraries.

1.5 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:
1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Product Requirements" for requirements for submitting comparable
product submittals for products by listed manufacturers.
3. Divisions 02 through 49 Sections for specific requirements and limitations for
substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from
those required by the Contract Documents and proposed by Prime/General Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to
changed Project conditions, such as unavailability of product, regulatory changes, or
unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Prime/General Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Prime/General Contractor or Owner.

1.4 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product
or fabrication or installation method to be replaced. Include Specification Section number and
title and Drawing numbers and titles.
1. Substitution Request Form: Use "Request for Substitution" Form included in Division 00
Section "Procurement Substitution Procedures."

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. Certificates and qualification data, where applicable or requested.
   g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
   j. Detailed comparison of Prime/General Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
   k. Cost information, including a proposal of change, if any, in the Contract Sum.
   l. Prime/General Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Landscape Architect's Action: If necessary, Landscape Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Landscape Architect will notify Prime/General Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or
   Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Landscape Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution
with related products and materials. Engage qualified testing agency to perform compatibility
tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved
substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need
for change, but not later than 15 days prior to time required for preparation and review of related
submittals.
   1. Conditions: Landscape Architect will consider Prime/General Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Landscape Architect will return requests without action, except to record noncompliance with these
   requirements:
      a. Requested substitution is consistent with the Contract Documents and will produce
      indicated results.
      b. Substitution request is fully documented and properly submitted.
      c. Requested substitution will not adversely affect Prime/General Contractor's construction schedule.

d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION

01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and
process Applications for Payment.

B. Related Sections:
1. Division 01 Section "Allowances" for procedural requirements governing the handling and
processing of allowances.
2. Division 01 Section "Unit Prices" for administrative requirements governing the use of unit
prices.
3. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction
schedule.
5. Division 01 Section "Submittal Procedures" for administrative requirements governing the
preparation and submittal of the submittal schedule.
6. Division 01 Section "Sustainable Design Requirements" for administrative requirements
governing submittal of cost breakdown information required for LEED documentation.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Prime/General Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Prime/General Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Prime/General Contractor's construction schedule.
1. Correlate line items in the schedule of values with other required administrative forms
and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Prime/General Contractor's construction schedule.

2. Submit the schedule of values to Landscape Architect for approval/comment along with submitting first draft of final contract.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
4. Subschedules for Separate Elements of Work: Where the Prime/General Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values correlated with each element.

B. Format and Content: Use the Project Manual table of contents or bid form and the requested scope breakout form provided by Landscape Architect as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
a. Project name and location.
b. Name of Landscape Architect.
c. Landscape Architect's project number.
d. Prime/General Contractor's name and address.
e. Date of submittal.
2. Submit draft of AIA Document G703 Continuation Sheets.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents and the requested scope breakout form provided by Landscape Architect. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
a. Include separate line items under Prime/General Contractor and principal subcontracts for LEED documentation and other project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Allowances: Provide a separate line item in the schedule of values for each allowance.
   Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete.
   Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Prime/General Contractor's option.
9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Landscape Architect and paid for by Owner.
   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Landscape Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Prime/General Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Davis-Bacon and Related Acts: This project is funded, in part, by a federal grant. Rules and provisions of the Davis Bacon and Related Acts apply to this project. It is the responsibility of the Contractor to acquire current appropriate and necessary publications and materials regarding the Davis-Bacon and Related Acts and determine how they may apply to this Project.
1. All labor performed on site shall be subject to wage restrictions, reporting, posting of notice at the work site, and associated federal penalties for failure to comply with the federal Davis-Bacon and Related Acts.
2. All wages for on-site labor shall be greater than or equal to the minimum wage rates of federal Davis–Bacon and Related Acts as listed for Polk County, Iowa. Current wage determination information for Polk County, Iowa can be found at www.wdol.gov. Request work classifications and wage rates that do not appear on the wage determination information in writing through the contract administrator.
3. Payrolls for all labor shall be reported on the appropriate forms, shall be certified by employer, and shall be submitted weekly to the contract administrator.
4. Prior to initial pay application provide the contract administrator a list of labor classifications anticipated to be employed and providing on site labor for this project.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide name and location of storage facility, detailed list of stored materials, certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices.

Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

3. Provide summary documentation for stored materials indicating the following:
   a. Materials previously stored and included in previous Applications for Payment.
   b. Work completed for this Application utilizing previously stored materials.
   c. Additional materials stored with this Application.
   d. Total materials remaining stored, including materials with this Application.

G. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Landscape Architect by a method ensuring receipt within 48 hours. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Prime/General Contractor's construction schedule (preliminary if not final).
   4. Products list (preliminary if not final).
   5. Submittal schedule (preliminary if not final).
   6. List of Prime/General Contractor's staff assignments.
   7. List of Prime/General Contractor's principal consultants.
   8. Copies of building permits.
   9. Certificates of insurance and insurance policies.
   10. Performance and payment bonds.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof
   that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

01 31 00
PROJECT MANAGEMENT, COORDINATION AND SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1. SECTION SUMMARY

A. This Section includes procedural requirements for the following:

1. Project Meetings.
2. Construction Coordination.
3. Submittals.

1.2. PROJECT MEETINGS

A. Preconstruction Conference: Schedule and convene a preconstruction conference before starting construction, at a time convenient to Owner and Landscape Architect, but no later than 10-days after execution of the Agreement. Hold the conference at Project site or another convenient location.

1. Attendees: Authorized representatives of Owner, Landscape Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference.
2. Agenda: Review responsibilities and personnel assignments. Discuss items of significance that could affect progress, including:
   a. Tentative construction schedule.
   b. Critical work sequencing.
   c. Procedures for processing field decisions and Change Orders.
   d. Procedures for processing Applications for Payment.
   e. Submittal procedures.
   f. Preparation of Record Documents.
   g. Use of the premises.
   h. Operation staging, including provisions temporary facilities and controls, delivery, storage, and parking availability.
   i. First aid.
   j. Security.
   k. Progress cleaning.
   l. Working hours.

B. Periodic Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests and Landscape Architect's periodic site visits.

1. Notify Owner and Landscape Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved with planning or coordination of future activities.
2. Landscape Architect will visit the site at regular intervals.

C. Preinstallation Meetings: Conduct preinstallation meetings where indicated in individual Specification Sections to clarify installation procedures, phasing, and coordination of the work.

1. Convene the meeting at least one week prior to installation. Notify Landscape Architect and other participants of meeting dates.
2. Make readily available necessary information such as approved submittals, drawings, and specifications.
3. Attendees: As follows, and as applicable to the Work:
   a. Landscape Architect, and retained consultants.
   b. Contractor and his/her superintendent;
   c. Relevant subcontractors;
   d. Manufacturer's representative and suppliers.
   e. Other concerned parties.
4. Critical Coordination Points for Landscape Architect:
   a. Ensure Landscape Architect review before finalizing the following layout items:
      1) Main Garden Axis
      2) Drainage Structures
      3) Walls
      4) Freestanding Masonry
      5) Curbs
      6) Stairs
      7) Handrails
      8) Paving
      9) Fences
      10) Light Fixtures and Receptacles
      11) Irrigation Boxes and Main Lines
      12) Signage
      13) Artwork
      14) All Plantings
5. Agenda: Discuss items of significance, including the following:
   a. Access to work and conditions of proper installation.
   b. Review conditions of installation, such as substrates, existing and surrounding conditions, and environmental conditions
   c. Identify conditions detrimental to the installation.
   d. Review preparation procedures, including protection of adjacent work.
   e. Verify installer's receipt and understanding of installation instructions.
   f. Review submittals, installation procedures, and sequenses.
   g. Review coordination with other work.
   h. Evaluate delivery schedule and progress schedule.
   i. Observe a sample installation.
   j. Convey required protection procedures.
   k. Evaluate, document, and approve field mock-ups.

1.3. CONSTRUCTION COORDINATION

A. Coordinate construction to ensure efficient and orderly installation of each part of the Work.

B. Sequencing: Coordinate construction operations as required to properly sequence the Work to achieve complete, finished installation.

C. Specification Sections: Coordinate construction indicated in separate Specifications Sections, and Sections that are depend on other Sections, to ensure efficient and orderly installation of each part of the Work, and proper installation, connection, and operation.

1.4. SUBMITTAL PROCEDURES, GENERAL

A. Contractor shall not perform any work requiring submittal and review of shop drawings, product data, and samples, with review and approval by the Landscape Architect. Work performed shall be in accordance with approved submittals.

B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

C. Contractor's Review and Preparation of Submittals: Comply with the following:

1. Contractor's Initial Review: Submittals shall be initially reviewed and approved by the General Contractor, prior to sending on to Landscape Architect. Check submittal content, dimensions, and coordinate with subcontractors as necessary to ensure that contract requirements have been met. Identify deviations from the Contract Documents.
2. Number of Copies: Not less than 3-copies, unless noted otherwise.
3. Place a permanent label or title block on each submittal for identification. Provide a 4- by 5-inch (100- by 125-mm) space on the label or beside title block to record review and approval markings and action taken. Include the following information on the label:

a. Project name.
b. Date.
c. Name and address of Contractor.
d. Name and address of subcontractor or supplier.
e. Number and title of corresponding Specification Section.

D. Landscape Architect's Review of Submittals:

1. General: Landscape Architect will only accept submittals from the General Contractor. Landscape Architect will review submittals to determine whether the submittal is consistent with the design intent and the Contract Documents; and not to determine accuracy and completeness of dimensions or quantities. Submittals not properly reviewed and approved prior to submitting for Landscape Architect's

review will be returned with an annotation "complete Contractor's initial review as required".

2. Do not submit submittals that are not required for review. Submittals not required will be returned without review to the contractor, with an annotation "not required for review".
3. Informational Submittals: Information submittals not requiring approval will not be returned to Contractor. Landscape Architect will review informational submittal to verify compliance with the Contract Documents, and will notify Contractor if submitted item does not comply. If submitted item does not comply, then resubmit as directed by Landscape Architect.
4. Action Submittals: Landscape Architect will review each action submittal, mark as appropriate to indicate action taken, and return copies less those retained. Compliance with specified requirements remains Contractor's responsibility.
5. Initial Review: Allow 7-days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Landscape Architect will advise Contractor when a submittal being processed must be delayed for coordination.
6. Resubmittal Review: Allow 7-days for review of each resubmittal.
7. All submittals which are not physical samples shall be submitted electronically.
8. Physical sample submittals shall have electronic transmittal setn for tracking of the submittal electronically.

E. Review of Submittals by Landscape Architect's Consultants:

1. Sequential Review: Where sequential review of submittals by Landscape Architect's consultants, allow 10-days for initial review of each submittal.

PART 2 - PRODUCTS

2.1. PRE-CONSTRUCTION SUBMITTALS

A. Unless noted otherwise, no work shall begin until all required preconstruction submittals have been submitted by the contractor, and reviewed and approved by the Landscape Architect and Owner.

B. Certificates of Insurance: Submit required certificates of insurance indicated in the Supplementary Conditions on a standardized form, such as ACORD or AIA Document G715. Landscape Architect will review certificates only for conformance with administrative contract requirements, including proper form, dates of coverage, and required signatures. Owner will make final review of compliance in consultation with their legal counsel and insurance advisors.

C. Surety Bond: Submit required bonds indicated in the Supplementary Conditions on a standardized form, such as AIA Document A312. Landscape Architect will review certificates only for conformance with administrative contract requirements, including proper form, dates, and required signatures. Owner will make final review of compliance in consultation with their legal counsel and insurance advisors.

D. Subcontractor and Major Material Suppliers List: Prepare a written summary identifying individuals or firms proposed for (only) major portions of the Work. Use CSI Form 1.5A.

E. Construction Schedule: Prepare a horizontal bar-chart Contractor's construction schedule.

1. Provide a separate time bar for each activity, using same breakdown of Work indicated in the Schedule of Values, and a vertical line to identify the first workday of each week.
2. Indicate pre-installation meetings where applicable.
3. Coordinate each element with other activities. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
4. Indicate milestones, Substantial Completion, Final Completion, and allow time for Landscape Architect's procedures necessary for certifying Substantial Completion.
5. Construction Schedule Submittal Procedure:
   a. Distribute copies to Owner and Landscape Architect subcontractors, and parties required to comply with dates.
   b. Revise the schedule after each meeting or activity where revisions have been made. As Work progresses, mark each bar to indicate actual completion. Distribute revised copies to Owner, Landscape Architect, subcontractors, and parties required to comply with dates.

F. Schedule of Values: Submit Schedule of Values complying with the General Conditions.

2.2. CONSTRUCTION ACTION SUBMITTALS

A. Shop Drawings: Submit Project-specific information drawn to scale. Do not base shop drawings on reproductions of the Contract Documents or standard printed data.

1. Copies: Submit one electronic print on sheets at least 8-1/2- by 11-inches (215- by 280-mm) but no larger than 30- by 42-inches (762- by 1067-mm). Landscape Architect will return the electronic print.
2. Indicate the following:
   a. Dimensions, profiles, methods of attachment, large scale details, and other information, as appropriate for the Work.
   b. Identification of products and materials.
   c. Notation of coordination requirements.
   d. Notation of dimensions established by field measurement.

B. Product Data: Mark each copy to show applicable choices and options. Include the following:

1. Data indicating compliance with specified standards and requirements.
2. Notation of coordination requirements.
3. For equipment data, include rated capacities, dimensions, weights, required clearances, and furnished specialties and accessories.

C. Samples: Submit Samples finished as specified and identical with the material proposed. Where variations are inherent in the material, submit sufficient units to show full range of the variations. Include name of manufacturer and product name on label.

2.3. CONSTRUCTION INFORMATION SUBMITTALS

A. Manufacturer Product Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

B. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed.

C. Operation and Maintenance Data: Assemble operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections.

D. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include performance and design criteria and a summary of loads.

2.4. CLOSE-OUT SUBMITTALS

A. Refer to Section 01701 - Execution and Closeout Requirements for detailed requirements during project closeout.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

01 31 10
SCHEDULES AND REPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. Administrative and procedural requirements for schedules and reports required for proper performance of the Work, including:

1. Preliminary construction schedule.
2. Contractor's construction schedule.
3. Schedule of inspections and tests.
4. Unit-price schedule.
5. Material location reports.
6. Field correction reports.
7. Special reports.

1.2 RELATED SECTIONS:

A. Specified elsewhere:

1. Division 1 Section "Applications for Payment" specifies requirements for submittal of the Schedule of Values.
2. Division 1 Section "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
3. Division 1 Section "Quality Control" specifies requirements for submittal of inspection and test reports.
4. Division 1 Section "Materials and Equipment" specifies requirements for submittal of the list of products.

1.3 PRELIMINARY NETWORK DIAGRAM

A. Preliminary Network Diagram: Submit a preliminary network diagram within 14 days of the date established for "Commencement of the Work." The preliminary network diagram shall outline activities for the first 60 days of construction. Include a skeleton diagram for the remainder of the Work with the preliminary diagram.

1. Include each significant construction activity. Coordinate each activity in the network with other activities. Schedule each construction activity in proper sequence.
2. Indicate completion of the Work on the date established for Substantial Completion, unless the Owner agrees otherwise.

B. Cash Requirement Prediction: With submittal of the preliminary network diagram, include a preliminary cash requirement prediction based on indicated activities.

C. Tabulation of Submittals: With submittal of the preliminary network diagram, include a tabulation by date of submittals required during the first 90 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead-time for manufacture or fabrication.

D. Distribution: Distribute the preliminary network diagram to parties involved in construction activities that are scheduled early, including the Architect and the Owner.

1.4 CPM SCHEDULE

A. Prepare the Contractor's Construction Schedule using the network analysis diagram system known as the critical path method (CPM). Follow procedures outlined in AGC's "Construction Planning & Scheduling."

1. Proceed with preparation of the network diagram immediately following notification of Contract award.
2. Establish procedures for monitoring and updating the CPM Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates. Use "one working day" as the unit of time.

B. CPM Schedule Preparation: Prepare a list of all activities involved in the Project. Include a list of activities required to complete the Work. Provide the best data available for generation of the network diagram and the CPM Schedule.

1. Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities.
2. Indicate estimated times for the following activities to be performed:

    a. Preparation and processing of submittals.
    b. Purchase of materials.
    c. Delivery.
    d. Installation.

3. Treat each story or separate area as a separate numbered activity for principal elements of the Work.
4. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

C. Processing: Enter prepared data on the processing system. Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM Schedule within the limitations of Contract Time.

D. Format: Display the full network on a single sheet of stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.

1. Mark the critical path. Locate the critical path near the center of the network; locate paths with the most float near the edges.
2. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue: Prepare the initial issue of the CPM Schedule network diagram from a listing of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports to show the following:

1. The Contractor or subcontractor and Work or activity.
2. Description of the activity.
3. Principal events of that activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in working days.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

1.5 SUBMITTALS

A. Submittal and Distribution: Submit 3 copies of the initial issue of the tabulations and network for acceptance. When authorized, distribute copies to the Construction Manager, the Owner, separate contractors, subcontractors and suppliers or fabricators, and others identified by the Contractor with a need-to-know schedule responsibility.

1. Post copies in the Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
3. Submit copies of each computer-produced report to the Construction Manager.

B. Schedule Updating: Revise the schedule immediately after each meeting or other activity, where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each project meeting.

1.6 SUBMITTAL SCHEDULE

A. Prepare a complete schedule of preliminary submittals. Submit the schedule within 7 days of the Pre-Construction Meeting with this Contractor's Construction Schedule.

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values and the list of products as well as the Construction Schedule.

B. Prepare the schedule in chronological order. Provide the following information:

1. Scheduled date for the first submittal.
2. Related Section number.
3. Submittal category.
4. Name of the subcontractor.
5. Description of the part of the Work covered.
6. Scheduled date for re-submittal.
7. Scheduled date for the Architect's final release or approval.

C. Distribution: Following the Architect's response to the initial submittal, print and distribute copies to the Construction Manager, Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated.

1. Post copies in the Project meeting room and temporary field office.
2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule prior to each Payment and Progress Meeting or other activity when revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.7 SCHEDULE OF INSPECTIONS AND TESTS

A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule at the first Payment and Progress Meeting .

B. Form: The schedule shall be in tabular form and shall include, but not be limited to, the following:

1. Specification Section number.
2. Description of the test.
3. Identification of applicable standards.
4. Identification of test methods.
5. Number of tests required.
6. Time schedule or time span for tests.
7. Entity responsible for performing tests.
8. Requirements for taking samples.
9. Unique characteristics of each service.

C. Distribution: Distribute the schedule to the Owner, Construction Manager, and each party involved in performance of portions of the Work where inspections and tests are required.

1.8 REPORTS

A. Field Correction Reports: When the need to take corrective action that requires a departure from the Contract Documents arises, prepare a detailed report. Include a statement describing the problem and recommended changes. Indicate reasons the Contract Documents cannot be followed. Submit a copy to the Construction Manager immediately.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of
construction during performance of the Work, including the following:
1. Start-up construction schedule.
2. Prime/General Contractor's construction schedule.
3. Field condition reports.
4. Special reports.

B. Related Sections:
1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and
inspections.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
1. PDF electronic file.

B. Start-up construction schedule.

C. Prime/General Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. Field Condition Reports: Submit at time of discovery of differing conditions.

E. Special Reports: Submit at time of unusual event.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of
construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Prime/General Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 PRIME/GENERAL CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 14 days, unless specifically allowed by Landscape Architect.
   2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule.
      Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Prime/General Contractor's construction schedule with submittal schedule.
   4. Startup and Testing Time: Include not less than 15 days for startup and testing.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Landscape Architect's administrative procedures necessary for certification of Substantial Completion.
   6. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
2. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
3. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Uninterruptible services.
   c. Provisions for future construction.
   d. Seasonal variations.
   e. Environmental control.
4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Mockups.
   e. Fabrication.
   f. Sample testing.
   g. Deliveries.
   h. Installation.
   i. Tests and inspections.
   j. Adjusting.
   k. Curing.
   l. Startup and placement into final use and operation.
5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   a. Structural completion.
   b. Permanent space enclosure.
   c. Completion of mechanical installation.
   d. Completion of electrical installation.
   e. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   1. Unresolved issues.
   2. Unanswered RFIs.

3. Rejected or unreturned submittals.
4. Notations on returned submittals.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Prime/General Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 START-UP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Phase 3 Prime/General Contractor to submit a comprehensive, fully developed, horizontal Gantt-chart-type, Prime/General Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the start-up construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 REPORTS

A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence.
Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at
Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Prime/General Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 PRIME/GENERAL CONTRACTOR'S CONSTRUCTION SCHEDULE

1. Prime/General Contractor's Construction Schedule Updating: At monthly intervals phase 3 Prime/General Contractor update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
2. Phase 3 Prime/General Contractor to revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Landscape Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in
the same locations. Delete parties from distribution when they have completed theirassigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

01 32 23
PHOTO DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.

B. Related Sections include the following:

1. Division 1 Section "Shop Drawings, Product Data, and Samples" for submitting photographic documentation.

1.3 SUBMITTALS

A. Construction Photographs: Submit images to be uploaded every seven days on Wednesdays by 12:00pm to the project FTP located at:
   a. In Internet Explorer, type *"ftp://ftp.hoerrschaudt.com/"*
   b. When prompted, use the following log-on:
   c. Username: GDMBG
   d. Password: *garden*
   e. Once you are in, press alt, go to "View", and select "open FTP site in windows explorer"
   f. Open the HSLA folder and then the folder named "2013-08-02 – For Construction Draft Set".

1. Progress images: For review of progress, digital photographs shall be submitted. Format and resolution shall be as described in 2.1 A below.

1.4 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPEG format with compression at "Best" or equal to produce the highest quality compressed image, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file information.
2. Field Office Images: Maintain one set of images on a storage device in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Construction Manager.

C. Preconstruction Photographs: Before commencement of demolition, commencement of excavation, and starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits before taking construction photographs.
2. Take photographs to show existing conditions adjacent to property before starting the Work.
3. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

END OF SECTION

01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:
   1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Landscape Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not
require Landscape Architect's responsive action. Submittals may be rejected for not complying with requirements.

C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems
used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making

corrections or modifications to submittals noted by the Landscape Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and
   Prime/General Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include
   submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Prime/General Contractor's construction schedule.
   a. Submit revised submittal schedule to reflect changes in current status and timing
      for submittals.
4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action, informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Landscape Architect's final release or approval.
   g. Scheduled dates for purchasing.
   h. Scheduled dates for installation.
   i. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Landscape Architect's Digital Data Files: At Prime/General Contractor's written request, electronic copies of Landscape Architect's CADD files of the Contract Drawings will be provided by Landscape Architect for Prime/General Contractor's use in preparing submittals, subject to the following conditions:
   1. Prime/General Contractor shall execute a CADD/Electronic File Transfer / Use Agreement included in the Project Manual following this section.
   2. Landscape Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

B. Coordination: Coordinate preparation and processing of submittals with performance of
   construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals,
      and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless
      partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification
      Section as separate packages under separate transmittals.

a. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
b. Landscape Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows.
Time for review shall commence on Landscape Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if
coordination with subsequent submittals is required. Landscape Architect will advise Prime/General Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner
as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Landscape Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals
may be transmitted simultaneously to Landscape Architect and to Landscape Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Landscape Architect before being returned to Contractor.

D. Identification and Information: Place a permanent label or title block on each paper copy
submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record
Prime/General Contractor's review and approval markings and action taken by Landscape Architect.
3. Include the following information for processing and recording action taken:
a. Project name.
b. Date.
c. Name of Landscape Architect.
d. Name of Construction Manager.
e. Name of Prime/General Contractor.
f. Name of subcontractor.
g. Name of supplier.
h. Name of manufacturer.

i. Submittal number or other unique identifier, including revision identifier.
   1) Submittal number shall use Specification Section number followed by a dash and then a sequential number (e.g., 061000_01). Resubmittals shall include an alphabetic suffix after sequential number (e.g., 061000_01A).
j. Number and title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Other necessary identification.

E. Identification and Information: Identify and incorporate information in each electronic submittal
file as follows:
1. Assemble complete submittal package into a single indexed file with links enabling
navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use Specification Section number followed by a dash and then a sequential number ((e.g., 061000_01). Resubmittals shall include an alphabetic suffix after sequential number (e.g., 061000_01A).
3. Provide means for insertion to permanently record Contractor's review and approval
markings and action taken by Landscape Architect.
4. Include the following information on an inserted cover sheet:
   a. Project name.
   b. Date.
   c. Name and address of Landscape Architect.
   d. Name of Prime/General Construction Manager.
   e. Name of Prime/General Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Name of subcontractor.
   h. Name of supplier.
   i. Name of manufacturer.
   j. Number and title of appropriate Specification Section.
   k. Drawing number and detail references, as appropriate.
   l. Location(s) where product is to be installed, as appropriate.
   m. Related physical samples submitted directly.
   n. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

F. Options: Identify options requiring selection by the Landscape Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Transmittal: Assemble each submittal individually and appropriately for transmittal and
handling. Transmit each submittal using a transmittal form. Landscape Architect will return submittals, without review, received from sources other than Prime/General Contractor.
   1. Transmittal Form: Use form acceptable to Landscape Architect.
   2. Transmittal Form: Provide locations on form for the following information:
      a. Project name.
      b. Date.
      c. Destination (To:).
      d. Source (From:).
      e. Names of subcontractor, manufacturer, and supplier.
      f. Category and type of submittal.
      g. Submittal purpose and description.
      h. Specification Section number and title.
      i. Indication of full or partial submittal.
      j. Drawing number and detail references, as appropriate.
      k. Transmittal number.
      l. Submittal and transmittal distribution record.
      m. Remarks.
      n. Signature of transmitter.
   3. On an attached separate sheet, prepared on Prime/General Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Landscape Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of
      revision.
   3. Resubmit submittals until they are marked with approval notation from Landscape Architect's action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals that are marked with approval notation from
Landscape Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Submit electronic submittals as PDF electronic files directly to Landscape Architect's Info Exchange Project Website specifically established for this Project. No fee or special software other than internet access is required for access to the Info Exchange Project Website. Specific access instructions will be provided following Award of Contract.
   2. Landscape Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
   3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
   4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
      a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
   5. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

2.2 ACTION SUBMITTALS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams showing factory-installed wiring.
      b. Printed performance curves.
      c Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before or concurrent with Samples.

6. Submit Product Data In the following format:
   a. PDF electronic file.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based upon Landscape Architect's digital data drawing files Is otherwise permitted.
   1. Preparation: Fully illustrate requirements In the Contract Documents. Include the
      following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop
      Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 Inches.
   3. Submit Shop Drawings in the following format:
      a. PDF electronic file.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Attach label on unexposed side of Samples that includes the following:
      a. Generic description of Sample.
      b. Product name and name of manufacturer.
      c. Sample source.
      d. Number and title of applicable Specification Section.
   3. Disposition: Maintain sets of approved Samples at Project site, available for quality control
      comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
      a. Samples that may be incorporated into the Work are indicated in individual
         Specification Sections. Such Samples must be in an undamaged condition at time of use.
      b. Samples not incorporated into the Work, or otherwise designated as Owner's
         property, are the property of Prime/General Contractor.
   4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or

sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Landscape Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Landscape Architect will retain one Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

A. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction
Progress Documentation."

B. Application for Payment: Comply with requirements specified in Division 01 Section "Payment
Procedures."

C. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment
Procedures."

D. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each
portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying
   products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.
   4. Submit subcontract list in the following format:

a. PDF electronic file.

E. LEED Submittals: Comply with requirements specified in Division 01 Section "Sustainable
Design Requirements."

2.3 INFORMATIONAL SUBMITTALS

A. Product Schedule: As required in individual Specification Sections, prepare a written summary
indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract
Documents.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:
a. PDF electronic file.

B. Prime/General Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

C. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project
Management and Coordination."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Landscape architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

F. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Submit written statements on manufacturer's letterhead certifying that

product complies with requirements in the Contract Documents.

I. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
Include the following information:
1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section
"Quality Requirements."

N. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing
agency's standard form, indicating and interpreting results of tests performed before installation
of product, for compliance with performance requirements in the Contract Documents.

O. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing
agency's standard form, indicating and interpreting results of compatibility tests performed
before installation of product. Include written recommendations for primers and substrate
preparation needed for adhesion.

P. Field Test Reports: Submit reports indicating and interpreting results of field tests performed
either during installation of product or after product is installed in its final location, for
compliance with requirements in the Contract Documents.

Q. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and
Maintenance Data."

R. Design Data: Prepare and submit written and graphic information, including, but not limited to,
performance and design criteria, list of applicable codes and regulations, and calculations.
Include list of assumptions and other performance and design criteria and a summary of loads.
Include load diagrams if applicable. Provide name and version of software, if any, used forE
calculations. Include page numbers.

S. Construction Photographs: Comply with requirements specified in Division 01 Section
"Photographic Documentation."

T. Material Safety Data Sheets (MSDSs): Submit information directly to Owner, if requested by
Owner; do not submit to Landscape Architect.

2.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Prime/General Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a
written request for additional information to Landscape Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other
required submittals, submit PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Prime/General Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the
Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Landscape Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01
Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name
and location, submittal number, Specification Section title and number, name of reviewer, date of Prime/General Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 LANDSCAPE ARCHITECT'S ACTION

A. General: Landscape Architect will not review submittals that do not bear Prime/General Contractor's approval stamp and will return them without action.

B. Action Submittals: Landscape Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Landscape Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
1. Final Unrestricted Release: Where submittals are marked "Approved", "No Exception
Taken", or "Reviewed" that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will
depend upon that compliance.
2. Final-But-Restricted Release: When submittals are marked "Approved as Noted" or
"Make Corrections Noted" that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend upon that compliance.
3. Returned for Resubmittal: When submittal is marked "Not Approved", "Revise and Resubmit" or "Rejected" or "Submit Specified Item" do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other
activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary until an approval status is obtained that permits the
Work to proceed.
a. Do not permit submittals returned for resubmittal to be used at the Project site, or elsewhere where Work is in progress. Submittals which have not been reviewed may not be used to construct the Work.

C. Informational Submittals: Landscape Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Landscape Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial
submittals has received prior approval from Landscape Architect.

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be
returned without review.

F. Unsolicited Submittals: Landscape Architect may discard submittals not required by the Contract
Documents without any review or action.

END OF SECTION

HOERR SCHAUDT
landscape architects
850 West Jackson Blvd. Suite 800, Chicago, IL 60607
Tel 312 492 6501 Fax 312 492 7101 www.hoerrschaudt.com

CADD/Electronic File Transfer / Use Agreement

Date: 2016-12-05

Project Name: River sOUTH

Project No.: **File No.:**

Dear Lend Lease:
At your request, we will provide electronic files for your convenience and use in establishing project layout or in the preparation of shop drawings related to the above noted project, subject to the following terms and conditions:

Our electronic files are compatible with: (software/hardware specifications). Hoerr Schaudt Landscape Architects (HSLA) makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained in these electronic files, at the time of transfer, are part of HSLA's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in establishing earthwork quantities or in the preparation of shop drawings for the referenced project. Any other use or reuse by you or by others is prohibited. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action or any nature against HSLA officers, directors, employees, agents and sub-consultants of HSLA that may arise out of or in connection you're your use of these electronic files. Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold HSLA, or officers, directors, employees, agents and sub-consultants of HSLA harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from your use of these electronic files.

These electronic files are not contract documents, nor do they contain changes occurring after issuance of the bidding documents. Differences may exist between these electronic files and corresponding hard-copy contract documents or any subsequent changes to them. Revisions issued by addenda prior to bidding may or may not be represented on these files. We make no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the hard-copy contract documents, including subsequent changes, and the electronic files, the contract documents shall govern. You are responsible for determining if any conflict exists and make any updates necessary to correct conflicts and make the files current with subsequent changes. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project. All elements of these drawings may not be drawn to the scale indicated. If used to determine dimensions, layout or quantities, the user shall verify drawings correspond to noted dimensions and verify scale.

Because information presented on the electronic files can be modified, unintentionally or otherwise, we reserve the right to remove all indicia of ownership and/or involvement from each electronic display.

We will furnish you electronic files of the following drawing sheets [ ] with [ ] without addendums posted:

Drawing Number	Drawing Date	Drawing Number	Drawing Date	Drawing Number	Drawing Date

ISSUE FOR SPECIAL ASSESSMENT DISTRICT dated 2016-12-05

Prior to delivery: This agreement shall be signed and submitted.
Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall we be liable for any loss of profit or any consequential damages as a result of your use or reuse of these electronic files.

Issued By	Contractor Signature	Title
Hoerr Schaudt Landscape Architects 850 West Jackson Blvd Suite 800 Chicago, IL 60607	Company Name	

EXHIBIT 01 33 00.1

01 34 00
SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Administrative and procedural requirements for submittal of Shop Drawings, Product Data, Samples, and other miscellaneous quality-control submittals.

B. Shop Drawings include, but are not limited to, the following:

1. Fabrication drawings.
2. Installation drawings.
3. Setting diagrams.
4. Shopwork manufacturing instructions.
5. Templates and patterns.
6. Schedules.

    a. Standard information prepared without specific reference to the Project is not Shop Drawings.

C. Product Data include, but are not limited to, the following:

1. Manufacturer's product specifications.
2. Manufacturer's installation instructions.
3. Catalog cuts.
4. Roughing-in diagrams and templates.

D. Samples include, but are not limited to, the following:

1. Partial Sections of manufactured or fabricated components.
2. Small cuts or containers of materials.
3. Field samples.

E. Quality-control submittals include, but are not limited to, the following:

1. Design data.
2. Certifications.
3. Manufacturer's instructions.

F. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits.
2. Applications for payment.
3. Performance and payment bonds.
4. Insurance certificates.
5. Listing of subcontractors.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal to the Construction Manager sufficiently in advance of scheduled performance of related construction activities to avoid delay.

1. Coordinate each submittal with other submittals and related activities that require sequential activity including:

a. Testing.
b. Purchasing.
c. Fabrication.
d. Delivery.

2. Coordinate transmittal of different types of submittals for the same element of the Work and different elements of related parts of the Work to avoid delay in processing because of the Construction Manager's need to review submittals concurrently for coordination.

a. The Construction Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are forthcoming.

3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals.

a. Allow 2 weeks for the Construction Manager's initial review of each submittal. Allow additional time if the Construction Manager must delay processing to permit coordination with subsequent submittals. The Construction Manager will advise the Contractor when a submittal being processed must be delayed for coordination.
b. When necessary to provide an intermediate submittal, process the intermediate submittal in the same manner as the initial submittal.
c. Allow 2 weeks for reprocessing each submittal.
d. The Construction Manager will not authorize an extension of time because of the Contractor's failure to transmit submittals to the

Construction Manager sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification.

1. Indicate name of the firm or entity that prepared each submittal on the label or title block.
2. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block to record the Contractor's review and approval markings and the action taken by the Construction Manager.
3. Include the following information on the label for processing and recording action taken.

a. Project name.
b. Date.
c. Name and address of the Architect.
d. Name and address of the Construction Manager
e. Name and address of the Contractor.
f. Name and address of the subcontractor.
g. Name and address of the supplier.
h. Name of the manufacturer.
i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Similar definitive information as necessary.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Construction Manager and to other destinations by use of a transmittal form. The Construction Manager will return submittals received from sources other than the Contractor.

1. Record relevant information and requests for data on the transmittal form. On the form, or an attached separate sheet, record deviations from requirements of the Contract Documents, including minor variations and limitations.
2. Include the Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

1.4 SHOP DRAWINGS

A. Submit newly prepared information, drawn accurately to scale. Do not reproduce Contract Documents or copy standard printed information as the basis of Shop Drawings.

1. Include the following information on Shop Drawings:

a. Dimensions.
b. Identification of products and materials included.
c. Compliance with specified standards.
d. Notation of coordination requirements.

e. Notation of dimensions established by field measurement.

2. Submit Coordination Drawings where required for integration of different construction elements. Show construction sequences and relationships of separate components where necessary to avoid conflicts in utilization of the space available.
3. Highlight, encircle, or otherwise indicate deviations from the Contract Documents on the Shop Drawings.
4. Do not allow Shop Drawing copies that do not contain an appropriate final stamp or other marking indicating the action taken by the Construction Manager to be used in construction.
5. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
6. Initial Submittal: Submit three (3) bond copy prints for the Construction Manager's review. The Construction Manager will return one (1) copy to the Contractor.

   a. Owner's review of submittals: Submit one (1) copy of submittals indicated on the contractors submittal log to the Owner for Owners review in sequence with the Construction Manager's review. The Owner shall forward copy of the Owner's comments to the Construction Manager which shall be incorporated into the Construction Manager's review prior to returning to the Contractor.

7. Final Submittal: Submit three (3) bond copy prints. The Construction Manager will return two (2) corrected drawings to the Contractor and retain one (1) copy for the Construction Manager's records. The Contractor is responsible for reproduction of returned drawings and distribution to the Subcontractors.

   a. The Contractor shall mark up and retain one of the prints returned as a "Record Document."

1.5 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Mark each copy to show which choices and options are applicable to the Project.

1. When Product Data includes information on several similar products, some of which are not required for use on the Project, mark copies clearly to indicate which products are applicable.
2. When Product Data must be specially prepared for required products, materials, or systems because standard printed data are not suitable for use, submit as Shop Drawings not Product Data.
3. Include the following information in Product Data:

   a. Manufacturer's printed recommendations.

b. Compliance with recognized trade association standards.
c. Compliance with recognized testing agency standards.
d. Application of testing agency labels and seals.
e. Notation of dimensions verified by field measurement.
f. Notation of coordination requirements.

4. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

B. Submittals: Submit 3 copies of each required Product Data submittal. The Construction Manager will retain one (1) copy and will return the other marked with the action taken and corrections or modifications required.

1. Unless the Construction Manager observes noncompliance with provisions of the Contract Documents, the submittal may serve as the final submittal.

C. Distribution: Furnish copies of final Product Data submittal to the manufacturers, subcontractors, suppliers, fabricators, installers, governing authorities and others as required for performance of the construction activities. Show distribution on transmittal forms.

1. Do not proceed with installation of materials, products, and systems until a copy of Product Data applicable to the installation is in the Installer's possession.
2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.6 SAMPLES

A. Submit full-size, fully fabricated Samples, cured and finished in the manner specified, and physically identical with the material or product proposed for use.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Construction Manager's sample where so indicated. Include the following information:

a. Generic description of the Sample.
b. Size limitations.
c. Sample source.
d. Product name or name of manufacturer.
e. Compliance with recognized standards.
f. Compliance with governing regulations.
g. Availability.
h. Delivery time.

2. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a

comparison of these characteristics between the final submittal and the actual component as delivered and installed.

a. When variation in color, pattern, texture, or other characteristic is inherent in the material or product represented by a Sample, submit at least 3 multiple units that show approximate limits of the variations.
b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
c. Refer to other Specification Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be in an undamaged condition at time of use. On the transmittal form, indicate such special requests about disposition of Sample submittals.
d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

B. Submittals: Except for Samples intended to illustrate assembly details, workmanship, fabrication techniques, connections, operation, and other characteristics, submit 2 Sample.

1. Maintain Samples, as returned by the Construction Manager, at the Project Site, available for quality-control comparisons throughout the course of construction activity.
2. Unless the Construction Manager observes noncompliance with provisions of the Contract Documents, the submittal may serve as the final submittal.
3. Sample may be used to obtain final acceptance of the construction associated with each set.

C. Field samples specified in individual Specification Sections are special types of Samples. Comply with Sample submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.7 QUALITY ASSURANCE SUBMITTALS

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Control."

1.8 CONSTRUCTION MANAGER'S ACTION

A. Except for submittals for the record or for information, where action and return of submittals is required, the Construction Manager will review each submittal, mark to indicate the action taken, and return.

1. Compliance with specified characteristics is the Contractor's responsibility and not considered part of the Construction Manager's review and indication of action taken.

B. Action Stamp: The Construction Manager will stamp each submittal with a uniform, action stamp. The Construction Manager will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When submittals are marked "Reviewed," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final acceptance will depend on that compliance.
2. Final-but-Restricted Release: When submittals are marked "Furnish as Corrected," the Work covered by the submittal may proceed provided it complies with both the Construction Manager's notations or corrections on the submittal and requirements of the Contract Documents. Final acceptance will depend on that compliance.
3. Returned for Re-submittal: When submittal is marked "Rejected or Revise and Resubmit," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the Construction Manager's notations. Resubmit without delay. Repeat if necessary to obtain a different action mark.

    a. Do not permit submittals marked "Rejected or Revise and Resubmit" to be used at the Project Site or elsewhere where construction is in progress.

4. Specified Item: When submittal is marked "Submit Specified Item," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise and submit products and or manufacturers as specified. Resubmit without delay.
5. Other Action: When a submittal is primarily for information or record purposes or for special processing or other contractor activity, the submittal will be returned, marked "Action Not Required."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

01 40 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Administrative and procedural requirements for quality-control services.

B. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by Independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Construction Manager or Architect.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Construction Manager, Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

E. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Schedules and Reports" specifies requirements for development of a schedule of required tests and inspections.

F. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents

and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.
2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.

    a. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.

G. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

H. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.
2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
4. Provide facilities for storage and curing of test samples.
5. Deliver samples to testing laboratories.
6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Provide security and protection of samples and test equipment at the Project Site.

I. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the Construction Manager, Architect and the Contractor in performance of the agency's duties. The testing

agency shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Construction Manager, Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

J. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.3 SUBMITTALS

A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Construction Manager and Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:

    a. Date of issue.
    b. Project title and number.
    c. Name, address, and telephone number of testing agency.
    d. Dates and locations of samples and tests or inspections.
    e. Names of individuals making the inspection or test.
    f. Designation of the Work and test method.
    g. Identification of product and Specification Section.
    h. Complete inspection or test data.
    i. Test results and an interpretation of test results.
    j. Ambient conditions at the time of sample taking and testing.
    k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
    l. Name and signature of laboratory inspector.
    m. Recommendations on retesting.

1.4 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore to original condition.

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

01 42 00
REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Landscape Architect's action on Prime/General Contractor's submittals, applications, and requests, "approved" is limited to Landscape Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Landscape Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site

is shown on Drawings and may or may not be identical with the description of the land on which
Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent
requirements, applicable construction industry standards have the same force and effect as if
bound or copied directly into the Contract Documents to the extent referenced. Such standards
are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents
unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with
industry standards applicable to its construction activity. Copies of applicable standards are not
bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain
copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other
Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other
Contract Documents, they shall mean the recognized name of the entities in the following list.
Names, telephone numbers, and Web sites are subject to change and are believed to be
accurate and up-to-date as of the date of the Contract Documents.

IAPMO International Association of Plumbing and Mechanical Officials (909) 472-4100
www.iapmo.org

ICC International Code Council (888) 422-7233
www.iccsafe.org

ICC-ES 6587	ICC Evaluation Service, Inc.	(800) 423-
	www.icc-es.org (562) 699-0543	
UBC	Uniform Building Code (See ICC)	

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE 0011	Army Corps of Engineers	(202) 761-
	www.usace.army.mil	
CPSC 638-2772	Consumer Product Safety Commission	(800)
	www.cpsc.gov (301) 504-7923	
DOC 2000	Department of Commerce	(202) 482-
	www.commerce.gov	
DOD 697-6257	Department of Defense	(215)
	http://.dodssp.daps.dla.mil	
DOE 586-9220	Department of Energy	(202)
	www.energy.gov	
EPA 0167	Environmental Protection Agency	(202) 272-
	www.epa.gov	
FAA 835-5322	Federal Aviation Administration	(866)
	www.faa.gov	
FCC 225-5322	Federal Communications Commission	(888)
	www.fcc.gov	
FDA 463-6332	Food and Drug Administration	(888)
	www.fda.gov	

GSA 3111	General Services Administration www.gsa.gov	(800)	488-
HUD 1112	Department of Housing and Urban Development www.hud.gov	(202)	708-
LBL 486-4000	Lawrence Berkeley National Laboratory www.lbl.gov		(510)
NCHRP	National Cooperative Highway Research Program (See TRB)		
NIST 975-6478	National Institute of Standards and Technology www.nist.gov		(301)
OSHA 321-6742	Occupational Safety & Health Administration www.osha.gov (202) 693-1999		(800)
PBS	Public Buildings Service (See GSA)		
PHS 7694	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202)	690-
RUS 720-9540	Rural Utilities Service (See USDA)		(202)
SD 4000	State Department www.state.gov	(202)	647-
TRB 334-2934	Transportation Research Board http://gulliver.trb.org		(202)
USDA 2791	Department of Agriculture www.usda.gov	(202)	720-
USPS 268-2000	Postal Service www.usps.com		(202)

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or

(215) 697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil

UFAS Uniform Federal Accessibility Standards
(800) 872-2253
Available from Access Board (202) 272-0080
www.access-board.gov

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation
(800) 952-5210
www.dca.ca.gov/bhfti (916) 574-2041

CCR California Code of Regulations
(916) 323-6815
www.calregs.com

CPUC California Public Utilities Commission
(415) 703-2782
www.cpuc.ca.gov

SUDAS Statewide Urban Design and Specifications
(515) 294-2869
www.iowasudas.org

TFS Texas Forest Service
(979) 458-6650
Forest Resource Development
http://txforestservice.tamu.edu

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner, Construction Manager, Architect, testing agencies, and authorities having jurisdiction.

1.4 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.5 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or

posts, 1-1/2 inches (38 mm) I.D. for line posts and 2-1/2 inches (64 mm) I.D. for corner posts.

2.2 EQUIPMENT

A. General: Provide new equipment. If acceptable to the Construction Manager, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Contractor's personnel shall not use the Owner's existing toilet rooms or washroom facilities.

bib and associated piping, ¾ inch diameter maximum, to the nearest suitable permanent cold water line. Provide all hoses and accessories as necessary. In the event that larger service is required, Contractor shall make necessary arrangements with the utility company for temporary water service. Contractor shall be responsible for all costs associated with temporary water service installation.

2. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

1. Install electric power service underground, except where overhead service must be used.
2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Provide sufficient lighting to perform construction activities in all areas of the building without having to use light stands or other mobile lighting sources.
2. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Telephones: Provide temporary telephone service and telephones throughout the construction period for all personnel engaged in construction activities.

F. Sanitary facilities include temporary toilets and drinking-water. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

G. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

1. Provide separate facilities for male and female personnel.

"Competent Person." Scaffolds and ladders shall be promptly removed after their purpose has been served. Particular attention should be given to the sidewalk pedestrian protection scaffolding that must be installed to protect students, faculty, staff, and the public during construction.

E. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

1. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
2. All signage to be approved by Owner.

F. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. It is the General Contractor's responsibility to ensure a secure site.

B. Temporary Fire Protection: Maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Termination and Removal: Unless the Construction Manager requests that it be maintained longer, remove each temporary facility when the need has ended. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
2. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.

END OF SECTION

01 56 39
SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary site fencing.
2. Division 31 Section "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of the following:

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

    a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
    b. Enforcing requirements for protection zones.
    c. Arborist's responsibilities.
    d. Field quality control.

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other nonsoil materials.

1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Landscape Architect.
3. Access Gates: Install as needed to provide minimal access to protected areas for maintenance, adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Landscape Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Landscape Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving."

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:

    a. Type of Pruning: Cleaning, Thinning, Raising, Reduction.
    b. Specialty Pruning: Vista.

3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.
5. Tie back any branches that are to remain but extend beyond the protection zone.

B. Chip removed branches and spread over areas identified by Landscape Architect.

3.7 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.8 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
4. Perform repairs within 24 hours.
5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
2. For every caliper inch of trees being replaced provide new tree(s) of 3 inch caliper size to total required replacement caliper. (for each tree being replaced that measures 6 inches in caliper size, two 3 inch caliper trees would be required, 15 inches of caliper to be replaced would require five 3 inch caliper trees).

01 58 00
PROJECT IDENTIFICATION SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. The General Contractor shall:

1. Provide temporary on-site informational signs to identify key elements of construction facilities.
2. Remove signs on completion of construction.
3. Allow no other signs to be displayed.
4. Secure permit for sign installation.

B. RELATED SECTIONS: The following sections contain requirements that relate to this section:

1. Division 1 for:

a. 010100 - Summary of Work.

1.3 INFORMATIONAL SIGNS:

A. Painted signs with painted lettering, or standard products.

1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
2. Colors: as required by regulatory agencies, otherwise of uniform colors throughout project.

B. Erect at appropriate locations to provide required information.

1.4 QUALITY ASSURANCE:

A. Sign Painter: Professional Experience in type of work required.

B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in
Project; product delivery, storage, and handling; manufacturers' standard warranties on
products; special warranties; and comparable products.

B. Related Sections:
1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Substitution Procedures" for requests for substitutions.
4. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or
taken from previously purchased stock. The term "product" includes the terms "material,"
"equipment," "system," and terms of similar intent.
1. Named Products: Items identified by manufacturer's product name, including make or
model number or other designation shown or listed in manufacturer's published product
literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal
process to have the indicated qualities related to type, function, dimension, in-service
performance, physical properties, appearance, and other characteristics that equal or
exceed those of specified product.

deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Prime/General Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Product Selection Procedures:
   1. Products: Where Specifications list a one or several manufacturers and products,
      provide one of the named products that comply with requirements. Comparable products
      or substitutions for Prime/General Contractor's convenience will not be considered.
   2. Manufacturers: Where Specifications include a list of manufacturers' names, provide a
      product by one of the manufacturers listed that complies with requirements. Comparable
      products or substitutions for Prime/General Contractor's convenience will not be considered.
   3. Basis-of-Design Product: Where Specifications name a product, or refer to a product
      indicated on Drawings, and include a list of manufacturers, provide the specified or
      indicated product or a comparable product by one of the other named manufacturers.
      Drawings and Specifications indicate sizes, profiles, dimensions, and other
      characteristics that are based on the product named. Comply with requirements in
      "Comparable Products" Article for consideration of an unnamed product by one of the
      other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Landscape Architect's sample", provide a product that complies with requirements and matches Landscape Architect's sample. Landscape Architect's decision will be final on whether a proposed product matches.
   1. If no product available within specified category matches and complies with other
      specified requirements, comply with requirements in Division 01 Section "Substitution
      Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by
   Landscape Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Landscape Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Landscape Architect will consider Prime/General Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied,

01 61 00
MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect/Engineer.
3. Manufactured and Fabricated Products:

    a. Design, fabricate and assemble in accord with the best engineering and shop practices.
    b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
    c. Two or more items of the same kind shall be identical, by the same manufacturer.
    d. Products shall be suitable for service conditions.
    e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Bidding Requirements:

    a. Conditions of the Contract.

2. Division 1 for:

    a. 010100 - Summary of Work.
    b. 013400 - Shop Drawings, Product Data & Samples.
    c. 016310 - Substitutions.
    d. 017100 - Cleaning
    e. 017823 - Operating & Maintenance Data

1. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
3. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

PART 2 - PRODUCTS: Not used.

PART 3 - EXECUTION: Not used.

END OF SECTION

substitutions. The following are not considered to be requests for substitutions:

1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
2. Revisions to the Contract Documents requested by the Owner, Construction Manager, or Architect.
3. Specified options of products and construction methods included in the Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

A. Substitution Request Submittal: The Construction Manager will consider requests for substitution if received within 30 days after commencement of the Work.

1. Submit 5 copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

    a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors, that will be necessary to accommodate the proposed substitution.
    b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
    c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
    d. Samples, where applicable or requested.
    e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum.
    g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.

4. Where a proposed substitution involves more than one prime contractor, each contractor shall cooperate with the other contractors involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of products.

B. Substitutions will not be considered if:

1. They are indicated or implied on shop drawings or product data submittals without formal request.
2. Acceptance will require substantial revision of Contract Documents.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

containers or emptying service as required. Provide weekly rubbish container emptying service as a minimum.

C. Location of dumpster shall be approved by Owner prior to placement on site.

D. Each Sub Contractor is responsible for daily and weekly cleanup of his own work area or room, his own field office, and his own storage areas, as directed by the General Contractor.

E. If the General Contractor does not perform or direct such cleaning with reasonable promptness or upon request, Construction Manager may cause such cleaning to be done by others and charge the cost of same to the General Contractor.

F. Special Requirements: The foregoing requirements shall be in addition to the requirements for cleaning and protection in the Conditions of the Contract, and to any special requirements for protection and cleaning specified elsewhere in the Contract Documents.

3.2 FINAL CLEANING

A. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the Project.

1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.
2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
3. Remove petrochemical spills, stains, and other foreign deposits.
4. Remove tools, construction equipment, machinery, and surplus material from the site.
5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.
6. Leave the Project clean and ready for occupancy.

B. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.

C. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

1. When extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
   1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
   2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
   3. Products: List products to be used for patching and firms or entities that will perform patching work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept
hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of
construction elements.
   1. Structural Elements: When cutting and patching structural elements, notify Landscape Architect of locations and details of cutting and await directions from the Landscape Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
   2. Operational Elements: Do not cut and patch operating elements and related components
   in a manner that results in reducing their capacity to perform as intended or that results in
   increased maintenance or decreased operational life or safety.
   Operational elements
   include the following:
      a. Primary operational systems and equipment.
      b. Fire separation assemblies.
      c. Air or smoke barriers.
      d. Fire-suppression systems.
      e. Mechanical systems piping and ducts.
      f. Control systems.
      g. Communication systems.
      h. Conveying systems.
      i. Electrical wiring systems.
      j. Operating systems of special construction.
   3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased

surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Landscape Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
      a. Description of the Work.
      b. List of detrimental conditions, including substrates.
      c. List of unacceptable installation tolerances.
      d. Recommended corrections.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   5. Proceed with installation only after unsatisfactory conditions have been corrected.

   Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move,

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels provided by use of total station technology. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and
levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Landscape Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

1. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
2. Do not change or relocate existing benchmarks or control points without prior written
approval of Landscape Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Landscape Architect before proceeding.
3. Replace lost or destroyed permanent benchmarks and control points promptly. Base
replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record
Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide
temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked
construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.

hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by
Owner's construction personnel.

1. Construction Schedule: Inform Owner of Prime/General Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation
conferences covering portions of the Work that are to receive Owner's work. Attend
preinstallation conferences conducted by Owner's construction personnel if portions of
the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas and adjacent public right of way and streets as required. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and
debris.
2. Do not hold waste materials more than seven days during normal weather or three days if
the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste.
Mark containers appropriately and dispose of legally, according to regulations.
a. Utilize containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where more than one installer has
worked.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for
proper execution of the Work.
1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the
entire work area, as appropriate.

C. Adjust equipment for proper operation. Adjust operating components for proper operation
without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties.
Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section
"Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or
deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and
finishes.
1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up
with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired
without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components
that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of no less then 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 14 days of date established for commencement of the Work. Plan shall include a narrative description of the process that will be implemented to record waste diversion.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use LEED-NC v2.2 Template - MRc2. Example of template attached at end of this Section. Include the following information:
   1. Material category.
   2. Generation point of waste.
   3. Total quantity of waste in tons.
   4. Quantity of waste salvaged, both estimated and actual in tons.
   5. Quantity of waste recycled, both estimated and actual in tons.
   6. Total quantity of waste recovered (salvaged plus recycled) in tons.
   7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
   1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator, or responsible individual, to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to everyone concerned within seven days of submittal return.
   2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
   2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until installation.
   4. Protect items from damage during transport and storage.
   5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
1. Pulverize concrete to maximum 1-1/2-inch size.
2. Crush concrete and screen for use as satisfactory soil for fill or sub-base.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
1. Pulverize masonry to maximum 1-1/2-inch size.
a. Crush masonry and screen for use as satisfactory soil for fill or sub-base.
2. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.
1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

G. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:
1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from

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CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. Administrative and procedural requirements for contract closeout including, but not limited to, the following:

1. Inspection procedures.
2. Project record document submittal.
3. Submittal of warranties.
4. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 33.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.

    a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise the Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Submit record drawings, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
5. Deliver tools, spare parts, extra stock, and similar items.
6. Complete final cleanup requirements.

B. Inspection Procedures: On receipt of a request for inspection, the Construction Manager and Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Construction Manager will prepare the Certificate of Substantial Completion following inspection or

completion is delayed under circumstances acceptable to the Construction Manager.

1. Upon completion of re-inspection, the Construction Manager will prepare a certificate of final acceptance. When the Work is incomplete, the Construction Manager will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
2. When necessary, re-inspection will be repeated.

C. Project Record Documents: In accordance with Section 017839.

D. Warranties and Bonds: In accordance with 017840.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

1. PDF electronic file. Assemble each manual into a composite electronically-indexed file.
   Submit on digital media acceptable to Landscape Architect.
   a. Name each indexed document file in composite electronic index with applicable
      item name. Include a complete electronically-linked operation and maintenance
      directory.
   b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose
   title pages and directories in clear plastic sleeves.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing
demonstration and training. Landscape Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for
Substantial Completion and at least 15 days before commencing demonstration and training.
Landscape Architect will return copy with comments.
1. Correct or modify each manual to comply with Landscape Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation
and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For
pieces of equiprnent not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual,

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic
PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where
scanning of paper documents is required, configure scanned file for minimum readable
file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based upon
file names. Name document files to correspond to system, subsystem, and equipment
names used in manual directory and table of contents. Group documents for each
system and subsystem into individual composite bookmarked files, then create composite
manual, so that resulting bookmarks reflect the system, subsystem, and equipment
names in a readily navigated file tree. Configure electronic manual to display bookmark
panel upon opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to
accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on
spine to hold label describing contents and with pockets inside covers to hold folded
oversize sheets.
a. If two or more binders are necessary to accommodate data of a system, organize
data in each binder into groupings by subsystem and related components. Crossreference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name,and subject matter of contents.
Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual.
Mark each tab to indicate contents. Include typed list of products and major components
of equipment included in the section on each divider, cross-referenced to Specification
Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic
software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.

7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish.
Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair Instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a

01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Administrative and procedural requirements for Project Record Documents.

B. Project Record Documents required include the following:

1. Marked-up copies of Contract Drawings.
2. Marked-up copies of Shop Drawings.
3. Newly prepared drawings.
4. Marked-up copies of Specifications, addenda, and Change Orders.
5. Marked-up Product Data submittals.
6. Field records for variable and concealed conditions.
7. Record information on Work that is recorded only schematically.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Shop Drawings, Product Data, and Samples" specifies general requirements for preparing and submitting Project Record Documents.
2. Division 1 Section "Contract Closeout" specifies general closeout requirements.

D. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make documents and Samples available at all times for the Architect's inspections.

1.2 RECORD DRAWINGS

A. Markup Procedure: During construction, maintain a set of blue- or black-line white prints of Contract Drawings and Shop Drawings for Project Record Document purposes.

1. Mark these Drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:

a. Dimensional changes to the Drawings.
b. Revisions to details shown on the Drawings.

a. In each Specification Section when products, materials, or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
b. Record the name of the manufacturer, supplier, installer, and other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.
c. Note related record Product Data, when applicable. For each principal product specified, indicate whether record Product Data has been submitted in maintenance manual instead of submitted as record Product Data.

2. Upon completion of markup, submit record Specifications to the Construction Manager for the Owner's records.

1.4 RECORD PRODUCT DATA

A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.

1. Mark Product Data to indicate the actual product installation when the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site and changes in manufacturer's instructions and recommendations for installation.
2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
3. Note related Change Orders and markup of record Drawings, where applicable.
4. Upon completion of markup, submit a complete set of record Product Data to the Construction Manager for the Owner's records.
5. When record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data.

1.5 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Architect for the Owner's records.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:

a. Field records on excavations and foundations.
b. Field records on underground construction and similar work.
c. Survey showing locations and elevations of underground lines.

01 78 40
WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 SUMMARY

A. Administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Divisions 2 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.2 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.3 CORRECTIVE WORK PERIOD

A. Within one year from date of Certificate of Substantial Completion, the Contractor is notified in writing by the Owner that any item of equipment, materials and/or workmanship has proved defective or that it is not meeting the specification requirements, he shall immediately replace, repair or otherwise correct the defect in deficiency without cost to the Owner.

B. The Contractor shall also replace or repair to the satisfaction of the Architect, any and all trades done to the building or its contents or to work of other trades in consequence of work performed in fulfilling this corrective work period requirement.

1. Refer to Divisions 2 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Form of Submittal: At Final Completion compile 3 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

maintenance procedures and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate content of training modules with content of approved operation and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Prime/General Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.
2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training
module. Assemble training modules into a training manual organized in coordination with
requirements In Division 01 Section "Operations and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage quallfied instructors to instruct Owner's personnel to adjust, operate, and maintain
systems, subsystems, and equipment not part of a system.
1. Owner will furnish Prime/General Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on tlmes. For equipment that requlres
seasonal operation, provide similar Instruction at start of each season.
1. Schedule training with Owner with at least seven days' advance notice.

C. Cleanup: Collect used and leftover educational materials and remove from Project site.
Remove instructional equipment. Restore systems and equipment to condition existing before
initial trainlng use.

END OF SECTION

and field test data will be for general information only. Production of concrete to comply with specified requirements is the responsibility of the contractor. Submit written reports to Landscape Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until each mix has been reviewed by the Landscape Architect.

a. Indicate amounts of mix water to be withheld for later addition at Project site.

2. Admixtures
3. Curing compounds
4. Reinforcement

B. Shop Drawings:

1. Steel Reinforcement Shop Drawings: Submit details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
2. Coordinate all dimensions and structural requirement with work by others.

C. Samples:

1. Submit 1 -48 Inch x48 inch sample (4 foot lengths for curbs including a corner sample and 1 example of taper and/or transition condition) of each mix design and finish indicating complete range of color, form finish and texture. Rework mix as required at the direction of the Landscape Architect to achieve an acceptable texture, color and finish. Samples may be completed on site or an appropriate offsite location for review by Landscape Architect. If completed off site, samples should be completed such that samples can be moved to the site at Owner/Landscape Architect request. Samples shall be reworked and reconstructed as necessary until the required standard of work has been achieved at no cost to the Owner.

D. Mockups: Construct mockups for each phase of work for demonstration and verification of construction method, dimension, finish and color.

1. Mockups shall be reworked and reconstructed as necessary until the required standard of work has been achieved at no cost to the Owner.
2. Mockups shall remain in place until completion of the work and shall be demolished afterward unless incorporated into the work at the direction of the Owner and Landscape Architect. Mockups may be completed on site or an appropriate offsite location for review by Landscape Architect. If completed off site, mockups should be completed such that samples can be moved to the site at Owner/Landscape Architects request.

7. ACI 347 " Recommended Practice for Concrete Formwork"
8. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
9. AWS D12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction."
10. CRSI "Manual of Standard Practice."

    a. Concrete Testing Service: The Owner will employ a testing laboratory to perform initial field quality control testing.

11. Materials and installed Work may require testing and retesting, at anytime during the progress of the Work. Allow free access to material stockpiles and facilities at all times. Tests, not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed Work, shall be done at the Contractor's expense.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Avoid damaging coatings on steel reinforcement.

1.7 PROJECT CONDITIONS

A. Before commencing work, examine all adjoining work on which this work is in any way dependent for proper installation and workmanship and report to the Contractor any condition which prevents performing first class work.

B. Before commencing work, examine all adjoining work on which this work is in any way dependent for proper installation and workmanship and report to the Contractor any condition which prevents performing first class work.

C. Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

D. Protect adjacent finish materials against spatter during concrete placement.

E. Provide all barricades and safeguards at all pits, holes, shaft and stairway openings, and the like. Provide all safeguards as required by authorities having jurisdiction. Take full responsibility for safety precautions and methods.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of the exposed concrete surface.
2. Furnish ties that, when removed, will leave smooth holes not larger than 1 inch (25 mm) in diameter in concrete surface. Provide release agent to allow clean removal.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.
4. Furnish stainless steel ties where drawings indicate exposed.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M.

C. Plain-Steel Wire: ASTM A 82, as drawn.

D. Deformed-Steel Wire: ASTM A 496.

E. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A coated, plain-steel wire.

F. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

1. Welded wire fabric maybe used in lieu of carbon steel fibers for interior slabs on grade and interior elevated concrete topping on metal deck when acceptable to the Landscape Architect.

G. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
4. Do not use wood, masonry, concrete or other similar supports.

B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

1. Provide the following for All exposed concrete elements:

    a. C-24 Charcoal, as manufactured by L.M. Scofield Company or approved equivalent.

2.6 WATERSTOPS

A. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Volclay Waterstop-RX; Colloid Environmental Technologies Co.
    b. Conseal CS-231; Concrete Sealants Inc.
    c. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
    d. Hydrotite; Greenstreak.
    e. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
    f. Adeka Ultra Seal; Mitsubishi International Corporation.
    g. Superstop; Progress Unlimited Inc.

2.7 VAPOR RETARDERS

A. General Vapor Retarder: ASTM E 1745, Class C, of one of the following materials; or polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick. Use only materials which are resistant to decay when tested in accordance with ASTM E 154:

1. Nonwoven, polyester-reinforced, polyethylene coatd sheet; 10 mils (0.25 mm) thick.
2. Three-ply, nylon- or polyester-cord-reinforced, laminated, high-density polyethylene sheet; 7.8 mils (0.18 mm) thick.

B. Vapor Retarder for Cast In Place Concrete adjacent to all planting locations: ASTM E 1745, Class C, of one of the following materials; or polyethylene sheet, ASTM D 4397, not less than 15 mils (0.381 mm) thick. Use only materials which are resistant to decay when tested in accordance with ASTM E 154:

1. Provide Stego Wrap 15 mil. membrane by Stego Industries, LLC prior to placement of concrete at all Silva Cell locations. Tape all seams and seal all penetrations using Stego tape or mastic. Follow manufacturer's instructions for installation.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm).

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5700 psi (39 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Below grade concrete walls, light pole bases, etc.: Normal-weight concrete proportioned according to ACI 211.1 and ACI 301. Minimum 28-day compressive strength shall be 4000PSI.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

C. Provide a minimum 28 day compressive strength of 4000 psi (27.7 MPa) and a maximum water-cementitious material ratio of 0.44, unless otherwise indicated.

D. Cementitious Materials:

1. For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than Portland cement according to ACI 301 requirements.
2. For all other concrete, limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

a. Fly Ash: 25 percent by weight.

E. Air Content: Use air-entraining admixture in exterior exposed concrete. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:

temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

2.15 CONCRETE FINISHES

A. Site:
   1. Vehicular Concrete Paving:
      a. P2: Medium to heavy intensity integral color, smooth float finish, medium to heavy sandblast/acid etch finish
   2. Pedestrian Concrete Paving:
      a. P1a: Medium to heavy intensity integral color, smooth float finish, medium to heavy sandblast/acid etch finish
      b. P1b: Light to medium intensity integral color, smooth float finish, light sandblast/acid etch finish
   3. Concrete Curbs:
      a. C1: Medium to heavy Intensity integral color, smooth float finish, medium to heavy sandblast/acid etch finish
      b. C2: Medium to heavy intensity integral color, smooth float finish, medium to heavy sandblast/acid etch finish

2.16 SEALERS

A. For ALL finished Concrete surfaces:

   1. Manufactured By: BASF
   2. Contact:1-800-474-7570
   3. Sealer: Enviroseal 40 Concrete/Masonry Silane Penetrating Sealer
   4. Install per manufacturer's recommendations

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads within acceptable deflection limits.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

N. Elevate formwork as required for anticipated deflections due to weight and pressures of fresh concrete, shortening of formwork system, and construction loads.

O. Carefully inspect falsework and formwork during and after concrete placement to determine abnormal deflection or signs of failure; make necessary adjustments to produce work of required dimensions.

P. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

Q. Forms for exposed Concrete:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes.
2. Do not use metal cover plates for patching holes or defects in forms.
3. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersection.
4. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance of concrete. Do not use narrow strips of form material that will produce bow.
5. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
6. Prevent absorption of release agents by pre-sealing forms as required.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required.
2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.
4. Skate deterrent pieces shall be attached with epoxy. No epoxy shall be visible at the surface.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least two mesh spacings. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Landscape Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls at not more than 60 feet in any horizontal direction. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into 15-foot maximum perpendicular strips, and areas not exceeding 225 square feet. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete within 24-hours after initial floating, when cutting action will not tear, abrade, or otherwise damage surface, and before concrete develops random contraction cracks.

Architect. Place concrete immediately after approval of foundation excavations.

5. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
6. Remove soil, debris, standing water, ice, snow, loose mill scale or coating and other foreign matter from formwork and metal deck.

B. Do not add water to concrete during delivery, at Project site, or during placement, unless indicated on trip ticket.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete. Place concrete in accordance with the practices and recommendations of ACI 304, and as herein specified.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or derbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

1. Acid Wash:

   a. After the concrete has taken its final set, a weak muriatic or phosphoric acid wash shall be applied to texturize the concrete surface. The weak acid wash shall be thoroughly neutralized and flushed from the finished surface. Under no circumstances shall Contractor allow the acid wash to enter the storm drain lines or to flow onto any adjacent surface.
   b. For bidding and mockup purposes, assume:

      1) Mix 2 parts Muriatic Acid with 1 part Water
      2) Apply to concrete surface
      3) Let set for approximately 2-3 minutes
      4) Scrub the surface
      5) Use TSP to neutralize the acid
      6) Pressure wash surface
      7) Repeat the above steps as necessary to achieve the light, medium, and heavy finish surfaces approved by the Landscape Architect.

   c. Contractor shall protect adjacent construction, plantings, planting soil, finishing's, structures, and the public from damage and harm due to the acid wash. The finished appearance of the exposed aggregate concrete sidewalk shall produce an appearance and texture that matches the approved mockup. Any significant difference in texture or appearance between two adjacent concrete panels, as determined by the Landscape Architect, shall result in removal and replacement of concrete panels by Contractor at no additional cost.

2. Return the concrete to the proper pH after acid etching by washing the surface with a mixture of water and ammonia or sodium carbonate. Ideal pH is 7.0 (neutral), but a pH range of 6.0-9.0 is acceptable. ASTM D 4262, "Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces," shall be used for determining the acidity or alkalinity of concrete prepared by etching.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Landscape Architect. Remove and replace concrete that cannot be repaired and patched to Landscape Architect's approval. Comply with ACI 301.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Landscape Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of five standard cylinder specimens for each composite sample.

    a. Cast and field cure one set of four standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39

    a. Test two field-cured specimens at 7 days, two at 28 days and one at 56 days if 28-day compressive strength has not yet been obtained.
    b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

E. Test results shall be reported in writing to Landscape Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Landscape Architect but will not be used as sole basis for approval or rejection of concrete.

03 30 00.10
CAST IN PLACE CONCRETE FOR LANDSCAPE APPLICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1. Section 03 45 01 - Pre-Cast Concrete for Landscape Applications
2. Section 04 43 01 - Stone Masonry for Landscape Applications
3. Section 05 50 01 - Metal Fabrications for Landscape Applications
4. Section 07 92 00 - Joint Sealants
5. Section 12 93 00 - Site Furnishings
6. Section 13 10 00 - Water Features
7. Section 32 14 00 - Unit Paving

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Site:

a. Vehicular Concrete Paving (1 type)
b. Pedestrian Concrete Paving (1 type)
c. Concrete Curbs (1 type)

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Design Mixes: Submit design mix for each concrete mix. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Include field test data used to establish the required average strength in accordance with ACI 301. Review of design mixes

3. Approved mockups shall be used as a standard for construction of the same type of material throughout the project. Completed work shall be reviewed in comparison to the approved mockup.
4. The following mockups shall be constructed.

    a. Construct minimum 6 foot section of each type of curb for verification of form, finish, mix quality, color, jointing etc. Mockup to include a corner sample as well as every example of taper and/or transition condition. Mockup may be incorporated into the work.
    b. Construct 100 square foot minimum section that includes each concrete paving type for verification of form of every type of finish, mix quality, color, jointing etc. Mockup may be incorporated into the work.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

F. Publications: Comply with the latest edition of the following, except as modified by the Contract Documents. Maintain a copy of the latest edition of ACI 301, 117, 318, and 347 at the project site at all times. Where provisions of the above codes and standards are in conflict with the building code in force for the Project, the building code shall govern.

1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
2. ACI 301, "Standard Specification for Structural Concrete."
3. ACI 305, "Hot Weather Concreting"
4. ACI 306 , "Cold Weather Concreting"
5. ACI 308, " Standard Practice for Curing Concrete"
6. ACI 318 " Building Code Requirements for Structural Concrete"

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. For all above-grade faces of concrete walls exposed to view: Smooth neoprene form liner with preformed joints and chamfer strips placed in forms. Mill-release agent treated and edge sealed.
2. Rust-free metal.
3. Exterior-grade undamaged, un-patched plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

    a. Medium-density overlay, Class 1, or better, mill-release agent treated and edge sealed.
    b. Structural 1, B-B, or better, mill oiled and edge sealed.
    c. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.

4. Architecturally Exposed Concrete: Medium-density overlay, class 1 or better, mill-release agent treated and edge sealed.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes. Construct paper of fiber tubes of laminated plies using water-resistant adhesive with wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist plastic concrete loads imposed by concrete without deformation.

C. Chamfer Strips: Metal, PVC, or rubber strips, typical.

D. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Ensure adequate pre-sealing of substrate before application of release agent to prevent absorption of release agent.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

C. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars.

D. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 755M.

E. Mechanical Reinforcement Couplers: ASTM A-519, Minimum tensile strength 100,000 psi

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I. Type III cement may be used in lieu of Type I at Contractor's option, when acceptable to the Landscape Architect.

1. Use only one brand of cement throughout project, except as otherwise indicated.

B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Severe weathering region, but not less than 3S.
2. Nominal Maximum Aggregate Size: 1/2 inch
3. Fine graded aggregate be provided. Provide samples for approval.

C. Lightweight Aggregate: ASTM C 330.

1. Nominal Maximum Aggregate Size: 3/4 inch (19 mm).

D. Water: Drinkable and complying with ASTM C 94.

2.5 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride thyocyanates or admixtures containing more than 0.1 percent chloride ions.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F.

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, non-fading, and resistant to lime and other alkalis.

2.8 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.9 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Drinkable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.10 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Reglets: Fabricate reglets of not less than 26 gage (0.0217-inch) (0.55-mm) thick galvanized steel sheet with 45 degree slot minimum 1" deep and ¼" wide and formed with upper lip bent back to engage concrete. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

D. Dovetail Anchor Slots: Hot-dipped galvanized steel sheet not less than 0.0217 inch (0.55-mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

E. For on-structure applications see Section 07 33 63 Vegetated Roof Assembly for root barrier, drainage mat and layered foam voiding specifications.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

1. Air Content: 6 percent for 3/4-inch (19-mm) nominal maximum aggregate size.

F. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixes where indicated.

G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

H. Prepare design mixes for each type and strength of concrete by either laboratory trial batch of field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to the Landscape Architect for preparing and reporting proposed mix designs.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice." In the case of fabrication errors, do not re-bend or straighten reinforcement.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the Work:

1. Bar lengths, depths or bends exceeding specified fabrication tolerances.
2. Bends or kinks not indicated on the Drawings or final Shop Drawings
3. Bars with reduced cross section due to excessive corrosion or other cause.
4. Bars with damaged corrosion resistive coating (if specified).

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

B. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air

1. Class A, 1/8 inch (3 mm), for surfaces predominantly exposed to public view.
2. Class B, 1/4 inch (6 mm), for course-textured concrete formed surfaces intended to receive plaster, stucco, or wainscoting.
3. Class C, 1/2 inch (13 mm). for all other surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete with ¾" x3/4" strips (unless otherwise indicated) accurately formed and surfaced to produce uniform straight lines and tight edges. Unexposed corners may be formed square or chamfered.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items, including those under separate prime contracts (if any).

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with non-staining, rust preventative form-release agent, according to manufacturer's written instructions, before placing reinforcement. Rust stained steel formwork is not acceptable.

M. Support form facing materials by structural members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces of accurate alignment, from irregularities and within allowable tolerances

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved 28-day design compressive strength.

1. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Landscape Architect.

3.4 VAPOR RETARDERS

A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions and as follows:

1. Use a large sheets as practical. Overlap minimum 6" and tape. Tape to perimeter and projections.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. At a spacing not to exceed 4'-0" on center in either direction. For slabs on grade, use supports not to exceed 4'-0" o.c. with sand plates or horizontal runners where base material will not support chair legs.
2. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.

D. Isolation Joints in Slabs-on-Grade: Install joint-filler strips at all slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.

F. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 WATERSTOPS

A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

A. Pre-Placement Inspection:

1. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems. During concrete placement, check formwork and related supports to ensure that forms are not displaced and that completed Work will be within specified tolerances.
2. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts involved in ample time to permit the installation of their Work; cooperate with other trades in setting such Work, as required.
3. Thoroughly wet wood forms immediately before placing concrete, as required where form coatings are not used.
4. Soil at bottom of foundation systems are subject to testing for soil bearing value by the testing laboratory, as directed by the Landscape

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified. Rough formed concrete may be used in all walls permanently below finish grade.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas. Tie holes shall remain in place, but shall be caulked 1" from surface of wall. Remove fins and other projections.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
2. Do not apply rubbed finish to smooth-formed finish

C. Pedestrian / Vehicular Paving: Shall receive uniform smooth float or broom finish, acid wash as specified.

equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 301, ACI 306.1 for cold-weather protection, and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive resilient sheet floor coverings. Cure concrete surfaces to receive other floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Landscape Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Landscape Architect's approval.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Landscape Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Landscape Architect.

H. Defective Work: Concrete work which does not conform to the specified requirements, including strength, tolerances, and finishes, shall be corrected at the Contractor's expense without extension of time . The contractor shall also be responsible for the cost of corrections to any other work affected by or resulting from corrections to the concrete work.

END OF SECTION

D. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, release agents and other items that visually affect cast-in-place architectural concrete.

E. Placement Schedule: Submit concrete placement schedule before start of placement operations. Include locations of all joints including construction joints (bonded or unbonded) and water seal types and locations.

F. Samples: For each of the following materials:

1. Form-facing panel.
2. Form ties.
3. Form liners.
4. Fine-aggregate gradations.
5. Chamfers and rustications.

G. Samples for Verification: Architectural concrete Samples, cast vertically, approximately 18 by 18 by 2 inches , of finishes, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

F. Material Certificates: For each of the following, signed by manufacturer:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Repair materials.

1.5. QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

2. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from one manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

an entire panel. Minimum 10' long section to meet above.

b. Mockups are not to be incorporated into the final Work.

3. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.

4. In presence of Engineer, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.

5. Obtain Engineer's and Landscape Architect's approval of mockups before casting architectural concrete. Approved mockups may not become part of the completed Work.

G. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:

a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.

c. Ready-mix concrete manufacturer.

d. Cast-in-place architectural concrete subcontractor.

2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place architectural concrete.

PART 2 – MATERIALS

2.1. FORM-FACING MATERIALS

A. Form-Facing Panels for Smooth Form Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to conform to joints per the Drawings.

B. Form Liners: Units of face design, texture, arrangement, and configuration indicated on drawings. Furnish with manufacturer's recommended liquid-

2.3. CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I,.

1. Fly Ash: ASTM C 618, Class F.

2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Imported fine aggregates shall be used for all polished concrete slabs.

C. Water: ASTM C 94/C 94M and potable.

2.4. ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5. CURING MATERIALS

A. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

4. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, non-fading, and resistant to lime and other alkalis.

a. Provide the following for All exposed concrete elements:

a. C-24 Charcoal, as manufactured by L.M. Scofield Company or approved equivalent.

D. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi.

2. Typical Maximum Water-Cementitious Materials Ratio: 0.50.

3. Slump Limit: 4 inches 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery

2.8. FABRICATING REINFORCEMENT

1. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9. CONCRETE MIXING

A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
2. When air temperature is between 85 and 90 deg F , reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F , reduce mixing and delivery time to 60 minutes.

K. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

2.11. REINFORCEMENT AND INSERTS

A. Set wire ties with ends directed into concrete at, not toward exposed concrete surfaces.

2.12. REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

B. Schedule form removal to maintain surface appearance that matches approved mockups.
Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.

C. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved 28-day design compressive strength. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

D. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

E. When forms are reused, clean surfaces, remove fins and laitance, recoat with release agents and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

2.13. JOINTS

A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete. Align construction joint within rustications attached to form-facing material.

c. W5: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

d. E20: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

2. Steps:

a. S2a: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

b. S2b: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

c. S2c: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

d. S4: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

e. S6: Heavy intensity integral color, smooth float finish, light to medium sandblast/acid etch finish

2.16. FINISHES, GENERAL

B. Architectural Concrete Finish: Match Engineer's design reference sample, identified and described as indicated, to satisfaction of Engineer.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

3. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

D. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

2.17. AS-CAST FORMED FINISHES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.

B. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.

C. Rubbed Finish: Apply the following to smooth-form-finished as-cast concrete where indicated:

any holes or tears during curing period; use cover material and waterproof tape.

3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

2.20. REPAIRS, PROTECTION, AND CLEANING

A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Engineer. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.

B. In the event of bug holes in smooth form finish concrete, wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match surrounding concrete. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

C. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Engineer's approval.

D. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.

E. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

F. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

G. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.

1. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

2.21. WATERPROOFING

A. Provide Enkadrain B10 drainage mat from grade to footing as shown on Drawings. Ensure all edges are covered to prevent soil integration into drainage mat.. Follow manufacturer's instructions to affix to wall.

2.22. FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

Volume 2 of 2

AN ORDINANCE PROVIDING FOR THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT

(SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530)

03 45 00
PRE CAST CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1. Section 033001 - Cast-In-Place Concrete for Landscape Applications
2. Section 055001 - Metal Fabrications for Landscape Applications
3. Section 061550 - Exterior Carpentry and Millwork
4. Section 079200 - Joint Sealants for Landscape Applications
5. Section 129300 - Site Furnishings for Landscape Applications
6. Section 321400 - Unit Paving for Landscape Applications

1.2 SUMMARY

A. This Section includes the following:

1. Pre-Cast Concrete Boardwalk System

2. Pre-Cast Concrete Seatwalls

1.3 SUBMITTALS

A. Product Data: For type of accessory indicated.

Shop Drawings: Include precast concrete fabrication, reinforcement and installation requirements. Include plans, elevations, sections, component details, and attachments to other Work. Show layout of the following:

1. Pre-Cast Concrete Seatwalls

B. Samples:

1. Submit 1 -48 inch x48 inch sample (4 foot lengths for curbs including a corner sample and 1 example of taper and/or transition condition) of each mix design and finish indicating complete range of color, form finish and texture. Rework mix as required at the direction of the Landscape Architect to achieve an acceptable texture, color and finish. Samples may be completed on site or an appropriate offsite location for review by Landscape Architect. If completed off site, samples should be completed such that samples can be moved to the site at

site to prevent cracking, distorting, warping, staining, or other physical damage, so markings are visible.

B. Lift and support units only at designated lifting and supporting points as shown on Shop Drawings.

PART 2 - PRODUCTS

2.1 MOLD MATERIALS

A. Molds: Provide molds and, where required, form-facing materials of metal, plastic, wood, or another material that is nonreactive with concrete and dimensionally stable to produce continuous and true precast concrete surfaces within fabrication tolerances and suitable for required finishes

2.2 REINFORCING MATERIALS - *TO BE CONFIRMED BY STRUCTURAL ENGINEER*

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn.

C. Supports: Manufacturer's bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to CRSI's "Manual of Standard Practice," PCI MNL 117, and as follows:

1. For uncoated reinforcement, use all-plastic bar supports.

2.3 CONCRETE MATERIALS - *TO BE CONFIRMED BY STRUCTURAL ENGINEER*

A. Portland Cement: ASTM C 150, Type I or Type III, white, of same type, brand, and source.

B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S.

1. Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining.
2. Fine Aggregates: Selected, natural or manufactured sand of the same material as coarse aggregate, unless otherwise approved by Landscape Architect.

C. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318.

D. Normal-Weight Concrete Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

E. Compressive Strength (28 Days): 4000 psi.

F. Water Absorption: 12 to 14 percent by volume, tested according to PCI MNL 117.

G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.

H. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.

2.7 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing operations.

B. Maintain molds to provide completed precast architectural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

2.8 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

B. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast architectural concrete units to supporting and adjacent construction.

C. Reinforcement: Comply with recommendations in CRSI's "Manual of Standard Practice" and PCI MNL 117 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.

B. Finish exposed top, bottom, and back surfaces of precast architectural concrete units to match face-surface finish.

2.10 ANCHORS AND FASTERS

A. Materials: Fabricated anchors from stainless steel, ASTM A 240/A 240M, Type 316. Fabricate dowels from stainless steel, ASTM A276, Type 316.

2.11 SEALERS

A. For ALL finished Concrete surfaces:

1. Manufactured By: BASF
2. Contact:1-800-474-7570
3. Sealer: Enviroseal 40 Concrete/Masonry Silane Penetrating Sealer
4. Install per manufacturer's recommendations

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 INSTALLATION, GENERAL

A. Construction Tolerances: Limit variation in precast concrete surface from level to 1/8 inch in 10 feet.

3.3 INSTALLATION

A. Install units using method recommended in writing by manufacturer unless otherwise indicated. Set units with alignment level and true to dimensions, varying 1/16 inch maximum in length, height, or width.

3.4 REPAIRS

A. Remove and replace damaged precast concrete units. Repairs do not comply with requirements.

04 20 00
MASONRY

PART 1 - GENERAL

1. RELATED DOCUMENTS

   a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

2. SUMMARY

   a. Section Includes:
      1) Vehicular paving (1 type)
      2) Boulder steps (2 types)
      3) Boulders (1 type)
      4) Mortar and grout
      5) Ties and anchors
      6) Embedded flashing
      7) Miscellaneous masonry accessories

   b. Related Sections:

      1) Section 03 30 00 Cast-in-Place Concrete for Landscape Applications
      2) Section 04 72 01 Cast Stone for Landscape Applications

3. ACTION SUBMITTALS

   a. Product Data: For each type of product indicated.

   b. Shop Drawings: For the following:

      1) Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
      2) Stone Units: Show sizes, profiles, and locations of each stone trim unit required.
      3) Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

   c. Samples for Initial Selection (provide base bid material and all alternate materials, include samples of all sizes as shown on Drawings, provide minimum 3 samples per material and application to show complete color range of source materials):
      1) Mortar and grout for cast stone
      2) Weep holes/vents

d. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1) Build mockup of typical wall area as shown on Drawings.
2) Build mockups for each type of exposed unit masonry construction in sizes approximately 72 inches long by 72 inches by full thickness, including accessories. Include one corner and cap for each size shown on Drawings. Include trim units as necessary.
3) Clean exposed faces of mockups with masonry cleaner as indicated.
4) One-half of the mock up to be treated with a masonry sealer, while the other half will be left natural.
5) Build mockup of typical rill section as shown on Drawings.
6) Build mockups for each type of exposed unit masonry construction in sizes including rill width x 4 foot long section (includes 1 step) by full thickness, including accessories.
7) Protect accepted mockups from the elements with weather-resistant membrane.
8) Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar color(s) and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

a) Approval of mockups is also for other material and construction qualities specifically approved by Landscape Architect in writing.
b) Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Landscape Architect in writing.

9) Approved mockups may not become part of the completed Work.

6. DELIVERY, STORAGE, AND HANDLING

a. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

b. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

c. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

d. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

e. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

a. Material: 3 inch thick granite
b. Color: Dark luna, per supplier and approved samples
c. Finish: flamed finish
d. Manufactured by, phone: Classic Stone, 630-897-9128

e. Boulder Steps (S1):
   a. Material: Granite boulders
   b. Color: Grey, per supplier and approved samples
   c. Finish: natural
   d. Manufactured by, phone: n/a

e. Boulder Steps (S5):
   a. Material: Granite boulders
   b. Color: Grey, per supplier and approved samples
   c. Finish: natural
   d. Manufactured by, phone: n/a

e. Boulder Steps (E12):
   a. Material: Granite boulders
   b. Color: Grey, per supplier and approved samples
   c. Finish: natural
   d. Manufactured by, phone: n/a
   e. Size: per plan

5. MORTAR MATERIALS

a. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color per approved samples and mockups.

b. Hydrated Lime: ASTM C 207, Type S.

c. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

d. Masonry Cement: ASTM C 91.

   1) Products: Subject to compliance with requirements

e. Mortar Cement: ASTM C 1329.

   1) Products: Subject to compliance with requirements. Retain first paragraph below for colored cement or for pigments added at Project site.

f. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

   1) Products: Subject to compliance with requirements. Mixes in first paragraph below allow better control of color than job-mixed colored

a) Products: Subject to compliance with requirements,

b) ACM Chemistries, Inc.; RainBloc for Mortar.
c) BASF Aktiengesellschaft; Rheopel Mortar Admixture.
d) Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

6. STONE FABRICATION

a. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.

b. Stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

c. Cut and drill sinkages and holes in stone for anchors and supports.

d. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

1. Clean sawed backs of stone to remove rust stains and iron particles.

e. Finishes for exposed faces and edges of stone to comply with requirements indicated for finish (smooth machine finish) and to match approved samples and mockups.

1. Finish exposed ends of coping to match exposed face, unless otherwise noted.

7. REINFORCEMENT

a. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

b. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized, carbon steel continuous wire.

8. TIES AND ANCHORS

a. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1) Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 641/A 641M, Class 1 coating.
2) Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
3) Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.
4) Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.

a) Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch

2) Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a) Products: Subject to compliance with requirements, provide the following:

i. Dayton Superior Corporation, Dur-O-Wal Division; D/A 213.
ii. Heckmann Building Products Inc.; 315-D with 316
iii. Hohmann & Barnard, Inc.; DW-10.
iv. Wire-Bond; 1004, Type III.

b) Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.

c) Anchor Section: Sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 3-5/8 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie.

d) Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.

e) Anchor Section: Corrosion-resistant, self-drilling, eye-screw designed to receive wire tie. Eye-screw has spacer that seats directly against framing and is same thickness as sheathing and has gasketed, washer head that covers hole in sheathing.

f) Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick

g) Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- wire.

3) Slip-in, Masonry-Veneer Anchors: Units consisting of a wire tie section and an anchor section designed to interlock with metal studs and be slipped into place as sheathing is installed.

a) Products: Subject to compliance with requirements, provide the following:

i. Hohmann & Barnard, Inc.; AA308.

b) Wire-Type Anchor: Bent wire anchor section with an eye to receive the wire tie. Wire tie has a vertical leg that slips into the

steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

a) Products: Subject to compliance with requirements, provide the following:

i. ITW Buildex; Teks Maxiseal with Climaseal finish.
ii. Leland Industries Inc.; Master Drillers with DT2000 Longlife Coating and Master Seal Bonded Washer.
iii. Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.

6) Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads.

a) Products: Subject to compliance with requirements, provide the following:

i. Dayton Superior Corporation, Dur-O-Wal Division; Stainless Steel SX Fastener.
ii. ITW Buildex; Scots long life Teks.

9. MISCELLANEOUS ANCHORS

a. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

b. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, stainless steel sheet.

10. EMBEDDED FLASHING MATERIALS

a. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1) Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
2) Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
3) Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
4) Fabricate through-wall metal flashing embedded in masonry from stainless steel with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

2) Asphalt-Coated Copper Flashing: 5-oz./sq. ft. copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.

   a) Products: Subject to compliance with requirements, provide the following:

      i. Advanced Building Products Inc.; Cop-R-Cote.
      ii. Dayton Superior Corporation, Dur-O-Wal Division; Copper Coated Thru-Wall Flashing.
      iii. Hohmann & Barnard, Inc.; H & B C-Coat Flashing.
      iv. Phoenix Building Products; Type ACC-Asphalt Bituminous Coated.
      v. Sandell Manufacturing Co., Inc.; Coated Copper Flashing.

3) Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.

   a) Products: Subject to compliance with requirements, provide the following:

      i. Advanced Building Products Inc.; Peel-N-Seal.
      ii. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
      iii. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
      iv. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
      v. Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
      vi. Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
      vii. Hohmann & Barnard, Inc.; Textroflash.
      viii. W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
      ix. Polyguard Products, Inc.; Polyguard 300.
      x. Sandell Manufacturing Co., Inc.; Sando-Seal.
      xi. Williams Products, Inc.; Everlastic MF-40.

   b) Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

4) Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

   a) Products: Subject to compliance with requirements, provide the following:

      i. DuPont; Thru-Wall Flashing.
      ii. Hohmann & Barnard, Inc.; Flex-Flash.
      iii. Hyload, Inc.; Hyload Cloaked Flashing System.

3) Elastomeric Sealant: ASTM C 920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

e. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

11. MISCELLANEOUS MASONRY ACCESSORIES

a. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

b. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

c. Weep/Vent Products: Use one of the following unless otherwise indicated:

1) Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity. Use only for weeps.
2) Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
3) Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
4) Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

a) Products: Subject to compliance with requirements, provide the following:

i. Advanced Building Products Inc.; Mortar Maze weep vent.
ii. Blok-Lok Limited; Cell-Vent.
iii. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
iv. Heckmann Building Products Inc.; No. 85 Cell Vent.
v. Hohmann & Barnard, Inc.; Quadro-Vent.
vi. *Wire-Bond; Cell Vent.*

5) Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.

a) Products: Subject to compliance with requirements, provide the following:

i. Mortar Net USA, Ltd.; Mortar Net Weep Vents.

e. Anti-Graffiti Sealant: Prosoco SURE KLEAN Weather Seal Block-Guard & Graffitti Conntrol II water based graffiti and water repellant for pourous masonry. Item #40193.

12. MASONRY CLEANERS

a. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. **Protect all existing flatwork, plantings, walls, soil, that may be exposed to splashing, spray drifts, etc. Do not use the cleaner on/during winds in excess of 15mph.**

1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a) Diedrich Technologies, Inc.
b) EaCo Chem, Inc.
c) ProSoCo, Inc.

13. MORTAR MIXES

a. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1) Do not use calcium chloride in mortar.
2) Use portland cement-lime mortar unless otherwise indicated.
3) Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

b. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

c. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.

d. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1) Pigments shall not exceed 10 percent of portland cement by weight.
2) Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
3) Mix to match Architect's sample.

2) For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3) For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

b. Lines and Levels:

1) For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2) For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3) For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4) For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5) For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6) For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7) For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

c. Joints:

1) For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2) For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
3) For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

4. LAYING MASONRY WALLS

a. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

b. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

c. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work,

1) Fasten screw-attached anchors to concrete backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2) Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
3) Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
4) Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5) Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
6) Space anchors as indicated, but not more than 16 inches o.c. vertically and 32 inches o.c. horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

8. EXPANSION JOINTS

a. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

b. Form expansion joints in brick as follows:

1) Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2) Build flanges of factory-fabricated, expansion-joint units into masonry.
3) Build in compressible joint fillers where indicated.
4) Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

c. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.

1) Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

9. FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

a. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

b. Install flashing as follows unless otherwise indicated:

05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of the contract documents, including general conditions and division one specification sections form a part of this section by this reference and shall have the same force and effect as if printed herewith in full.

B. Extent of metal fabrications is indicated on drawings and indicated by provisions of this section.

C. Work under this section consists of furnishing of all labor, materials, equipment and services necessary for, and incidental to, the complete and proper installation of all metal fabrications and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents.

D. The material and installation shall conform to the applicable building code requirements of all authorities having jurisdiction.

E. Definition: metal fabrications include items made from iron, steel, stainless steel or aluminum shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere. Refer to structural, mechanical, electrical and architectural drawings and specifications.

F. Types of work in this section include, but is not limited to, metal fabrications for:
   1. Metal Paving
   2. Metal Bridge
   3. Metal Walls
   4. Handrails
   5. Guardrails
   6. Planter Rails
   7. Shade Structures
   8. Platform Railing
   9. Railing with Bar Tables
   10. Playground Fence
   11. Vine Trellis

G. Except as otherwise indicated, provision and installation of metal fabrication work required to support an item of work is the responsibility of the contractor installing the item requiring support. Metal fabrication work related to the work specified in all sections, including but not limited to the following sections, is work of those sections but shall also comply with the requirements of this section. The additional requirements specified under

f. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products or open head joints to form vents.

1) Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

10. FIELD QUALITY CONTROL

a. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

b. Inspections: Level 1 special inspections according to the "International Building Code."

1) Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

c. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

11. REPAIRING, POINTING, AND CLEANING

a. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

b. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

c. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

d. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1) Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2) Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3) Protect adjacent plantings, soil, stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

incompatible materials. Use materials that are non-staining to exposed surfaces of supported materials.

E. Design handrails to meet local requirements and codes.

F. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.3 QUALITY CONTROL

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Codes and Standards: Comply with applicable provisions of the following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC)
2. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."

D. Professional Engineer Qualifications: A professional engineer who is licensed in the State of Texas and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with metal fabrications that are similar to that indicated for this Project in material, design, and extent. The professional engineer's services shall have resulted in a record of successful in-service performance.

E. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

F. Installer Qualifications: Engage an experienced installer who has completed metal fabrications similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance.

1. Installer shall assume responsibility for engineering, fabricating, and installing metal fabrications.
2. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for metal fabrications including drawings and comprehensive engineering analysis that shows the system's compliance with specified requirements.

indicated on shop drawings before submission. This includes work required to hang or anchor exterior stone.

D. Samples/mockups representative of materials and finished products as may be requested by the Owner and/or the Architect:

1. For fences/gates provide a minimum 18" linear section for review including at least one post and all associated connections.
2. For railings provide a minimum 18" linear section for review including at least one post and all associated connections.
3. For signage letters, mockup entire sign with a minimum of 3 different font sizes for review. Material can be wood, plastic or printed paper. Once overall signage dimensions are approved submit minimum of 1 letter for review indicating all approved dimensions and details relevant to the most complicated letter of the chosen font. Final sample to include Owner and Landscape Architect directed finish.
4. For linear stock submit min. 12 inch long samples of each application showing final finish and weld quality. Provide a minimum of 3 color options for Landscape Architect review. Confirm final color options with Landscape Architect.
5. For sheet goods and plate materials submit min. 12"x12" sample. Provide a minimum of 3 color options for Landscape Architect review. Confirm final color options with Landscape Architect.
6. For bolts, nuts and other hardware submit minimum of 3 for each type of item requested. Provide a minimum of 3 color options for Landscape Architect review. Confirm final color options with Landscape Architect.
7. All associated sealers, fabrics, gaskets, washers required to fabricate and install the fabricated item per the drawings.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Control" Article.

F. Qualification Data: For firms and persons specified in the "Quality Control" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.

1) Drawn Seamless Tube: ASTM B 483, 606-T832
2) Plate and sheet: ASTM B 209, 6061-T6
3) Shapes: ASTM B 209, 6061-T6
4) All aluminum sections are to be Aluminum Association standard shapes with square edges, unless otherwise indicated.
5) Fasteners: Use stainless steel fasteners of the type indicated unless otherwise indicated. Do not use metals that are corrosive or incompatible with metals joined.
6) Where aluminum contacts steel or galvanized steel, use a self-adhesive teflon FEP separation membrane to prevent galvanic corrosion.

i. Stainless Steel: Comply with the following standards for forms and types of stainless steel for required items of work.

1) Type: ANSI Type 316L, unless otherwise indicated
2) Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316L.
3) Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
4) Plate: ASTM A 167
5) Tubing: ASTM A 269
6) Castings: ASTM A 296, iron-chromium-nickel alloy

B. Finishes/Paint/Coatings:

1. Metal primer paint: Immediately after surface preparation, apply metal primer paint in accordance with paint manufacturer's instructions. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces. See Section 09 90 01 Paining for Landscape Applications.
2. Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel, complying with SSPC - Paint 20, and compatible with primer.
3. Clear hard anodizing for aluminum surfaces shall comply with ASTM D3933.
4. Bead blast complete assemblies and sub assemblies prior to anodizing or oil baked finish application. Samples to include various levels of bead blast for Landscape Architect approval prior to final fabrication. Landscape Architect to provide sample for aesthetic intent.
5. Oil baked finish to be reviewed and approved by Landscape Architect through samples prior to final fabrication.
6. For surfaces receiving paint, paint all exposed surfaces including all exposed fasteners, supports, rods, etc.

C. Fasteners: Use stainless steel fasteners of the type indicated unless otherwise indicated. Do not use metals that are corrosive or incompatible with metals joined.

1. Use materials of size, thickness, and shapes indicated or, if not indicated as required to produce strength and durability in finished product for use intended. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Shear and punch metals cleanly and accurately. Remove burrs. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.
5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, equipment, and similar items.
7. Galvanizing: Provide a zinc coating for those items indicated or specified to be galvanized, as follows:

    a. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 3 mm thick and heavier.
    b. ASTM A 386 for galvanizing assembled steel products.

8. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
9. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
10. All welding shall occur prior to finishing. No field welding shall be carried out.
11. Prime all welds and damage to galvanizing with galvanizing primer

B. Shop Painting:

1. Shop prime paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces that are not exposed in finish construction, unless otherwise indicated.

3. Finish: Natural

D. Metal Walls a (W2b)

1. Material: 3/8 inch weathered steel
2. Color: Natural
3. Finish: Natural

E. Handrails

1. Material: 1 3/8 inch diameter galvanized tube steel
2. Color: Natural
3. Finish: Natural

F. Guardrails

1. Material: 1" Sq. Galvanized top rail, 1" sq. galvanized bottom rail, 1" Sq. galvanized posts, 1" x 2" WWF galvanized
2. Color: n/a
3. Finish: n/a

G. Planter Rails

1. Material: ½ inch stainless steel bar stock
2. Color: Silver metalic
3. Finish: Tnemec paint

H. Shade Structures

1. Material: 3/8 inch weathered steel with integrated lighting
2. Color: Natural
3. Finish: Natural

I. Platform railing

1. Material: 1" Sq. Galvanized top rail, 1" sq. galvanized bottom rail, 1" Sq. galvanized posts, 1" x 2" WWF galvanized
2. Color: n/a
3. Finish: n/a

temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.

3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat.

4. Field Welding: Comply with specified requirements, and with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

   a. At exposed connections, finish exposed welds and surfaces smooth and blended and polished so that no roughness shows after finishing and contour of welded surface matches those adjacent.

5. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint, zinc chromate primer or other material selected for compatibility with adjacent materials.

6. Repair all blemishes to match original finish.

3.3 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and prepare surfaces and paint exposed areas with materials as indicated in Section 09 90 01.

B. For galvanized surfaces: Clean field welds, bolted connections and abraded areas and apply 2 coats of galvanizing repair paint.

C. Clean all surfaces and surrounding areas of dirt and debris. All excess material and debris shall be removed from the site.

3.4 QUALITY ASSURANCE

A. The contractor shall remove and replace work that does not comply with specified requirements.

B. The Contractor shall correct deficiencies in metal fabrications scope of work that inspections and test reports have indicated to be not in compliance with contract requirements. The Quality Assurance testing agency will perform additional tests, at the Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

END OF SECTION

commencing.

F. Provide MSDS sheets for pressure treatments, chemical sealers, fire retardants. Submitted information shall indicate VOC content.

1.4 QUALITY ASSURANCE

A. FSC Chain of Custody Certified. Provide evidence of certification. Comply with AWI grading standards.

1.5 DELIVERY, STORAGE AND HANDLING

A. Time delivery and installation of the timber materials to avoid extended on-site storage.

B. Keep timber and associated material protected during fabrication, delivery, storage, handling and installation.

C. Store materials under cover, protected from weather, out of direct sunlight and away from contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings. Allow a minimum of 3 days for acclimation in local temperature and humidity conditions.

PART 2 - PRODUCTS

2.1 LUMBER

A. Boardwalk Decking System: Provide pricing for the following options (see Section 034500 for third pricing option):

a. Tanalized Wood:

i. Wood Species: Pine or Douglas Fir or approved equal

ii. Finish: Tanalized, smooth, wood to be clear and free of heart and heart centers

iii. Sizes: See plans

iv. Fasteners: All to be Galvanized or Stainless Steel

b. Acetylated Wood:

i. Manufacturer: Accoya or approved equal

ii. Product: Accsys Technologies "Accoya®" Wood

B. Logs: Shall be as approved by the Landscape Architect and as shown on the drawings.

C. Wood Slats for Privacy Fencing: Shall be as approved by the Landscape Architect and as shown on the drawings. Boards should be full length per the drawings, clear of all heart, free of heart center, air dried, from old growth, "Architect Clear" grade, S4S E4E, Ipe. Slats to be fastened with concealed fasteners.

2.2 FASTENERS

D. All fasteners grade 316 stainless steel. All fasteners to be concealed.

2.3 WOOD PRESERVATIVE [FOR WOOD THAT IS NOT PAINTED]

A. All surfaces to receive finish treatment of Messmers UV Plus, Penafin, Sitkens Deck Finish, or equivalent penetrating, clear, UV inhibiting sealer.

B. Fresh cuts shall be sealed within 24 hours with latex-based endgrain sealant.

2.4 WOOD PAINT

A. All exposed surfaces to receive (2) prime coats of oil-based paint and (2) finish coats of oil-based paint, color to be approved by landscape architect prior to painting.

PART 3 - EXECUTION

3.1 GENERAL

A. Examine the areas and conditions where exterior millwork is to be installed and notify the Owner's Representative and Landscape Architect of any conditions that may be detrimental to the roofing membrane or in any way impact on the correct installation, layout or design intent of the work. Do not proceed with work until unsatisfactory conditions are corrected to allow for proper installation of the work.

B. Verify that substrates and membranes are ready for installation of boards.
   1. The substrate that is to receive decking shall offer adequate drainage in accordance with good building practices.
   2. Inspect to ensure that all metal framing has been properly prepared to accept the boarding. Any surface defect which may impair performance of the decking or waterproofing membrane shall be appropriately repaired.

C. Coordinate all dimensions with structural steel framing.

07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Work shall be performed in accordance with Texas DOT Standard Specification and as modified herein to include the following:

1. Joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of the section, and as indicated on Drawings.

B. Related Sections include the following:
1. Section 03 30 01 - Cast In Place Concrete for Landscape Applications
2. Section 03 45 01 – Pre-Cast Concrete for Landscape Applications

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view. Coordinate selection with concrete and unit paving mockups.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Mockups: See Sections 03 30 01 and 03 45 01 for requirements.

E. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

F. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

G. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

1. Testing Agency Qualifications: An Independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

F. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Landscape Architect.
2. Conduct field tests for each application indicated below:

   a. Each type of elastomeric sealant and joint substrate indicated.

3. Notify Landscape Architect five business days in advance of dates and times when test joints will be constructed.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed below.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: Refer to Sealant Schedule at the end of this section.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

9. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

F. Multicomponent Nonsag Urethane Sealant:

1. Products:

a. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
b. Sonneborn, Division of ChemRex Inc.; NP 2.
c. Tremco; Vulkem 227.
d. Tremco; Vulkem 322 DS.

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, A, and, O as applicable to joint substrates indicated.

G. Single-Component Nonsag Urethane Sealant:

1. Products:

a. Sika Corporation, Inc.; Sikaflex - 1a.
b. Sonneborn, Division of ChemRex Inc.; NP 1.
c. Tremco; Vulkem 116.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, A, and O, as applicable to joint substrates indicated.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin) as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Provide one of the following:

a. "Sof Rod" by Nomaco
b. "Soft Backer Rod" by Sonneborn.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and

sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

3.6 SEALANT SCHEDULE

TYPE	POLYMER	EXPOSURE /TRAFFIC	COLOR	USES/APPLICATIONS
Elastomeric	Silicone: Low modulus; Medium Modulus	Exterior joints in vertical surfaces and non-traffic horizontal surfaces	To be Selected by Landscape Architect	• Control and expansion joints in cast-in-place concrete. • Joints in precast concrete. • Joints between materials listed above and frames of doors and windows. • Other joints as indicated.
Elastomeric	Two-part Urethane or One-part Urethane	Exterior joints in horizontal traffic surfaces	To be Selected by Landscape Architect	• Control, expansion, and isolation joints in cast-in-place concrete slabs. • Joints in paving. • Other joints as indicated.

END OF SECTION

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:
1. Section 03 30 01 "Cast In Place Concrete for Landscape Applications".
2. Section 05 50 01 "Metal Fabrications for Landscape Applications"
3. Section 08 45 23 "Water Feature Shoji Wall Panel"
4. Section 12 93 00 "Site Furnishings"
5. Divisions 15 and 16: Additional requirements for painting of mechanical and electrical work are specified in these divisions.

1.2 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
4. Semi-gloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.3 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.
1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
3. Certification by the manufacturer that products supplied comply with USGBC LEED™ regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Initial Selection:
1. Submit standard range of colors for selection.

C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.
   8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.7 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the University.
   1. Quantity: Furnish the University with an additional 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
   1. Tnemec Protective Coatings (Tnemec).

m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

E. Colors: Metallic Silver, submit sample to Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as the Contractor's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify the Landscape Architect about anticipated problems using the materials specified over substrates primed by others in work specified in other sections.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
   1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
   1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
   3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
   1. Paint colors, surface treatments, and finishes are indicated in the schedules.
   2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   3. Provide finish coats that are compatible with primers used.
   4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
   5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
   7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
   9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2 Omit primer on metal surfaces that have been shop primed and touchup painted.
   3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
   1. Provide satin finish for final coats.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
   1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
   1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work specified in other sections, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by the Landscape Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

C. Protect and mask adjacent building components prior to applying concrete sealer.

3.7 WASTE MANAGEMENT

A. Separate waste in accordance with the Waste Management Plan.

12 93 00
SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Benches
2. Custom Benches
3. Tables
4. Chairs
5. Trash/Recycling Receptacles
6. Bollards
7. Tree Grates and Frames
8. Bird House Installation
9. Paver Grate
10. Bike Racks
11. Bar Stools
12. Movie Theatre
13. Tables with Shade Structures
14. Plant Establishment Fence

B. Related Sections include the following:

1. Section 03 30 01 - Cast In Place Concrete for Landscape Applications
2. Section 05 50 01 - Metal Fabrications for Landscape Applications
3. Section 32 13 13 - Portland Cement Concrete Paving

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

B. Shop drawings: The contractor shall submit for approval shop drawings for the fabrication and erection of all gratings, based on construction drawings of current issue. Include plans, elevations, and details of sections and connections as required. Show type and location of all fasteners.

C. Samples of Grating and Anchorage system shall be submitted for approval.

I. Paver Grate (E13):

1. Product: Paver Grate
2. Finish:
3. Manufactured By: Ironsmith, 800-338-4766

J. Bike Racks (E15):

1. Product: Cycle Dock
2. Finish:
3. Manufactured By: Dero, Inc., 888-337-6729

K. Bar Stools (E17):

1. Product:
2. Finish:
3. Manufactured By:

L. Custom Bench (E18a):

1. Product:
2. Finish:
3. Manufactured By:

M. Custom Bench (E18b):

1. Product:
2. Finish:
3. Manufactured By:

N. Custom Bench (E18c):

1. Product:
2. Finish:
3. Manufactured By:

O. Movie Theatre (E21):

1. Product: Advantage Airpro
2. Finish:
3. Manufactured By: Airscreen

P. Tables with Shade Structures (E22):

1. Product:
2. Finish:
3. Manufactured By:

Q. Plant Establishment Fence (E24):

1. Product:
2. Finish:

12 93 00
SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Custom Seating System

1.01 SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

B. Product data:

1. Manufacturer's standard product literature.
2. Shop drawings.
3. Installation instructions.
4. Maintenance instructions.

C. Submit powdercoat finish samples for approval.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Minimum 15 years experience in the manufacture of site seating.
2. Forest Stewardship Council (FSC) Certified Supplier. Provide manufacturer's FSC certification number.
3. Provide reference list of at least ten major transportation authorities, municipalities, universities, or other high-use public environments currently using site seating fabricated by the manufacturer.

1.03 DELIVERY, STORAGE AND HANDLING

A. Handle products in accordance with manufacturer's instructions.

B. Store products in manufacturer's original packaging until ready for installation.

C. Protect products from impacts and abrasion during storage.

1.04 WARRANTY

A. Provide manufacturer's standard warranty:

1. Warranty terms: one year from date of invoice against defects in materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis-of-design product: provide backed and/or backless benches based on the product named:

1. Custom Fabricated Vector Seating System by Forms+Surfaces.

B. Install in conformance to applicable ADA guidelines and End User's established Accessibility policies.

END OF SECTION

NEMA National Electrical Manufacturers Association.
NSF National Sanitation Foundation

C. Provide labeled equipment certifying approval, as hereinafter specified, by Underwriters Laboratories (UL) and/or ETL Testing Laboratories.

1.3 SUBSTITUTIONS

A. The use of manufacturers' names and catalog numbers followed by the phrase "or approved equal" is generally used to establish a standard of quality and utility for the specified items and to provide a dimensional reference for construction documents that are drawn to scale.

B. Submittals for "approved equal" items shall, where applicable, include the following data which are not necessarily required for specified items:

1. Manufacturer's shop drawings or catalog pages.
2. Performance characteristics.
3. Materials.
4. Finish.
5. Certification of conformance with specified codes and standard specifications.

C. Submittals of "approved equal" components may be rejected if:

1. Manufacturer's shop drawings or catalog pages are not included.
2. The component would necessitate the alteration of any portion of the plumbing, electrical, architectural, or structural design.
3. Dimensions vary from the specified component in such a manner that accessibility or clearances are impaired or the work of other trades is adversely affected.

1.4 SUBMITTALS

A. Submittals containing excessive ancillary, irrelevant or promotional materials will be rejected.

B. Submit a material list for all materials furnished under this Section.

C. Submittals must be furnished as a single package, with exception made for embedded or cast in place items which require early approval. If submitted electronically, "single package" refers to a single PDF file.

D. Submit dimensional drawings and product data from manufacturer for the following items furnished under this Section:

1. Pumps.
2. Filter assembly.
3. Vibration isolation components.
4. Water treatment equipment and chemicals.

B. The contractor shall supervise the operation of the equipment and be responsible for the proper operation and maintenance thereof and make no claim against the Owner for any damage to the equipment during such operation. The contractor shall make such changes, adjustments, or replacements of equipment as may be required to make the installation comply with the Specifications.

C. The costs of electricity, water and normal operational supplies during the thirty day operation period will be paid by the Owner. Water treatment chemicals are included in the services of the water treatment company retained by the plumbing contractor. The Contractor shall pay for all operating costs resulting from system deficiencies.

D. Coordinate the thirty day operation period with the Electrical Contractor and other trades related to the fountain work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Where practical, the product of a single manufacturer for each type of material or equipment shall be used throughout all work specified under this Section.

B. Provide all special tools for proper operation and maintenance of the equipment provided under this Section. Deliver to the owner.

C. Furnish three hard back 3-ring binders containing all bulletins, operating and maintenance instructions, lubrication schedules, parts lists and other pertinent information for each and every piece of equipment furnished under this Section. Include service telephone numbers. Index each binder into sections and label for easy reference. Deliver to the Architect.

D. Products shown on the Drawings but not specified herein shall be provided in accordance with information shown on the Drawings and the general provisions of this part of the Specification.

2.2 MOTORS

A. Furnish and install all required motors for all equipment included under this Section.

B. All motors to be NEMA Standard, rated for operation at 40 degrees C. ambient, of ample size to operate at their rated load at full speed, continuously, without causing excessive noise, vibration or temperature rise.

C. All motors 1 HP and larger, except if specified otherwise: Squirrel cage type wound for 480 volts, three phase, 60 hertz, NEMA Design B, low current inrush and normal starting torque, open drip-proof type, equipped with ball bearings, except as otherwise specified.

C. Tank, *comprising the following:*

1. 24" diameter 304 extra low carbon stainless steel construction.
2. 4" flanged.
3. Design flow rate: 212-335 GPM.

D. Filter system includes:

1. Remote vacuum transfer, 1.5 HP, 3-phase motor, as supplied by Filtrex, Model No. BM965AA.
2. Pressure gauge panel.
3. Air regulator.
4. Air lubricator.
5. Effluent sight glass.
6. Bump mechanism consisting of air stroke actuator.
7. Automatic air vent.
8. Vacuum breaker.
9. Type MOD1SSC automatic filter controller, 120 VAC.
10. 4" air operated butterfly valves with rotary actuator, 4-way solenoid pilot (120 VAC), speed controls and manual override.
11. Filter media: Diatomite earth type Eagle-Picher FW-60, Dicalite 4200 or approved equal.

E. Air Compressor:

1. As manufactured by Speedair, Model 3z422 or approved equal.
   a. 6.2 CFM @ 80 psi, 2 HP, 230/460 V, 3 ph with 30 GAL. horizontal receiver.

2.5 WATER TREATMENT SYSTEMS

A. Water treatment assemblies:

1. As manufactured by Fountain Supply Company or approved equal.
2. Assembled as shown on the Drawings and using chemical pumps, controller and other components specified in this section.
3. Chemical pump:
   a. As manufactured by Stenner, Model No. 45MJL3AS or approved equal.
   b. Output capacity: 1.1 GPD minimum, 22 GPD maximum.
   c. Accessory kit:
      (1) (3) connecting nuts.
      (2) (3) ferrules.
      (3) (1) injection check valve.
      (4) (1) *suction line strainer.*
      (5) (20 feet) 3/8" suction/discharge tube.
      (6) (1) spore pump tube.
      (7) (1) installation and maintenance manual.

b. 3/4" NPT side connections.
c. Opening: 3-1/2" quarter turn fill.
d. 2-1/2" diameter 304 stainless steel wire mesh basket.
e. 3/4" NPT bottom drain port.

3. Bag: Model No.3132, nylon microfilament mesh, 35 microns.

F. Ultraviolet sterilizer UV-1:

1. As manufactured by Neptune Benson or approved equal.
2. ECOFLO II, Model No. ECF-220-8VTHY.
3. Maximum validated flow rate: 1100 GPM.
4. Construction: 316L Stainless steel.
5. Connections: 8" flanged
6. Design flow rate: 585 GPM.
7. Pressure rating: 150 psi.
8. Dose level: 30 mj/crn2 after 9000 hours of operation at 94% UVT.
9. Number of lamps/wattage: 2 x 2,000 watts.
10. Electrical supply: 480V, 3 phase, 60Hz, .
11. Operating power: 2,000 watts.
12. Control cabinet:

a. Model ECF-480.
b. Features:

(1) Stop, start and reset buttons.
(2) Dose, flow and temperature display.
(3) Full fault and help screens.
(4) Valve and pump interface contacts.
(5) Modbus/SCADA capability.

c. Control cabinet rating: NEMA 12 / IP54.
d. Material: Carbon Steel.

2.6 SPECIALTIES

A. Pool fittings:

1. Fabricated in accordance with details on the Drawings and as manufactured by Fountain Supply Company or approved equal.
2. Materials: Brass, copper or stainless steel as noted on the Drawings.

a. Stainless steel plate: Type 304, conforming to ASTM A-240.

3. Joining: Weld, braze or solder as appropriate for the application. Welds for pool fittings to be watertight.
4. Exposed finish: Natural metal.
5. Provided with grounding lug.

B. Display nozzles: As manufactured by Fountain Supply Company.

J. Ultrasonic water level transmitter:

1. As Manufactured by FlowLine, Inc. or approved equal.
2. EchoSonic Ultrasonic Level Transmitter No: LU23-41.
    a. Output: 4 - 24 mA, 2-wire.
    b. Supply voltage: 24 VDC (loop)
    c. Resolution: 1mm.
    d. Accuracy: 0.2 percent of range.
    e. Range: 8 in. to 18 ft.
    f. Pipe connection: 2", threaded.
    g. Beam width: 3" diameter.
    h. Loop resistance: 500 ohms.
    i. Enclosure rating: NEMA 4X (IP65)
    j. Fail-safe: Revert to 22 mA.
    k. Supplied with LI99-1001 FOB USB adapter for calibration.
    l. Supplied with LM52-2410 3" socket x 2" NPT PVC adapter bushing.

K. Pressure switches:

1. As manufactured by Static-O-Ring or approved equal.
2. Model No. 54N3-K117-N4-D1A.
3. Switch: Single pole, double throw, 15 amperes rating.
4. Housing: Weatherproof, cast aluminum with 1/4" NPT connection.
5. Vacuum/pressure range: 15" Hg. vacuum to 15" Hg. pressure.

L. Water supply assembly:

1. As manufactured by Fountain Supply Company or approved equal.
2. Assembled as shown on the Drawings and using backflow preventers, valves, and other components specified in this Section.
3. Individual components to be submitted as specified individually.

M. Metal wye-strainers:

1. As manufactured by Mueller Steam Specialty or approved equal.
2. 2" and smaller: and smaller: No. 351M bronze body, threaded.
    a. Screen: Stainless steel, No. 20 wire mesh.

N. PVC wye strainers:

1. As manufactured by Ipex or approved equal.
2. No. RVUT104 clear PVC body, threaded.
3. Connections: 3/4", true-union.
4. Screen: 19 mesh, stainless steel.
5. Seal: EPDM.

O. Backflow preventers:

1. As manufactured by Febco or approved equal.

4. 4 – 20 mA output.
5. Supply with display feature.
6. Suitable for mounting on 1/2" - 4" pipe.
7. Construction materials: Polypropylene and 316L stainless steel.

T. Automatic air release valves:

1. As manufactured by Apco or approved equal.
2. Model No. 50 with 3/32" orifice.
3. Cast iron body and cover.
4. Stainless steel float and valve mechanism.
5. Connection: Threaded, 3/4".

U. Resilient pipe seals:

1. PSI Thunderline "Link-Seal" or approved equal.
2. Modular synthetic rubber link type, 'C' service designation with, glass reinforced nylon plastic pressure plates.
3. Metallic hardware and fasteners:
   a. In dry applications: Zinc galvanized plated low carbon steel.
   b. Where metallic hardware is in contact with soil or water: Stainless steel.

V. Wall penetration sleeves for resilient pipe seals:

1. PSI Thunderline "Century Line".
2. Model CS thermoplastic pipe sleeves with integral waterstop.

W. Foam sealant: Dow Corning Fire Stop Foam or approved equal.

X. Equipment space floor drain fittings:

1. As manufactured by Zurn or approved equal.
2. Floor drain: Zurn No. Z-543.
   a. Body: "Dura-coated" cast iron with membrane flashing clamp, and 4" inside caulk connection.
   b. Grate: "Dura-coated" cast iron, 16" diameter, 45 sq. in. open area.

Y. Hand-operated chain hoists:

1. As manufactured by Chester Hoist, Inc., or approved equal.
2. Model No. 1312-1/2, 1/2 ton capacity geared, army-type trolley hoist with hook, hook latch, and integrated 4-wheel trolley.
3. Adjustable for various I-beam sizes.
4. Wheels to have ball check grease fittings, and to be easily adjusted for slight bearing wear.
5. Chain length to reach from trolley to floor.
6. Provided with chain container.

b. Glycerin filled discharge pressure gauge
c. Glycerin filled inlet pressure gauge
d. Hour meter usage indicator

5. Protection:

a. Low water pressure cutoff.
b. Safety relief valve.
c. Pump thermal relief valve.
d. Motor thermal overload.

E. High pressure line:

1. As manufactured by Koolfog, Inc.

a. Tube: Polyester Elastomer
b. Catalog No. HPH0004, or as recommended by fog system manufacturer for this application.

(1) Max working pressure: 1,500 PSI.
(2) Nominal I.D.: 1/4" or as recommended by fog system manufacturer.
(3) Maximum O.D.: 0.487" or as recommended by fog system manufacturer
(4) Minimum bend radius: 1-1/2" or as recommended by fog system manufacturer.
(5) Weight: per manufacturer.

c. Reinforcement: Single polyester braid.
d. Cover: polyurethane.
e. Cover color: Black, perforated.
f. Temperature Range: -40° F to +212° F.
g. Working length: ± 2% @ rated WPSI

F. Atomization line:

1. Fog line:

a. Custom rings as manufactured by Koolfog, Inc.
b. Material: 316 stainless steel welded or seamless tubing, ½" O.D., 0.035" wall, or as recommended by manufacturer.

G. Hose and tube fittings:

1. Compression fittings.

a. Material: 316 stainless steel
b. Connection: Tube-to-tube; tube-to-NPT
c. Two-ferrule design

2. Reusable hose fittings:

a. Material: brass.
b. Connection: Hose-to-NPT.

M. Ventilating fan:

1. As manufactured by Continental Fan Manufacturing, Inc.,
2. Model No. TCD280 (1/4 HP) or approved equal .
3. Wall mounted, direct drive, centrifugal exhauster.
4. Capacity: 1030 CFM @ 1/2" static pressure.
5. Motor: 1/4 HP, 1750 RPM.

N. Intake/exhaust grilles:

1. As manufactured by Krueger Manufacturing Company or approved equal.
2. Model No. EGC-5.
3. Fan shall be supplied with thermostat.

O. Ductwork: Refer to PVC Pipe and Fittings Section.

P. Unit heater UH-1.

1. As manufactured by Marley Heating or approved equal.
2. Model No. UH520.
3. 5 KW, 208 VAC, three phase, 60 Hz.
4. Combination wall/ceiling bracket, Model No. CSB1.
5. Single pole thermostat kit, 60, 60-120 degrees F. temperature range, Model No. TA-1.
6. Summer/winter fan switch kit.

2.8 WETWELLS (WETLAND SYSTEMS)

A. General:

1. Complete formed and reinforced, pre-engineered and pre-programmed, turnkey wetwell system, quantity as shown on drawings. To include all required structural, mechanical, and electrical gear as noted herein.
2. As manufactured and supplied by Watertronics or approved alternate.
3. Wetwell housing (shell) material: HDPE or Fiberglass per manufacturer's recommendation regarding to cost effectiveness.
4. Provide self-flushing intake screening kit with cleaning nozzles.
5. Three pumps total, two circulation pumps (main and backup), and one higher pressure pump for intake screen cleaning.
6. Nominal well depth, 10'.
   a. Contractor to verify actual well depth requirement for each wetland.
   b. Connection elevations (intake and pressure pipe) per drawings.
7. 4" x 4" FL x 20' HDPE intake flume pipe.
8. Rail and chain system for pump removal.
9. Paintable access hatch cover. Color per architect.
10. Surge and lightening protection.
11. All pump casing, motor frame and impellers shall be cast iron. All shafts and fasteners shall be stainless steel. The pump will include a double mechanical

b. Provide low-water pump cutoff
c. Provide enunciation of wetwell level

9. Provide high discharge pressure alarms, VFD fault alarm, filter alarm, pipe fill alarm (pipe cannot pressurize), phase loss or reversal alarm, high and low voltage alarm, and control power alarm.
10. Data alarm logging and recording capabilities. 12 month data storage capabilities.

2.9 ENTRY WATER FEATURE AT SOUTH WELLS STREET (SYSTEM A)

A. General:

1. Complete, mechanical system for sub-surface percolation "constructed wetland" based pond, capable of producing a high level of pond water quality and clarity.
2. Concrete bottom pond.
3. As manufactured and supplied by Aquascape, Inc., or approved equal.
4. Package to include all required valves, submersible pumps, housings and strainers, flexible PVC piping, fasteners, connecters, snorkel and pondless vault lids, etc., to produce a complete and operational "natural" (non-chemical) living pond system.
5. Manufacturer to review construction drawings, including those of the structural, landscape, and disciplines, and including drawings showing gravel layers (planting bed) to assure geometric and functional compatibility with supplied gear, so as to insure production of the required level of water quality.
6. Manufacturer's package to provide three site visits (Chicago) during the pond construction phase, with two being for oversite installation and one being a startup visit. A follow-up report shall be provided after each visit.

B. Components:

1. Submersible pumps:

a. Wetland pumps (two required): Aquascape No. 9PL

(1) 5,600 GPH at 15 feet.
(2) 8.3 amperes, 1000 watts.
(3) Cord length as required, minimum 20 feet.
(4) Provide downstream throttling ball valve and quick disconnect union.
(5) Each pump to be housed in Aquascape "Pondless Vault."

b. Main pond recirculation pump (one required): Aquascape No. 9PL

(1) 4,600 GPH at 15 feet.
(2) 7.5 amperes, 900 watts
(3) Cord length as required, minimum 20 feet.
(4) Provide downstream throttling ball valve and quick disconnect union.

C. Butterfly valves for throttling applications:

1. As manufactured by Nibco or approved equal.
    a. 2-1/2" through 12": No. LD2000-5 full lug type, ductile iron body with aluminum bronze disc and weatherproof gear operator. Pressure rating: 200 psi.

D. Butterfly valves for isolating applications:

1. As manufactured by Nibco or approved equal.
    a. 2-1/2" through 6": No. LD2000-3 full lug type, ductile iron body with aluminum bronze disc and lever-lock operator. Pressure rating: 200 psi.
    b. 8" through 12": No. LD2000-5 full lug type, ductile iron body with aluminum bronze disc and weatherproof gear operator. Pressure rating: 200 psi.

E. Silent check valves:

1. As manufactured by Nibco or approved equal.
    a. 2" and smaller: No. S-480, soldered (or No. T-480, threaded where indicated on the Drawings), bronze body, inline lift type, resilient disc.
    b. 2-1/2" and larger: No. F-910-W, flanged, globe pattern, iron body, inline lift type, with renewable Buna-N seat and disc.
2. Pressure rating: 125 psi.

F. Swing check valves:

1. As manufactured by Nibco or approved equal.
    a. 2" and smaller: No. S-413-W, soldered (or No. T-413-W, threaded where indicated on the Drawings), bronze body, Y-pattern, with regrinding type seat and resilient disc.
    b. 2-1/2" and larger: No. F-918, flanged, iron body, with bolted bonnet, renewable seat and disc.
2. Pressure rating: 200 psi.

G. PVC check valves:

1. As manufactured by Asahi or approved equal.
2. "Quarter-Bloc", true union, ball check type.
3. Pressure rating: 150 psi at 73 degrees F.

H. 1-1/2" hose angle valves:

1. As manufactured by Giacomini S.p.A. or approved equal.
2. No. A56, cast bronze, with iron hand wheel.
3. Connections: 1-1/2", FNPT inlet, 1-1/2" male hose threaded outlet.
4. Pressure rating: 300 psi.

C. Fittings for grooved stainless steel pipe:

1. Fittings:
   a. Victaulic or approved equal. Grooved end design to accept grooved mechanical couplings.
   b. Schedule 10, type 304 stainless steel conforming to ASTM A-403.
2. Couplings: Victaulic Model 89 rigid coupling or approved equal.
   a. Malleable iron conforming to ASTM A-47.
   b. Pearlitic malleable iron conforming to ASTM A-220.
   c. Ductile iron conforming to ASTM A-536.
   d. Gaskets: Grade "E", EPDM.

D. Welded stainless steel pipe and fittings:

1. Pipe: Schedule 10, type 304, conforming to ASTM A-312T304, beveled ends for welding.
2. Fittings: Schedule 10, type 304, conforming to ASTM A-774, ASTM A-403, and ANSI B16.9.
3. Flanges: Class 150, type 304, conforming to ASTM A-182F304 and ANSI B16.5.

E. Threaded stainless steel pipe and fittings (2" and smaller):

1. Pipe: Schedule 40, type 304, conforming to ASTM A-312T304.
2. Fittings: Threaded, Class 150, type 304, conforming to ASTM A-351 and ANSI B16.15.

F. PVC pipe and fittings:

1. Pipe:
   a. Schedule 40, conforming to ASTM-D1785.
   b. Material: Conforming to ASTM-D1784, cell classification 12245B (Type 1, grade 1).
2. Fittings:
   a. Schedule 80, socket welded connections conforming to ASTM-D2467, threaded connections conforming to ASTM-D2464. Pressure rating: 125 psi minimum.
   b. Material: Conforming to ASTM-D1784, cell classification 12454B (Type 1, grade 1).
   c. Large diameter, fabricated PVC fittings to be used for sizes that are only available as fabricated by the specified fitting manufacturer. Molded fittings shall be used where available.
3. Solvent cement: Conforming to ASTM-D2564.
   a. For 6" and smaller PVC pipe:- Weld-on Adhesives No. 711. (Faster setting).

G. Continental Fan Manufacturing Inc.
www.continentalfan.com
Tel: 800.779.4021

H. Dow Corning Corp.
www.dowcorning.com
Tel: 989.496.4400

I. Febco
www.febcoonline.com
Tel: 800.767.1234

J. Fibergrate Corporation
www.fibergrate.com
Tel: 800.527.4043

K. Filtrex Inc.
www.filtrexnj.com
Tel: 973.595.0400

L. Flowline, Inc.
www.flowline.com
Tel: 562.598.3015

M. Fountain Supply Company
www.fountainsupply.com
Tel: 661.254.4448

N. Giacomini S.p.A
www.giacomini.com
Tel: 778.373.4929

O. Georg Fischer Signet
www.gfsignet.com
Tel: 626.571.2770

P. Ham-Let
www.ham-let.com
Tel: 281.566.4900

Q. Haws International
www.hawsco.com
Tel: 888.640.4297

R. Hersey Products Inc.
www.muellersystems.com
Tel: 800.323.8584

S. Ipex
www.ipexinc.com
Tel: 866.473.9462

FF. PSI Thunderline Link-Seal
www.linkseal.com
Tel: 800.423.2410

GG. Ryan Herco
www.ryanherco.com
Tel: 800.848.1141

HH. Seton Nameplate Corporation
www.seton.com
Tel: 800.571.2596

II. Singer Valve
www.singervalve.com
Tel: 604.594.5404

JJ. Static-O-Ring, Inc.
www.sorinc.com
Tel: 800.676.6794

KK. Stenner Pump Company
www.stenner.com
Tel: 800.683.2378

LL. Victaulic Company
www.victaulic.com
Tel: 610.559.3300

MM. Watertronics
Tel: 262.367.5000
www.watertronics.com

NN. Weld-On Adhesives, Inc. www.weldon.com
Tel: 800.888.8312

PART 3 - EXECUTION

3.1 GENERAL

A. Install and connect all equipment in accordance with manufacturers' instructions and recommendations. Provide all piping, valves and connections recommended by the Manufacturer for proper operation.

B. Protect all pipes, equipment and other parts of the work against injury by exposure to the weather during construction while stored or installed in place.

C. Make all adjustments required for the proper operation of the plumbing system. Use Manufacturer's representatives or factory technicians where adjustments cannot be accomplished by the Contractor's personnel.

B. Applications (unless indicated otherwise on the Drawings):

1. In the equipment space and passing through building spaces to a transition point approximately 6" inside the building wall:
   a. 2" and smaller: Schedule 40 stainless steel with threaded ends.
      (1) Fittings: Threaded stainless steel fitting and flanges
   b. 2-1/2" and larger: Schedule 10 stainless steel with rolled grooved ends.
      (1) Stainless steel fittings and flanges.
      (2) Joining with rigid galvanized iron or steel couplings.
2. Water treatment piping: Schedule 80 PVC.
   a. Fittings: Schedule 80 PVC solvent welded fittings.
3. Underground piping from the transition point inside the equipment space: Schedule 40 PVC.
   a. Fittings: Schedule 80 PVC solvent welded fittings.
4. Exposed piping in the pools: As indicated on the Drawings.

C. Pipe joints:

1. Grooved pipe: Grooves for mechanical couplings shall be cut using tools, methods and dimensional criteria specified by the manufacturer of the coupling. Grooves may be cut after galvanizing.
2. Welded pipe: Perform all welding in accordance with the requirements of ASME Building Services Piping Code B31.9.
3. Threaded pipe:
   a. Cut all threads accurately, axis of thread coinciding with axis of pipe.
   b. No more than two threads shall show beyond fittings.
   c. Make up joints with Teflon tape.
   d. Remake leaky joints with new materials.
4. PVC pipe:
   a. Bevel all pipe ends with a coarse file or beveling tool.
   b. Clean surfaces to be joined of all loose dirt and moisture from the I.D. and O.D. of the pipe end and the I.D. of the fitting socket.
   c. Apply a coating of appropriate primer to the entire I.D. surface of the fitting socket and to an equivalent area on the O.D. of the pipe end.
   d. Apply solvent cement using an appropriate natural bristle brush as follows: Apply a liberal coating of cement around the entire perimeter of the pipe end to a width slightly more than the equivalent socket depth of the fitting. Apply a light but complete coating once around the entire depth of the socket surface, avoiding excessive cement application. Apply a second liberal coating onto the pipe end.
   e. Immediately after cementing, insert the pipe into the fitting to the full socket depth while rotating the pipe or fitting one quarter turn. Hold

grading, planting and concrete work in the area of the piping is completed.

b. Pressurize all underground drain piping beneath the equipment space to 10 psi prior to backfilling. (spot backfilling to anchor piping may be done prior to pressurizing). Piping shall remain pressurized until all backfilling and concrete work in the area of the piping is completed.

7. The completed piping systems shall be tested as follows:
   a. Conduct each test for a minimum continuous duration of eight hours.
   b. Hydrostatically pressure test all storm and sanitary drain piping at 10 psi.
   c. Hydrostatically pressure test all other piping and equipment at 75 psi.
   d. Strike all solder joints with a soft-face hammer while under pressure.

8. Log pressure readings for all tests required above at the beginning and end of each test and on every working day between. Note the location and cause of any failures and method of repair on the daily log. Submit copy of the log to the Architect weekly.
9. Testing of the completed systems as specified under Paragraph 7 above shall be witnessed by the Architect.

G. Flushing:

1. Before the fountain system is operated, flush all fountain system piping with water to remove foreign matter.
2. Completely drain all piping and equipment.
3. Fill the system to the required capacity.
4. Circulate the water throughout the system for one hour, using the display pump. Do not allow cloudy water to pass through the filter tank.
5. Drain, fill and circulate (items 2, 3 and 4 above) until the water remains clear.

3.5 HOUSEKEEPING PADS

A. All floor mounted equipment shall be erected on concrete housekeeping pads with chamfered edges. Pads shall be 4" high except where otherwise indicated or required.

3.6 PIPING AND EQUIPMENT SUPPORT

A. Provide equipment anchorage, pipe supports and hangers as necessary to maintain alignment, prevent stress and allow removal and maintenance of functional equipment. Piping shall not be supported by the equipment. All equipment anchorage, pipe supports and hangers shall be designed, installed and seismically braced in accordance with UBC requirements for seismic zone 4. Seismic bracing of piping shall comply with SMACNA seismic restraint manual, latest edition, seismic hazard level B. Provide shop drawings and calculations for all equipment anchorage and supports for all piping 6" diameter and larger.

B. Provide a valve tag for each valve, as indicated on the schematic piping diagram, to provide information to correlate the valve with the outlet or fitting served.

C. Provide a half-size copy of the "As-built" Schematic Piping Diagram, permanently encased in plastic or glass, to provide operating personnel ready correlation of each valve identified with each outlet or fitting served.

D. Install nameplates for gauge/control device panels as shown on the Drawings. Attach using stainless steel machine screws.

3.8 ADJUSTMENTS

A. Make necessary temporary and final adjustments for each system and piece of apparatus installed, using factory trained technicians when necessary. Refer to the Drawings for adjustment details.

3.9 VENTILATION

A. Furnish and install ventilating fan, thermostat, duct work, louvers, dampers and intake and exhaust duct terminations, as shown on the Drawings.

3.10 WATER TREATMENT PROGRAM

A. The plumbing contractor shall engage a water treatment contractor to supervise chemical water treatment of the fountain system.

B. The water treatment contractor is to provide a seven (7) month supply of the specified chemicals in concentrations suitable for the installation. (Initial 30 day operation period plus six months after acceptance by Owner).

C. The treatment contractor shall perform initial water treatment system start-up including, but not limited to chemical drum installation, pump priming, and pump adjustments. The treatment contractor shall maintain and monitor the water treatment system during the initial thirty day operation period as necessary. The plumbing contractor shall make arrangements for the treatment contractor to be on site during the start-up phase.

D. The treatment contractor shall provide assistance to maintenance personnel in the operation and maintenance of the system, and shall provide for the visit of a service technician no less than four (4) times per month for six (6) months subsequent to final acceptance of the fountain system by the Owner. A water analysis shall be provided to maintenance personnel no less than once per month. The visiting technician will see that an adequate water maintenance program is being maintained and will provide any corrective measures necessary. (The Owner will make arrangements with the water treatment contractor, or a contractor of the Owner's choice, before the expiration of this period for the continuation of service after the initial six month service period).

13 12 14
FOUNTAIN ELECTRICAL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORKP

A. Furnish all labor, materials, apparatus, tools, equipment, transportation, temporary construction, and special or occasional services as required to make a complete working electrical installation, as shown on the Drawings and described in these Specifications.

B. Work included:

1. Electrical distribution system including motor starters, transformer, panelboard, branch circuits, grounding system, and related conduit and wire.
2. Electrical control system including control panels, programmable logic controllers, time switches, relays, and related conduit and wire.
3. Electrical supporting devices for suspension and support of conduit and equipment.
4. Concrete housekeeping pads as required and as indicated on the Drawings.

C. Related work specified elsewhere:

1. Concrete work.
2. Moisture protection.
3. Fountain Plumbing.

1.2 REFERENCE STANDARDS

A. This installation shall comply with all applicable provisions of the latest edition of the following codes:

1. NEC National Electrical Code.
   UBC Uniform Building Code.

B. Materials furnished hereunder shall, where applicable, comply with the latest edition of applicable standard specifications published by the following organizations:

1. ASTM American Society for Testing and Materials.
   ANSI American National Standards Institute.
   IEEE Institute of Electrical and Electronic Engineers.
   IPCEA Insulated Power Cable Engineers Association.
   NEMA National Electrical Manufacturers Association.

C. Provide labeled equipment certifying approval, as hereinafter specified, by Underwriters Laboratories (UL).

F. All submittals must be newly prepared and not reproduced from the Contract Documents.

G. Provide sufficient identification on each submittal to indicate the application. Submittals not so identified may be rejected.

H. Submittals may be rejected if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if the required information is not included.

1.5 OPERATING INSTRUCTION

A. At the time of completion, a period of not less than eight hours shall be allotted by the Contractor for instruction of operating and maintenance personnel in the use of all systems. All personnel shall be instructed at one time, the Contractor making all necessary arrangements with manufacturer's representatives to provide instruction, product literature and application guides for the users reference.

1.6 THIRTY DAY OPERATION PERIOD

A. As soon as the structure has been completed and all plumbing and electrical equipment has been installed and tested, the fountain may be placed in operation.

B. Prior to acceptance of the installation by the Owner, the Contractor shall demonstrate a concurrent thirty day, fully automated uninterrupted daily operation of not less than twelve hours nor more than twenty hours for all systems provided under this Section.

C. The contractor shall supervise the operation of the equipment and be responsible for the proper operation and maintenance thereof and make no claim against the Owner for any damage to the equipment during such operation. The contractor shall make such changes, adjustments, or replacements of equipment as may be required to make the installation comply with the Specifications.

D. The cost of electricity, water, and normal operational supplies during the thirty day operation will be paid by the Owner. The Contractor shall pay for all operating costs resulting from system deficiencies.

E. Coordinate the thirty day operation period with the Plumbing Contractor and other trades related to the fountain work.

E. Stainless steel rigid conduit and couplings: Type 316 stainless steel, threaded, conforming to UL 6A, CUL 6a, and ANSI C80.1. Calbrite or approved equal.

F. Watertight conduit entrance seals: OZ Gedney type FSK or approved equal with grounding connection.

G. Surface raceway: Seamless steel construction, hinged cover, factory gray enamel finish, conforming to U.L. Standard No. 5.

H. Outlet boxes:

1. Cast metal outlet boxes: 4" round, plated cast iron alloy body with threaded hubs and mounting lugs, cast iron alloy cover, neoprene gasket, Crouse-Hinds VXF series or approved equal.
2. Conduit outlet bodies: Plated cast iron alloy body with threaded hubs, neoprene gasket and cast iron cover.
3. Cast bronze junction boxes: Cast bronze body and cover, neoprene gasket, stainless steel fasteners and internal ground screw, Hydrel 1700 series or approved equal.
4. Potting compound: 3M "Scotchcast" Re-enterable Electrical Insulating Resin 2123.

I. Supporting devices:

1. Provide all necessary inserts, fasteners, clamps, rods, channels, straps, bolts, nuts and washers.
2. Supporting devices shall be as manufactured by Unistrut or approved equal as recommended for the application.
3. Fasteners: Toggle bolts, expansion inserts, wood screws or machine screws as appropriate to the construction.

2.3 WIRE AND CABLE

A. NEC type THWN, moisture and heat resistant thermoplastic insulated with nylon jacket. 75 degrees C. temperature rating.

1. Conductor: Copper, solid for sizes AWG #12 and #10, stranded for sizes #14, and #8 and larger.

B. NEC type THW, moisture and heat resistant thermoplastic insulated. 75 degrees C. temperature rating.

1. Conductor: Copper, solid for sizes AWG #12 and #10, stranded for sizes #14, and #8 and larger.

C. Splicing and terminating:

1. Insulated spring connectors: Thomas and Betts "Piggy" wire joints or approved equal.

11. All enclosures shall be factory coated with gray enamel, constructed to NEMA standards and bear the U.L. label where applicable.

B. Circuit breakers:

1. Molded case, trip indicating thermal-magnetic type, 40° C ambient temperature compensated, fixed mounting, with quick-break switching mechanism mechanically trip-free from the operating handle and conforming to applicable NEMA AB-1 Specifications. Refer to Drawings for trip/frame and poles required.
2. Ground fault current-interrupting circuit breakers, where indicated shall meet the requirements for molded case, thermal-magnetic circuit breakers and shall contain in addition a ground fault sensing circuit which shall trip the breaker whenever an imbalance of five milliamps between line and neutral is detected.

C. Nameplates: Laminated plastic, 1" x 3-1/2", black with white engraved letters. Minimum character size 1/8".

D. Protective matting: As supplied by Cactus Mat Manufacturing Company. No. 1050 corrugated rubber switchboard matting or approved equal. See drawings for dimensional requirements.

2.6 CONTROL SYSTEM CPC

A. Control system CPC is integrated into control/power panel CPPC.

B. As designed, assembled, wired, programmed, and tested by The Panel Shop, Inc., or approved equal.

1. Complete, UL 508 listed, fully engineered, programmed and tested, operational turnkey control system. The Contractor shall contact the fountain consultant at the start of the control system design in order to initially discuss and further familiarize with system requirements.
2. Control system engineer must demonstrate a minimum of five years of experience in the design and implementation of complete control and power systems for water features of medium or large complexity.
3. Control system engineer shall contact the fountain consultant to discuss system requirements as described herein at the start of the project in order to avoid possible ambiguities as to logical and functional requirements.
4. Color HMI touchscreen display to be utilized for operation and monitoring of control functions except where physical inputs (e.g., pump selector switches, alarm pilot lights) are required.
   a. Minimum size diagonal screen dimension: 8 inches.
   b. Minimum pixel dimensions: 800 x 600.
   c. Minimum colors per pixel: 65,536.

or "virtual" (touchscreen) devices. The general alarm pilot light as discussed below must also be physical and not virtual.

C. Functional logic requirements:

1. Water level control:

a. Water level is monitored at, and adjustments made to the storage reservoir, as any deficit of water and water addition will be reflected at that location.

b. The control system shall power and read the 4-20 mA, 2-wire output from the specified Ultrasonic level sensor, noted as ULS-1 on the drawings.

(1) Control system shall provide at least one spare analog input for possible future use.

(2) Control system engineer shall refer to the level sensor's specification and cut-sheet and define how the unit is to be configured for the required application.

c. All level set points described herein shall be fully adjustable via the touch screen (HMI).

(1) There shall be a digital and graphical readout of the current (real-time) water level and all level set points, relative to the reservoir bottom.

d. Manually-initiated fill sequence:

(1) At any time the operator can call a screen that allows him to initiate or abort the fill sequence, and therefore energize or de-energize the 120 VAC normally closed (NC) water supply solenoid valve FV-1C.

(2) When this function is engaged, all pumps are unconditionally disabled, and the water supply solenoid valve FV-1C is energized and therefore open.

(3) When the water level rises to the "fill level," the fill cycle terminates. FV-1C will de-energize, and the fountain pumps will operate normally as described in the pump control section below.

(a) The "fill level" is determined by the upper "fill level" setting, entered at the HMI, and which is operator adjustable.

(b) The "fill level" is called the "static water level" on the schematic piping diagram.

(4) Initiation of the manual fill sequence cancels the low-water lockout condition discussed below.

(5) Status of fill cycle (on or off) shall be enunciated by the touchscreen.

(6) Provisions shall be provided for forcing FV-1C into the energized state (therefore open) for testing purposes even if the water level is above the "full" level.

g. Pumped overflow mode:

(1) There shall be a pumped overflow "on" setpoint, entered using the HMI.

(2) The pumped overflow mode will only be enabled once the water stream system pump (pump DP-6) has been continuously on for eight (8) minutes.

(3) If the water level reaches the pumped overflow "on" setpoint, the pumped overflow system is engaged.

(a) The first sump pump (e.g., DRP-1) starts if it is off but in the AUTO mode.

(b) If the water continues to rise after 10 seconds of first pump actuation, the second sump pump (e.g., DRP-2) also starts if it is off but in the AUTO mode.

(c) This is lead/lag/alternation operation. The next time operation of the sump pump(s) are required, the second pump (e.g., DRP-2) starts first.

(d)

(4) When the water level in the reservoir again falls to the pumped overflow activation level for five (5) continuous seconds, the pumped overflow function disengages and the sump pumps shut off. This terminates the pumped overflow sequence.

(5) Each sump pump shall be provided with TEST/OFF/AUTO control.

2. Low suction pressure control:

a. Function monitors debris collecting in the pump basket strainer. Compound (pressure/vacuum) monitoring switch PS-1C is utilized.

(1) Switch PS-1C monitors the basket strainer serving the water runnel, jet, and filter pumps.

(2) The specified suction pressure switch should be wired normally closed. The contacts are actually "normally closed/held open" – increasing vacuum withdraws a plunger away from the switch's microswitch, allowing the switch into its normal (close) position.

b. If the suction pressure at the pressure switch falls below the operator-adjustable (at the switch) set point for five continuous seconds, a "clogged suction strainer" lockout and alarm shall occur, unconditionally disabling all display effect and filter pumps. Manual reset only, via virtual or door-mounted pushbutton.

c. A "FOUNTAIN STOPPED DUE TO LOW SUCTION PRESSURE" alarm shall appear on the touchscreen..

3. Ultraviolet sterilizer UV-1C control:

a. This UV sterilizer treats water spray jet and stream circulating water. The fog system utilizes a separate, smaller UV sterilizer.

b. Power for the main UV control board to be provided by an independent circuit – not from the main fountain control system. However, the UV system's integral control system must be configured such that a "remote start" input is utilized.

b. A programmable electronic time switch function with astronomic scheduling capability shall be provided, capable of independently operating the display pump(s) as follows:

(1) One channel shall schedule operation of jet pumps DP-2C through DP-6C (choreographed jet assemblies). While in operation, these jet assembles shall during normal operation follow the choreographies as dictated by show controller programming.
(2) A second time switch channel shall independently schedule operation of pump DP-1C (stream).

c. Display pumps DP-1C through DP-6C:

(1) Two-wire (start/stop with no memory). Provide dry contact for variable frequency drive (VFD) as required.
(2) VFD run-confirm contact shall be used to input pump on/off status into PLC.
(3) The control system shall provide a physical (mounted on the door of the control cabinet) a HAND/OFF/AUTO 3-position selector switch for control of each pump. The switch shall be illuminated when run confirmation is received.

(a) HAND position: The pump shall operate, bypassing the time switch and wind control interlock Low water and low suction pressure shutoff protection, and loss of UV sterilizer interlock, shall not be bypassed. Initiating the pumped drainage sequence (below) shall also stop the display pumps (DP-1C through DP-6C). Remote enable/disable switch shall also have capacity to stop the pumps, if switched.
(b) OFF position: The display pump is unconditionally disabled.
(c) AUTO position: Pump operation shall be scheduled according to the dedicated time switch channel. All shutoff protection and interlocks shall remain active. Initiation of pumped drainage sequence (below) shall also stop display pumps DP-1C through DP-6C. Remote enable/disable switch shall also have capacity to stop pumps DP-1C through DP-6C if switched. Loss of UV sterilizer, as signaled by UV controller, also disables DP-1C through DP-6C.
(d) For possible future use: Provide dedicated digital input and thermocouple input connected to field terminals, which can optionally be connected to low-temperature sensor (thermostat contact and/or thermocouple). Should temperature fall below set-point, display pumps DP-1C through DP-6C become disabled if in auto mode. Filter pump FP-1C remains operational.

(4) Variable frequency drive (VFD) speed reference, pumps DP-2C through DP-6C (Jets):

(a) Each pump supplies a discrete ring type jet header, and is therefore individually controlled.
(b) Pumps to be powered through variable frequency drives (VFD).

a. Basic items to be controlled:

(1) Five jet rings as shown on drawings.
(2) DMX based colored lights at fountain jets and fog zones.
(3) Each water spray (as opposed to fog) jet ring is supplied by a single display effect pump, DP-2C through DP-6C for each of the five rings.
(4) The stream, supplied by pump DP-1C, should also have the capability of having its speed modulated by the control system. However, it is anticipated that at least initially there shall be a single pump speed setpoint only, input by the fountain programmer using the HMI.

b. A manufacturer supplied show controller module using Gilderfluke gear shall be provided as part of the fountain control system.

c. Control system integrator shall use show controller gear to provide six (6) programmed seven-minute water spray jet and light "shows" for the five jet ring assemblies and fog zones. Each show shall produce a unique storyboard of rising and falling jet heights.

(1) Control system integrator/programmer shall work closely with the project Landscape Architect when developing sequence storyboards.
(2) Show controller programmer shall then work with Landscape Architect in the field in order to fine-tune and provide the desired effects.
(3) Provide five discrete dry contacts, where each one is associated with one of the five light shows noted above. These contacts are for connection to site lighting control system by others. When one of the contacts close, it will signal that a particular light shows is activated. (The site lighting control system will then respond by adjusting ambient lighting qualities to match the active water and fog light show).
(4) Light scheduling shall be through an astronomic time switch channel ("on" times vary with changing day lengths, as seasons change).

d. Fog emitters:

(1) Provide separate astronomic times switch channel for fog lighting.
(2) Provide four discrete inputs for external activation of fog. Inputs (dry contact closure) trigger fog activation if the fog is not already on.
(3) Provide scheduling function for fog emitters.

e. Shows shall have the capacity for looping and being joined together to make longer composite shows.

f. Control system shall also have the capability of modulating the water runnel pump speed if required, although this capability is only expected to be minimally utilized (if at all) during initial programming.

8. Pumped drainage sequence:

the 30-minute test period limitation is surpassed and the inhibitor pump is disabled, the touch screen shall indicate this and explain the reset procedure.

(2) OFF position: The inhibitor pump is unconditionally disabled.

(3) AUTO position: The inhibitor pump will be energized whenever water supply valve FV-1 or MUV-1C is energized.

b. The HMI shall indicate whenever the inhibitor pump is energized.

11. Water treatment controller WT-1C:

a. Powered through interposing relay, allowing main control system to energize/de-energize unit.

b. Control system shall provide WT-1C (pH, TDS, and ORP controller) with 120 VAC input power.

c. pH Adjustment:

(1) Acid chemical metering pump will be operated directly by the dedicated stand-alone water treatment controller, WT-1. There is no interface with the PLC. Acid will be dosed on a demand, as-needed basis. Control drawings must show this.

d. Conductivity (TDS) Bleed Valve:

(1) Conductivity bleed valve BV-1C will be operated directly by the dedicated stand-alone water treatment controller WT-1C. Not operated by the PLC. Control drawings must show this. Conductivity (mineral buildup) control will be implemented via operation of the bleed valve on a demand, as-needed basis.

(2) When BV-1C opens and dumps mineral-rich water, the automatic water make-up sequence (above) will sense the water level reduction and add city water to dilute the fountain water until conductivity falls below the controller's set-point.

(3) Valve is normally closed (NC), energize to open.

e. Chlorine (ORP) control:

(1) Chlorine chemical metering pump will be operated directly by WT-1C. There is no direct interface between the metering pumps and the PLC. Chlorine will be dosed on a demand, as-needed basis.

f. The water treatment controller is equipped with a dry alarm contact which must be connected to a PLC input. This shall communicate a general alarm, referring operating personnel to the controller for more information.

12. Water treatment controller interlock:

a. Issue power to WT-1C via relay contacts controlled by the PLC. This allows for the following interlocks:

(1) Low-water lockout.

(2) Flooded – float switch FLS-1C closed.

(3) Low suction pressure lockout.

(4) Initiation of manual fill or pumped drainage control functions.

control is still active) or the non-wind-control state if moderate wind control stage is no longer active.

(c) Display pumps DP-1 through DP-5 will slowly ramp up to their designated speed setting.

e. Provisions for manually initiating and aborting the wind control function for both stages must be provided.

f. Indication of when and which function (moderate or high wind) function is active must be provided both on the touchscreen display and via a physical, yellow, blinking "wind control activated" pilot light mounted on the control panel door.

g. Control system must provide 24 VDC power to wind sensor (typically not loop powered, but verify). Also provide two twisted shielded pair conductors for analog inputs from sensor to read wind speed and direction.

h. Note: Direction signal from wind sensor is not used, but input should be connected to PLC for possible future use.

14. Emergency stop:

a. A physical, red, labeled, mushroom-head, push-pull emergency stop pushbutton must be provided on the control panel door. If pushed, all pumps, the filter tank controller, water treatment controller, and the UV sterilizer are unconditionally disabled, and the button is illuminated.

15. General Alarm Pilot Light:

a. There shall be a physical, door-mounted, red pilot light that blinks whenever any alarm condition exists. The touchscreen will enunciate the specific nature of the alarm as specified in the sections above.

16. BMS Interface:

a. Alarm enunciation:

(1) There shall be at least five dry contacts for each control system wired to field terminals, to be made available for connection to BMS inputs for alarm enunciation. Alarms shall minimally include (dry contact closes upon):

(a) Fountain low-water.
(b) Low suction pressure (clogged suction strainer).
(c) Flooded vault flooding - Float switch FLS-1 closed.
(d) General alarm (check fountain control panel for specifics).
(e) Spare.

b. BMS control of fountain functions:

(1) Field terminals shall be provided such that the BMS dry-contact closures can independently:

(a) Schedule display pumps DP-1C through DP-5C (jets) operation. Single contact schedules five pumps.
(b) Schedule display pump DP-1C (water stream) operation. Single independent contact.

H. O-Z / Gedney
www.emersonindustrial.com
Tel: 800.621.1506, option 1

I. Schneider Electric/Square D
www.schneider-electric.us
Tel: 888.778.2733

J. The Panel Shop
www.controlpanelshop.com
Tel: 818.837.1494

K. Thomas and Betts www.tnb.com
Tel: 901.252.5000

L. Unistrut Corp. www.unistrut.us

PART 3 - EXECUTION

3.1 GENERAL

A. Install all materials and equipment in accordance with NEC requirements and the manufacturers' instructions and recommendations.

B. Protect all conduits, conductors and equipment against injury by exposure to weather during construction while stored or installed in place. Touch up any scratches after installation.

C. Coordinate the location of outlets serving equipment furnished by other trades to allow space for necessary access, repair, removal and replacement.

D. Make all adjustments required for proper operation of the electrical system. Use manufacturers' representatives or factory technicians where adjustments cannot be accomplished by the Contractor's personnel.

3.2 RACEWAYS AND BOXES

A. General:

1. Size all conduits in accordance with the NEC to accommodate quantities, sizes and types of conductors shown on the Drawings.
2. Minimum conduit size shall be 3/4" unless indicated otherwise on the Drawings.
3. Exposed work may be used within the equipment space unless indicated otherwise on the Drawings.
4. Arrange exposed conduit straight, parallel and perpendicular to the walls of the structure.
5. Group conduits in parallel horizontal or vertical runs wherever practical.

4. Backfill to surface in 6" layers to a minimum of 95% compaction. At paved areas, material may be sand, gravel, or native soil. At planted areas, soil shall be as specified by the Architect.

G. Penetrations:

1. Core drilling for conduit penetrations shall be accomplished only at locations and in a manner approved by the Architect.
2. nInstall watertight conduit entrance seals at all below grade wall and floor penetrations. Provide membrane clamps where required.

3.3 WIRE AND CABLE

A. General:

1. Minimum conductor size:
   a. Control: AWG #14.
   b. All other applications: AWG #12.
2. Color coding: All conductors shall be identified by means of factory colored insulation, using colored compounds or coatings; or with colored marking tape designed for the purpose.

B. Applications:

1. Wiring within the control panel: NEC type THW or THWN.
2. All other applications: NEC type THWN.

C. Splicing and terminating:

1. Join conductors #8 and smaller using insulated spring connectors, #6 and larger using cast bronze pressure connectors. Cover with 2 layers of tape at half lap to 1" beyond the splice or connector.
2. Make up all splices at outlet and junction boxes with separate 6" tails of the correct color.
3. All wire and cable in equipment enclosures shall be bundled and clamped.

D. Insulation resistance testing:

1. Measure resistance to ground of each branch circuit and control conductor including neutrals.
2. Conduct test using a 1000 volt DC megohmeter.
3. Replace any conductor showing less than 10 megohms to ground.
4. Provide a typewritten record of test results. Deliver to the Architect.

E. Identification:

1. Every control conductor shall be numbered at all external devices and junction boxes to match the corresponding control panel terminal.

and the Fountain Consultant who will respond with remote troubleshooting assistance.

D. When power and control testing is completed, the Contractor shall deliver a written report to the Architect stating that all functions have been satisfactorily tested and are operational. If some functions cannot be made to work properly the report shall state which functions have yet to be made operational along with possible causes of the problem. The report will act as a notice to the Architect and Fountain Consultant that the fountains are ready for a startup visit.

E. The purpose of the Fountain Consultant's visit shall be to observe and verify the functionality of all fountain systems and to assist with adjustments and troubleshooting as necessary.

F. The Contractor shall insure that the Mechanical/Plumbing Contractor and the control system integrator/programmer are on site and available during the Fountain Consultant's visit so all systems can be tested and operated.

END OF SECTION

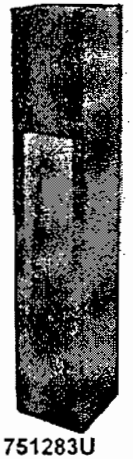
SLV LIGHTING NORTH AMERICA
ENGLISH

INSTRUCTION MANUAL
FOR OUTDOOR LUMINAIRE

RUSTY SLOT 50 LED

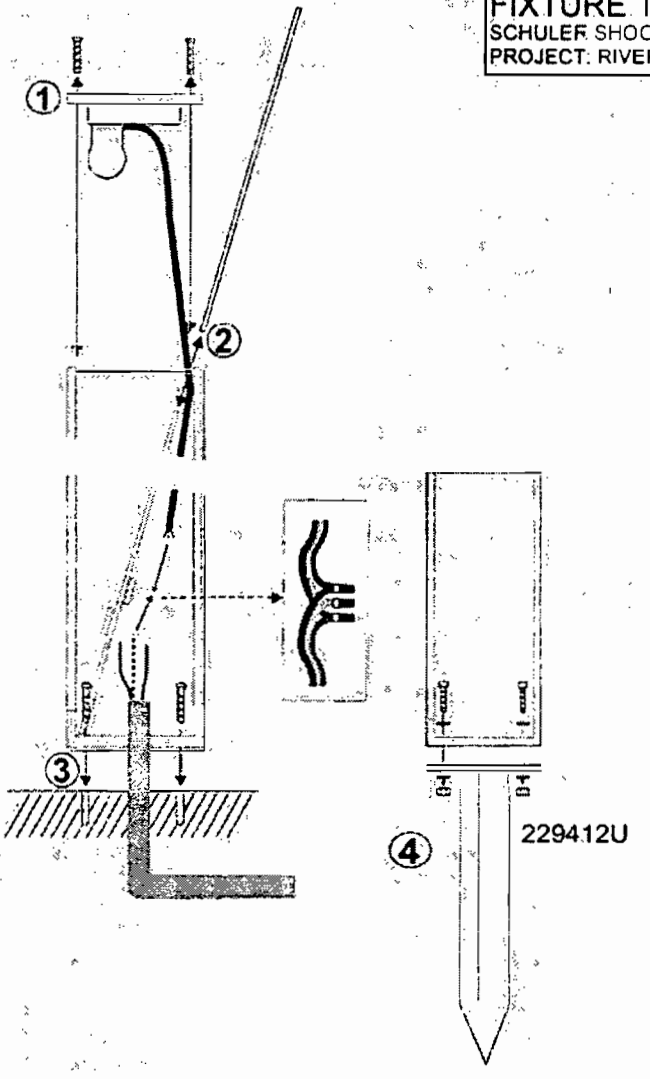
751273U

RUSTY SLOT 80 LED



751283U

FIXTURE TYPE SA, SA1
SCHULER SHOOK
PROJECT: RIVERLINE



- The fixture body is hollow to allow electrical conduit to extend into the fixture body. Wire connections can be contained within the fixture body. Use silicone filled wire nuts for added protection of the wiring connections.
- Fixture can be installed in ground/soil using an optional stainless steel Earth Spike (article # 231230U). Earth spike is open on one side for conduit. Dig hole, insert spike, level the fixture, backfill with soil or concrete mix.
- Fixture can be secured to a deck using fastening materials suitable for the installation/mounting surface. Electrical conduit can extend inside the hollow fixture body
- Fixture can be mounted on concrete. Place fixture over the conduit. Drill holes and set anchors. Installer must provide the bolts and concrete anchors that are suitable for the concrete and depth of the concrete.

NOTICE: Do not try to seal the product yourself, using additional silicon or another sealant.

- **Electrical Connection:**
- The electrical connections shall be made by a licensed electrician using suitable connectors. The connections must be secure and protected. If a remote enclosure is used, the enclosure must be watertight and in compliance with the National Electric Code, as well as all local regulations.
- The fixture has a hollow body. Line (black) and Neutral (white) leads are supplied from the LED module.
- A ground wire is supplied on the inside of the fixture body near the base. Fixtures must be grounded.
- The 120V mains wires should be connected to the corresponding black (Line) and white (Neutral) conductors inside the fixture body Use suitable wire connectors (silicone filled) to ensure these connections are secure and watertight.

- The green/yellow ground wire and ground connection point in the fixture must be connected to incoming green/ground wire in the installation. A good ground/earth connection must be made to fixture.
- ⚠ **Check if the product functions properly and is securely fixed.**
- The product is now ready for operation.

Technical Data:

Voltage: 120VAC 60Hz
Light source: LED Module, 10w, 650lm, 3000K, 83 CRI

IP 55:
- Protection against disturbing dust deposition.
- Protection against jetted water from all directions.

Weight:
751273U: 27.6 lbs.
751283U: 40.8 lbs.

art.-no. 751273U/83U

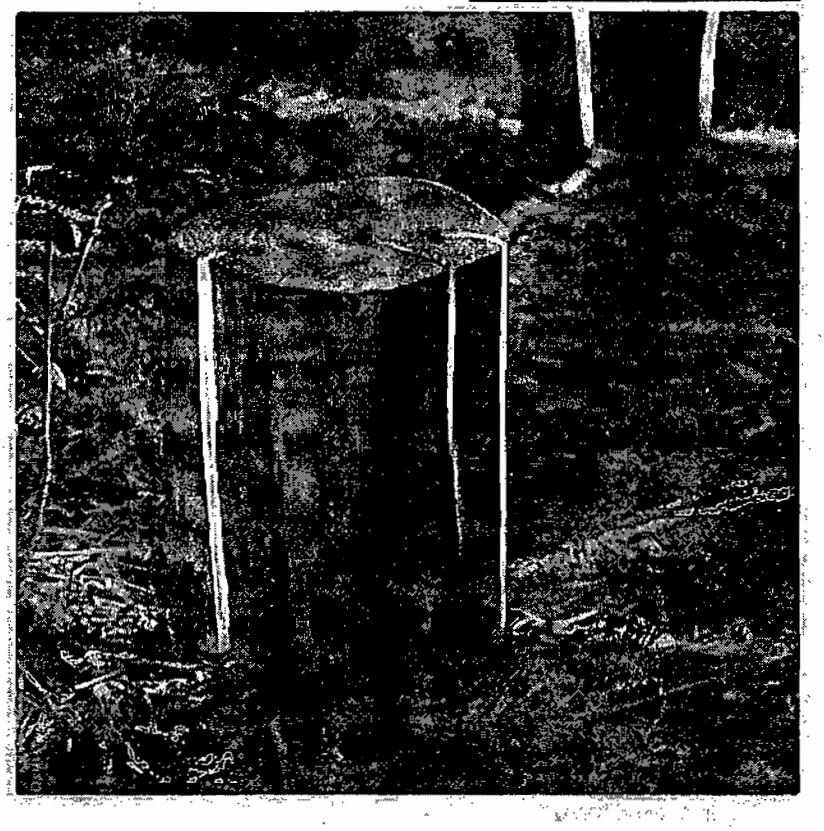
5731 Benjamin Center Drive
Tampa, FL 33634
Phone inside US: (813) 349-1900
www.slvlighting.com
Technical Details are subject to change.

FIXTURE TYPE **SA, SA1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

FIXTURE TYPE **SB**
SCHULER SHOOK
PROJECT. **RIVERLINE**

STUMP - THE CRACKED LOG TABLE/STOOL

$780.00



Stump

Table/Light/Stool

A new Design in the Cracked Light range.

Measuring approximately 400mm high and 300mm wide these lamps can be used in multiple applications. Being weather resistant these lamps are ready to be wired (12 volt) in any setting outdoor or in.

Stumps are often used as a table or stool when in the outdoors. This design has taken the idea of dispersion of light through cracks in timber and turned it into a multipurpose object which can be used as a table, stool or to illuminate an area with shards of light. These shards come from warm white LED strip lights fitted into the lamp in a custom fixture.

This object has used timber which has been salvaged. Directly inspired by the natural environment, the warm yellow light represents the fiery fate the timber would have otherwise have been exposed to.

Other Information:

- Stump is ready to be wired to 12 Volt DC power supplies, inside or out. They come with a

- Driver/Transformer with Australian plug for indoor use only.

- They also have a key whole bracket for optionally fixing each Stump to the ground.

- A new rechargeable and solar battery version is in the process of being developed

ACCLAIM LIGHTING

Flex Tube SC

Client:	
Project:	FIXTURE TYPE **SC**
Type:	SCHULER SHOOK
Order Code:	PROJECT: **RIVERLINE**
Quantity:	

ORDER CODES (*Special Order Item)

FTB - 12 _ - AA__ N

All Accessories Sold Separately Including First Cables and End Caps, See Below

- **A** - 2700K*
- **B** - 3000K
- **D** - 3500K*
- **E** - 4000K
- **N** - Red*
- **P** - Green*
- **Q** - Blue

- **3** - Flex Tube SC 32.8' Spool (10m).
- **4*** - Flex Tube SC Injection Molded Side Mount Cable 32.8' Spool (10m)
- **5*** - Flex Tube SC Injection Molded Rear Mount Cable 32.8' Spool (10m)

RELATED COMPONENTS

APS-480-24	Non-Dim 24VDC 480W 120/240V UL Din Rail Power Supply, Maximum Load - 3 x 10m Runs
APS-240-24	Non-Dim 24VDC 240W 120/240V UL Din Rail Power Supply, Maximum Load - 1 x 10m Run
DPW-111-FA	**AL Driver 8 RGBW 24V.** - 24V Power + DMX Driver, 120VAC or 240VAC Input / 1 Spool Maximum
AL-150-24	Dry Location 24VDC 150W Transformer, 120 or 240VAC Input / 1 Spool Maximum for Non-Dim Use
CLG-150-24	Wet Location 24VDC 150W Transformer, 120V-277VAC Input / 1 Spool Maximum for Non-Dim Use
FTUBESCFC	**Flex Tube SC First Cable Kit (FTB Only)** - IP68, 300mm (12"), Includes Gasket + Screws
FTUBESCLC	**Flex Tube SC Link Cable (FTB Only)** - IP68, 300mm (12"), Includes Gasket + Screws
FTUBESCMC	**Flex Tube SC Seamless Mid Connector (FTB Only)**
FTUBEEC	**Flex Tube End Cap Kit** - IP68, Includes Gasket + Screws
FTUBELCH1M	**Flex Tube Self Lock Mounting Channel 1m (3.28')** - Aluminum, Includes 3 Clasps + 4 Screws
FTUBELCH5CM	**Flex Tube Self Lock Mounting Channel 5cm (2")** - Aluminum, Includes 1 Clasp + 1 Screw
FTTK2	**Flex Tube Install Tool Kit** - Includes Cutter, Insert Assist, and Carrying Case

FLEX DC NEON

FIXTURE TYPE **SC**
SCHULER SHOOK
PROJECT: **RIVERLINE**

Specification Sheet

FLEX NEON is a high performance flexible LED fixture designed as a neon replacement but useful in a wide variety of applications where a smooth surface of light is desired.

- Offered standard in 2700k, 3000k, 3500k, 4000k, and RGB. 4 Solid colors available as special order.
- Flex Neon is dimmable via 0-10v, MLV, or DMX.
- Flex Neon is IP67 rated
- Available in flat or round lens cover

ELECTRICAL

Input Voltage	24VDC
Dimming Options	DMX 0-10V MLV
Power Consumption	4 Watts / ft: RGB, White, Green, Blue 2 Watts / ft: Red, Yellow, & Amber
Wire Size	18AWG, 2 wire (while still a solid color) 20AWG, 4 wire (RGB)
Certification	UL

PHYSICAL

Field Cuttable	Every 4" (Every 6.5": Red, Amber, & Yellow)
Bend Radius	2.34"
Operating Temperature	-40° C (-40°F) to +70°C (+158°F)
Environment	IP67
Maximum Run Length	23'
Dimensions (WxH)	Flat: 0.45" (11.50mm) x 0.83" (21.00mm) Round: 0.45" (11.50mm) x 1.14" (29.00mm)

OPTIONS

Mounting	Mounting Clips Self Locking Mounting Clips Mounting Channel Self Locking Mounting Channel

LUMEN OUTPUT

Flat	2400k: 91 lm/ft 2700k-4000k: 97 lm/ft
Round	2400k: 103 lm/ft 2700k-4000k: 115 lm/ft

PERFORMANCE

Color Temperature	2400k, 2700k, 3000k, 3500k, 4000k RGB
Lumen Maintenance	50,000 Hours
Binning Tolerance	+/- 150k
Warranty	3 years

PART NUMBER BUILDER

SERIES	COLOR		SHAPE	LENGTH
FLEXNEON	2400 = 2400k	4000 = 4000k	F = Flat	XX = Custom Length
	2700 = 2700k	RGB	R = Round	
	3000 = 3000k	*Solid colors by special order		
	3500 = 3500k			

1108 Monterey Pass Rd, Monterey Park, CA 91754
213.250.6068 | info@opticarts.com | **www.opticarts.com**

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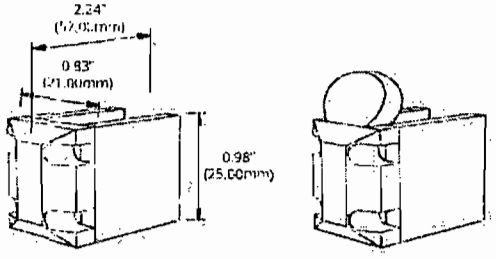
FLEX DC NEON

FIXTURE TYPE SC
SCHULER SHOOK
PROJECT RIVERLINE

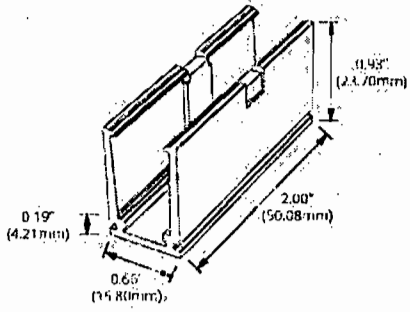
Specification Sheet

ACCESSORIES



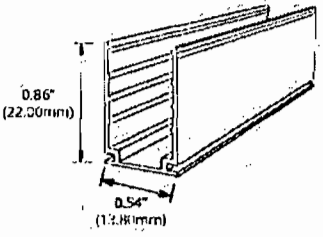
END CAP

PART #	
FLEXNEON.CAP	End Cap



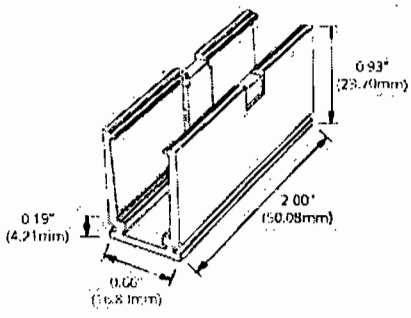
SELF-LOCKING ALUMINUM CHANNEL

PART #	
FLEXNEON.CH.1MSL	1 meter self-locking channel
FLEXNEON.CH.2MSL	2 meter self-locking channel



ALUMINUM CHANNEL

PART #	
FLEXNEON.CH.1M	1 meter channel
FLEXNEON.CH.2M	2 meter channel



SELF-LOCKING MOUNTING CLIP

PART #	
FLEXNEON.MC2.SL	Self-locking mounting clip

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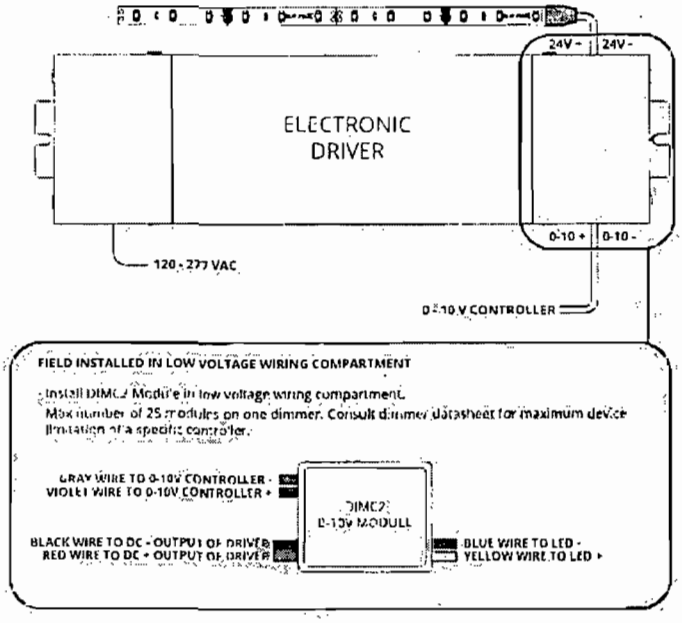
FLEX DC NEON

FIXTURE TYPE SC
SCHULER SHOOK
PROJECT RIVERLINE

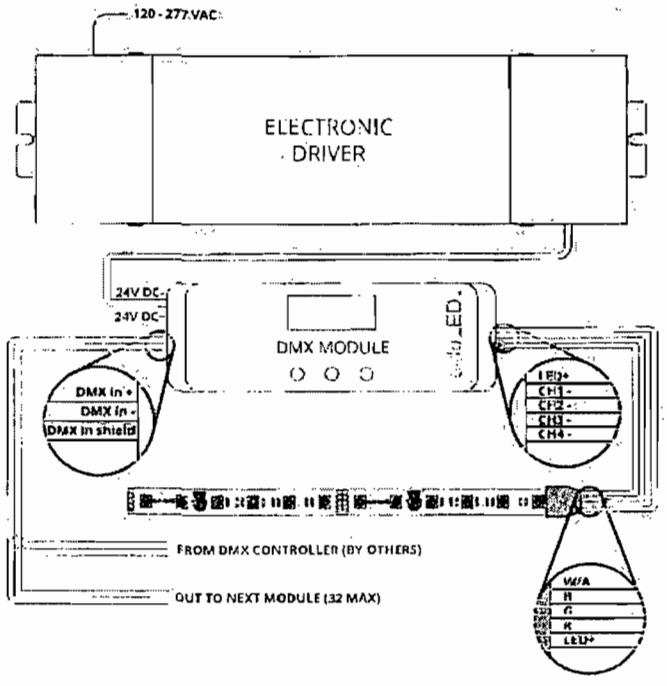
Specification Sheet

COMPATIBLE DRIVERS



ELECTRONIC DRIVER W/0-10V MODULE

PART	DESCRIPTION
GG100E-24-UNV-010V	96W 120-277VAC ELECTRONIC DRIVER WITH 0-10V DIMMING MODULE (UNV)
DIMENSIONS	
96W	H 3.00", W 11.46", D 1.30"
DIMMING PERFORMANCE	
ELECTRONIC DRIVER + 0-10V	Dims to 10% on most 0-10V dimmers



ELECTRONIC DRIVER W/DMX MODULE

PART	DESCRIPTION
GG100E-24-UNV-DMX	96W 120-277VAC ELECTRONIC DRIVER WITH CLOSED DMX DIMMING MODULE
DIMENSIONS	
96W	H 3.00", W 11.46", D 1.30"
DMX MODULE	H 1.97", W 6.02", D 0.91"

*Must be installed in UL box (by others)

DIMMING PERFORMANCE	
ELECTRONIC DRIVER + DMX MODULE	Dims to 0.1% on most DMX systems

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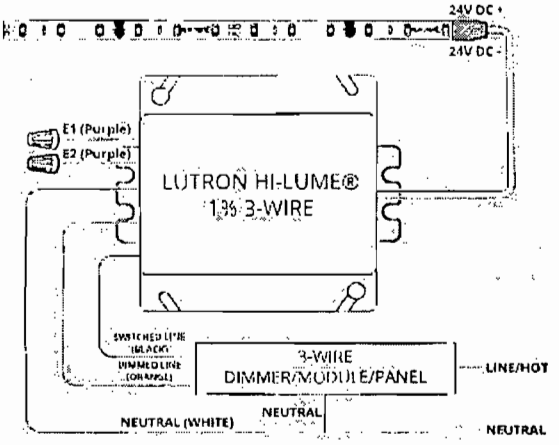
FLEX DC NEON

FIXTURE TYPE SC
SCHULER SHOOK
PROJECT RIVERLINE

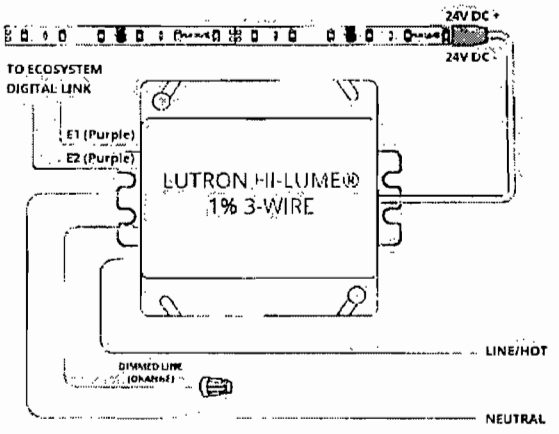
Specification Sheet

COMPATIBLE DRIVERS

3-WIRE



ECOSYSTEM



LUTRON HI-LUME® 1%:
3-WIRE/ECOSYSTEM

Optic Arts is a Lutron OEM Advantage Partner

PART	DESCRIPTION
L3DA4U1UKL-CV240	5-40W, 120-277VAC, 3-WIRE/ECOSYSTEM DRIVER
DIMENSIONS	
HI-LUME® 1%	H 4.00"; W 4.89"; D 1.62"
DIMMING PERFORMANCE	
LUTRON HI-LUME® 1% 3-WIRE/ECOSYSTEM	Dims to 1% with compatible Lutron controls

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Specification Sheet

FIXTURE TYPE SD
SCHULER SHOOK
PROJECT. RIVERLINE

lumenfacade™
INGROUND
WHITE & STATIC COLORS

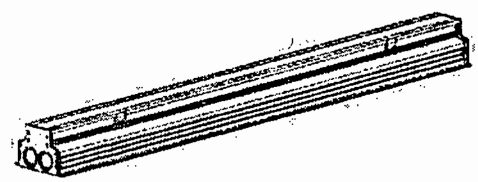
Client ______________________ **Project name** ______________________

Order# __________ **Type** __________ **Qty** __________

FEATURES AND BENEFITS

Physical

- Aluminum optical chamber housing
- Anodized aluminum flush trim
- Polymer recycled PVC blockout housing
- Available in 1', 2', 3' or 4' sections
- Die cast aluminum end caps
- Stainless steel hardware
- Tempered glass lens
- Asymmetric wallwash, 10° x 10°, 10° x 60°, 30° x 60° or 60° x 60° optics
- 0°, 2.5°, 5° or 20° factory-set optical aiming options (not available for asymmetric wallwash)
- IP68 rated for up to 1' (30cm), not suitable for permanent immersion applications
- IK10 rated
- 1000kg max load; walk over only*



IK10

lumen EcoSystem. Enabled

Performance

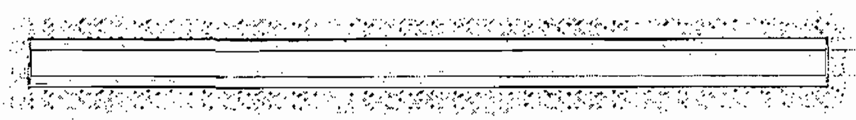
- Lumen maintenance 80,000 hrs [L70 @ 25°C]
- Lumen maintenance 60,000 hrs [L70 @ 50°C]
- Lumen measurements comply with LM - 79 - 08 standard
- Resolution per foot or per fixture (configured with LumenID V3 software & DMX/RDM)
- Operating temperatures: -40° C to 50° C [-40F to 122F]

Performance summary

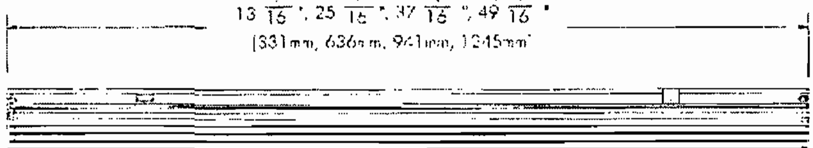
4ft HO 4000K 0° tilt setting	Delivered Output [lm]	Intensity [peak cd]
10°x10°	3,932	16,137
10°x60°	3,668	10,138
30°x60°	4,035	5,317
60°x60°	3,845	3,062

Electrical

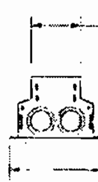
- Line voltage luminaire for 100 to 277V
- Power and data in 1 cable (#16-5)
- IP68 push-lock connectors
- 5W/ft version meets ASHRAE standards for linear lighting on building facades
- 8.5W/ft Regular Output version
- 15.25W/ft High Output version
- Dimming options: 0-10V, DALI, DMX/RDM enabled, Lumentalk or Lutron® EcoSystem® Enabled



TOP VIEW



FRONT VIEW
*All dimensions are preliminary



SIDE VIEW

SECTION DETAIL

*To meet 1000kg walk over resistance requirements, cement must support 100% of the exterior surfaces of the blockout.

1751 Richardson, Suite 1505
Montreal (Quebec) Canada
H3K 1G6
1.877.937.3003
F 514.937.3003
T 514.937.6989
info@lumenpulse.com
www.lumenpulse.com

5-year limited warranty.

Consult www.lumenpulse.com for our complete Standard Terms and Conditions of Sale.

lumenpulse

20160923
MS - R12

ACCESSORIES

Order separately, refer to each item's specification sheet for ordering information

Control Systems:

LTO2 lumentouch is a wall mount DMX 512 controller keypad.

LCU lumencue is a USB / mini SD DMX 512 controller

LID lumenID is a diagnostic and addressing DMX 512 controller
It must be specified on all DMX applications
Refer to LID specification sheet for details.

LTN lumentone is a simple pre-programmed DMX 512 controller
with a push button rotary dial and live feedback

Control Boxes:

CBX DMX/RDM control box.
Up to six power and data outputs to fixtures or fixture runs.
Ethernet enabled option.
Refer to CBX specification sheet for details

Cables **(required)**:

LOILC Leader Cable for lumenfacade Inground; 10', 25' or 50' [3m, 7.6m or 15.2m] standard lengths

LOIJC Jumper Cable for lumenfacade Inground; 2', 4' or 10' [0.6m, 1.2m or 3m] standard lengths

Inground Junction Box (optional):

lumenfacade Inground IP68 sealed junction box starter kit - **LOI-JBOX** order code.
*Use for stand alone fixtures and/or first of run fixtures
*LOI-JBOX accessory does not fit in 1ft fixtures.

751 E chardon, Suite 1305
Montreal (Quebec) Canada
H2K 1G6

1.877.937.3003
P 514.937.3003
F 514.937.6289
info@lumenpulse.com
www.lumenpulse.com

5-year Limited warranty.

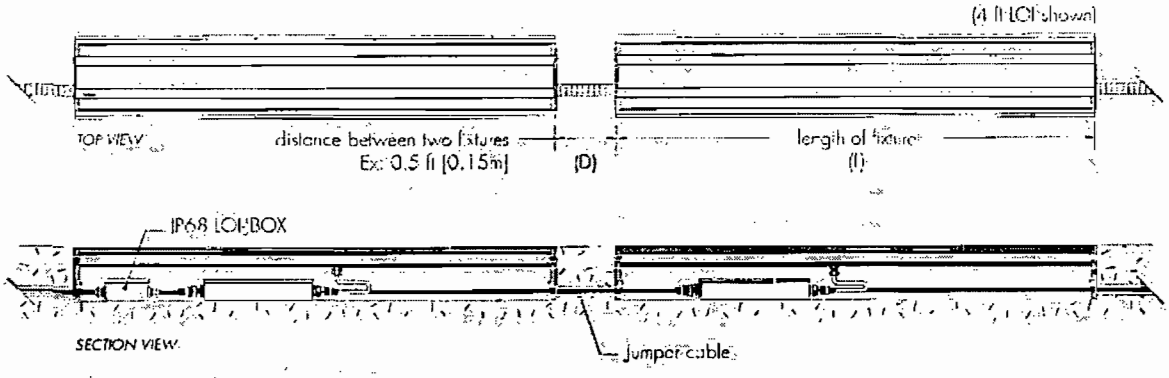
Consult www.lumenpulse.com for our complete Standard Terms and Conditions of Sales

lumenpulse

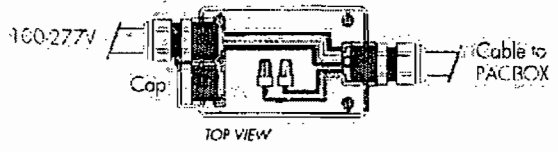
TYPICAL WIRING DIAGRAMS - continued

Non-Dimming or Lumentalk Dimming Version

1% minimum dimming value with Lumentalk dimming



IP68 LOI-JBOX Accessory - Wiring Detail

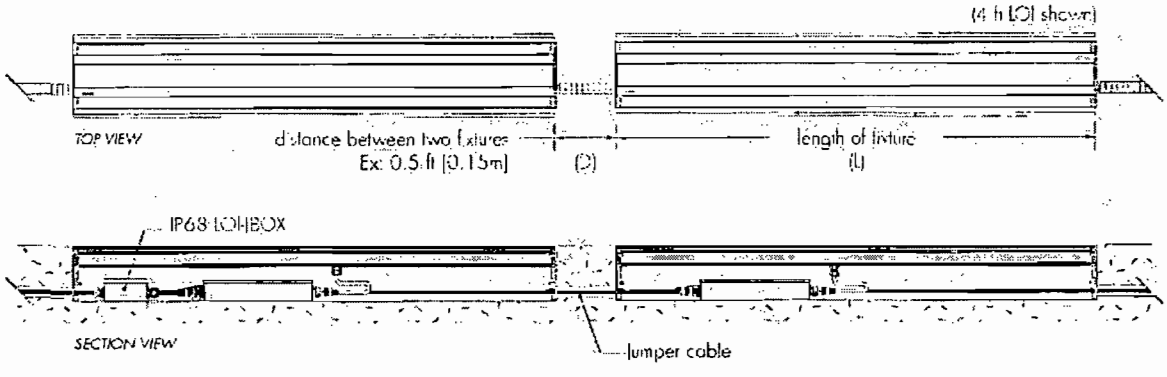


Jumper Cable Length Selection

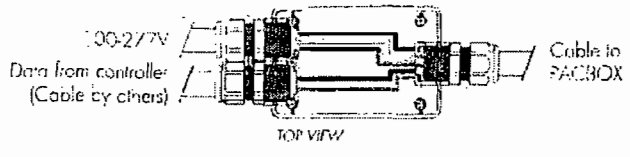
Add the length of one fixture to the distance between two fixtures: L + D.	Ex: L + D = 4.5ft. [1.4m]
Order the next longest jumper cable available: **2', 4' or 10' [0.6m, 1.2m or 3m]**	Therefore 10' [3m] jumper cable required

Dimming Version (0-10V, DALI, EcoSystem®*)

10% minimum dimming value for 0-10V, 1% minimum dimming value for DALI, EcoSystem®



IP68 LOI-JBOX Accessory - Wiring Detail



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Order the next longest jumper cable available: **2', 4' or 10' [0.6m, 1.2m or 3m]**	Therefore 10' [3m] jumper cable required

*Each Lutron® EcoSystem® enabled fixture has its own address; for the example shown above, there are a total of 2 EcoSystem® addresses

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F 514.937.6289
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5-year limited warranty

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Specification Sheet

FIXTURE TYPE SD
SCHULER SHOOK
PROJECT: **RIVERLINE**

lumenfacade™
INGROUND
WHITE & STATIC COLORS

HOW TO ORDER

LOI	Select:	100/277	Select:	Select:	Select:	Select:	Select:	Select:	Select:
	1	2	3	4	5	6	7	8	9

1

Housing:

LOI ASHRAE - Lumenfacade™ Inground, 5W/ft ASHRAE compliant
LOI RO - Lumenfacade™ Inground, Regular Output, 8.5W/ft
LOI HO - Lumenfacade™ Inground, High Output, 15.25W/ft

A Lumenfacade Inground fixture includes 1x optical chamber (LOIC), 1x power and control box (PACBOX) and 1x recessed blockout (RBO). The LOIC, PACBOX and RBO are provided according to the output/color, length and control configuration

2

Voltage:

100/277 - 100-277 volts

3

Length:

12 - 13 1/16 inches (331mm) (2.44 kg/5.38 lbs)
24 - 25 1/16 inches (636mm) (5.23 kg/11.53 lbs)
36 - 37 1/16 inches (941mm) (7.03 kg/15.50 lbs)
48 - 49 1/16 inches (1245mm) (8.84 kg/19.49 lbs)

4

Colors and Color temperatures:

27K - 2700K
30K - 3000K
35K - 3500K
40K - 4000K
RD - Red (8-10 week lead time)
GR - Green (8-10 week lead time)
BL - Blue (8-10 week lead time)

5

Optics:

WW - Asymmetric Wallwash optic
10x10 - 10° x 10° *
10x60 - 10° x 60°
30x60 - 30° x 60°
60x60 - 60° x 60°
* For best results, use with HO fixtures. Contact factory for application support.

6

Tilt Setting:

Note: asymmetric wallwash optic is factory set with a 2.5 degree tilt

TS0 - 0 degrees
TS2.5 - 2.5 degrees
TS5 - 5 degrees
TS20 - 20 degrees
Factory set. Cannot be adjusted in the field. Consider ground level when selecting a tilt setting for your application.

7

Optical Option:

INTL - Internal Louver

8

Control:

NO - No Dimming
LT - Lumentalk Dimming[1]
DIM - 0-10V Dimming[2]
DMX/RDM - DMX/RDM enabled[3]
DALI - DALI Dimming[4]
ES - Lutron® EcoSystem® Enabled Dimming[5]

9

Option:

ASL - Anti-slip lens

Consult installation instructions to plan all aspects of the fixture installation.

Notes:

[1] 1% minimum dimming value [2] 10% minimum dimming value [3] 1% minimum dimming value. Fixtures set to by fixture resolution. 1 DMX address per fixture [4] 1% minimum dimming value. 1 DALI address per fixture [5] 1 EcoSystem address per fixture. 1% minimum dimming value

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F 514 937 6289
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www.lumenpulse.com

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H3K 1G6

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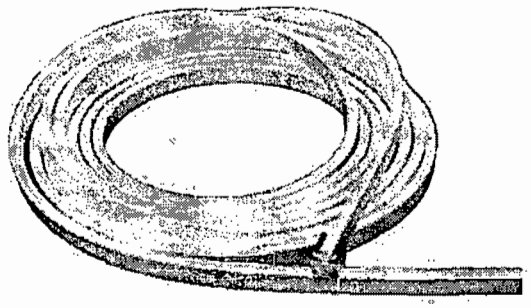
2016.09.23
MS - R12

ACCLAIM LIGHTING

Flex Tube SC

Client:	
Project:	FIXTURE TYPE **SF**
Type	SCHULER SHOOK
Order Code:	PROJECT. **RIVERLINE**
Quantity:	

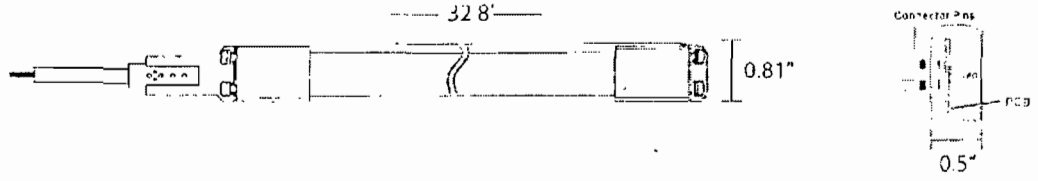


Flex Tube SC is a single color, outdoor rated, flexible LED tube. It features a bend diameter of as little as 5", can be cut to length every 4", and features an IP68, submersible rating, suitable for any exterior application. It is sold in spools of 32' (10m), and is, impact, UV, and saltwater resistant.

SPECIFICATIONS

Color	2700K, 3000K, 3500K, 4000K, Red, Green, Blue
Beam Angle	160°
Max Fixture Runs	32' (10m)
Power Consumption	3.75W Per Foot, 120W per 32' (10m) Spool
Lumens Per Foot	120
Cut & Connect Joints	Located Every 4"
Housing	UV Coated, Flexible PVC Jacket + Silicone Top
Installation Temperature	32°F to 113°F (-0°C to 45°C)
Operating Temperature	-40°F to 131°F (-40°C to 55°C)
Operating Voltage	24VDC
Dimming	via DMX-512, 1 Channel Per Spool / Section
Connectors & Hardware	All Accessories Sold Separately Including First Cables and End Caps, See Page 2
Ingress Protection	IP 68, Wet Location / Submersible Up To 10' (3m)
Impact Resistance	IK 08, Up 5 Joule Impact Energy Protection
Warranty	3 Years
Weight	7.6 lbs (3.5 kg)
Dimensions	W 0.5" x H 0.81" x L 32.8' (12.7 mm x 20.6 mm x 10m)
Certifications	c UL us LISTED CE RoHS

DIMENSIONS



Lumen measurements comply with IES LM-79-08 provided by a recognized, independent testing lab: LM79 Photometry. LM80 source compliance documents, and IES files are available at acclaimlighting.com

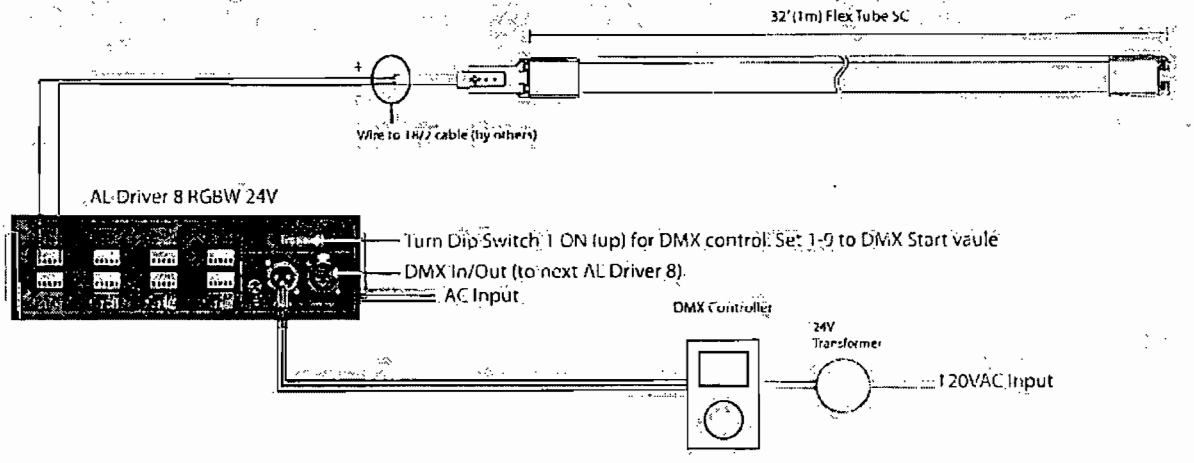
ACCLAIM LIGHTING

Flex Tube SC

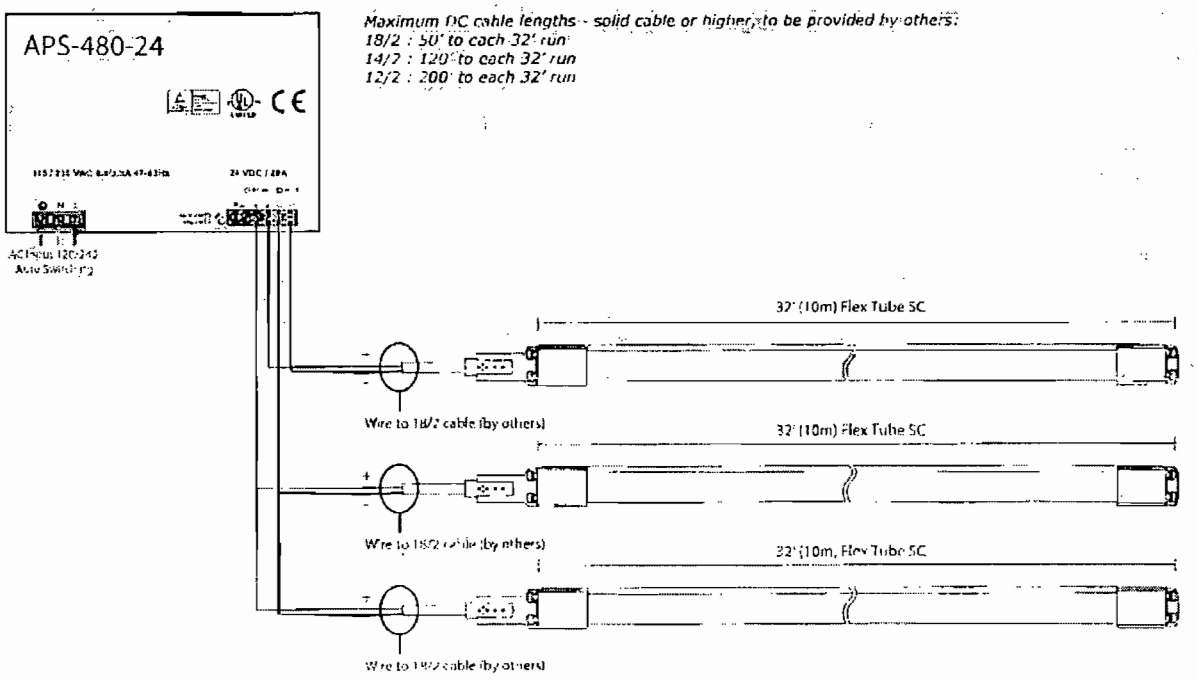
Client:	
Project:	FIXTURE TYPE SF
Type:	SCHULER SHOOK
Order Code:	PROJECT: RIVERLINE
Quantity:	

WIRING (DMX Dimming)

Maximum DC cable lengths - solid cable or higher, to be provided by others:
18/2 : 50' to each 32' run
14/2 : 120' to each 32' run
12/2 : 200' to each 32' run



WIRING (Non-dim)



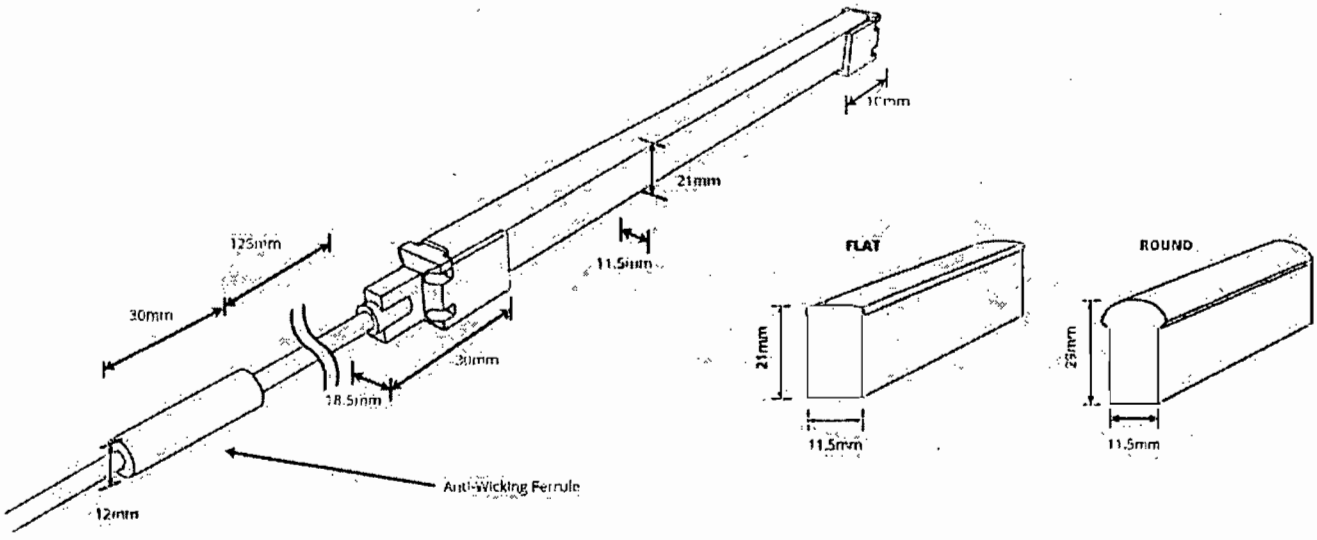
FLEX DC NEON

FIXTURE TYPE **SF**
SCHULER SHOOK
PROJECT: **RIVERLINE**

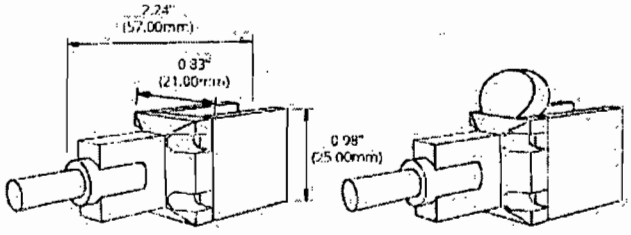
Specification Sheet

DIMENSIONS

• Due to the nature of the FLEXNEON product, specific lengths may not fall exactly on a cutting point. In this case, Optic Arts will always cut to the smaller dimension unless otherwise specified.
• Some on-site assembly required. See installation guides for details.

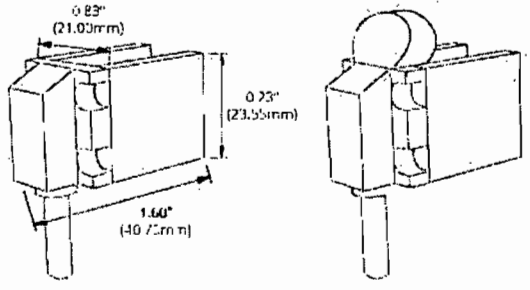


ACCESSORIES



POWER CONNECTOR

PART #	
FLEXNEON.PC.L1	Left connector, 1'
FLEXNEON.PC.L10	Left connector, 10'
FLEXNEON.PC.R1	Right connector, 1'
FLEXNEON.PC.R10	Right connector, 10'
FLEXNEON.PCRGB.L1	Left connector RGB, 1'
FLEXNEON.PCRGB.L10	Left connector RGB, 10'
FLEXNEON.PCRGB.R1	Right connector RGB, 1'
FLEXNEON.PCRGB.R10	Right connector RGB, 10'



REAR POWER CONNECTOR

PART #	
FLEXNEON.PC.L1B	Rear Left connector, 1'
FLEXNEON.PC.L10B	Rear Left connector, 10'
FLEXNEON.PC.R1B	Rear Right connector, 1'
FLEXNEON.PC.R10B	Rear Right connector, 10'
FLEXNEON.PCRGB.L1B	Rear Left connector RGB, 1'
FLEXNEON.PCRGB.L10B	Rear Left connector RGB, 10'
FLEXNEON.PCRGB.R1B	Rear Right connector RGB, 1'
FLEXNEON.PCRGB.R10B	Rear Right connector RGB, 10'

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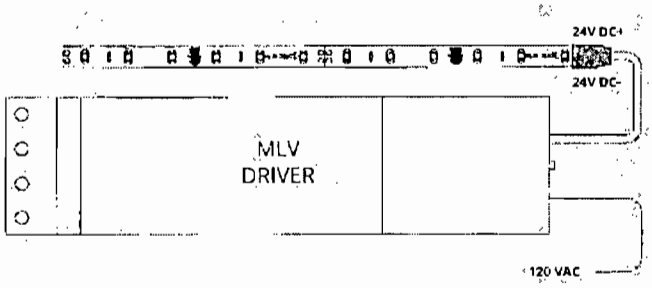
FLEX DC NEON

FIXTURE TYPE SF
SCHULER SHOOK
PROJECT RIVERLINE

Specification Sheet

COMPATIBLE DRIVERS



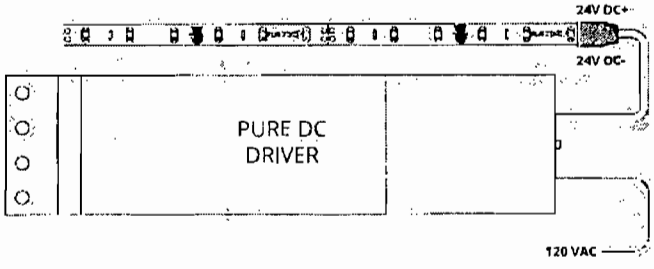
MLV

PART	DESCRIPTION
ML10S24VDC	10W 120VAC DIMMABLE DRIVER
ML20S24VDC	20W 120VAC DIMMABLE DRIVER
ML35S24VDC	35W 120VAC DIMMABLE DRIVER
ML35S24VDC 277	35W 277VAC DIMMABLE DRIVER
ML40S24VDC	40W 120VAC DIMMABLE DRIVER
ML50S24VDC	50W 120VAC DIMMABLE DRIVER
ML50S24VDC 277	50W 277VAC DIMMABLE DRIVER
ML60S24VDC	60W 120VAC DIMMABLE DRIVER
ML75S24VDC	75W 120VAC DIMMABLE DRIVER
ML75S24VDC 277	75W 277VAC DIMMABLE DRIVER
ML96S24VDC	96W 120VAC DIMMABLE DRIVER
ML96S24VDC 277	96W 120VAC DIMMABLE DRIVER
EM2-200S24DC	200W 120VAC DIMMABLE DRIVER
EM3-300S24DC	300W 120VAC DIMMABLE DRIVER

DIMENSIONS	
10W-50W	H 2.11"; W 7.36"; D 1.00"
60W-96W	H 3.93"; W 8.13"; D 1.50"
200-300W	H 5.69"; W 10.29"; D 3.13"

DIMMING PERFORMANCE	
MLV DRIVER	0 ms to 20% on most MLV dimmers

NOTE: Must be loaded between 25%-100% of rated load to maintain FLEX DC warranty

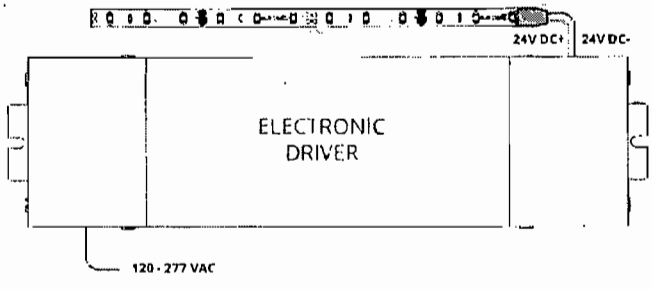


PURE DC MLV

PART	DESCRIPTION
481-24DCR	48W 120VAC JUSTIN MLV DIMMABLE DRIVER
481-24DCR-277	48W 277VAC JUSTIN MLV DIMMABLE DRIVER
961-24DCR	96W 120VAC JUSTIN MLV DIMMABLE DRIVER
961-24DCR-277	96W 277VAC JUSTIN MLV DIMMABLE DRIVER

DIMENSIONS	
48W/96W	H 3.87"; W 11.25"; D 3.25"

DIMMING PERFORMANCE	
PURE DC DRIVER	Dims to 0.1% on most MLV dimmers



ELECTRONIC DRIVER - NON-DIM

PART	DESCRIPTION
GG100E-24-UNV	ELECTRONIC DRIVER

DIMENSIONS	
48W/96W	H 3.00"; W 11.46"; D 1.40"

DIMMING PERFORMANCE	
PURE DC DRIVER	NON-DIM

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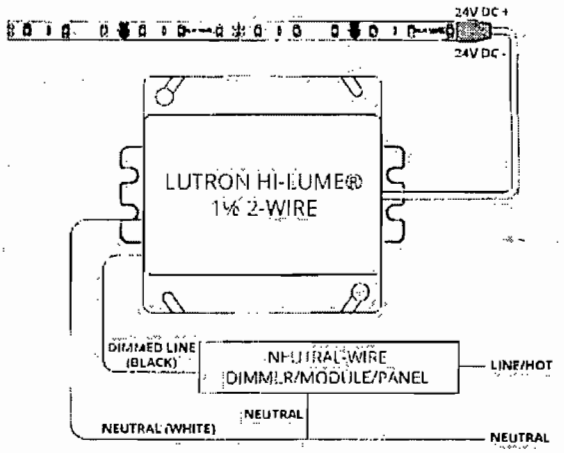
FLEX DC NEON

FIXTURE TYPE **SF**
SCHULER SHOOK
PROJECT: **RIVERLINE**

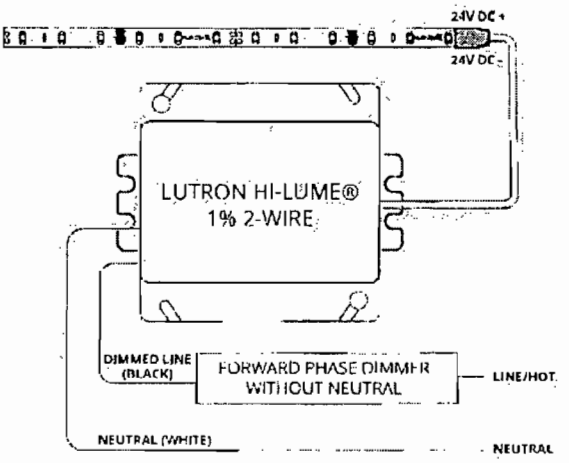
Specification Sheet

COMPATIBLE DRIVERS

DIMMER WITH NEUTRAL



DIMMER WITHOUT NEUTRAL



LUTRON HI-LUME® 1% 2-WIRE:
2-WIRE CONTROL FORWARD PHASE

LUTRON
Optic Arts is a Lutron OEM Advantage Partner

PART	DESCRIPTION
LTEA4U1UKL-CV240	5-40W, 120VAC, 2 WIRE FORWARD PHASE DIMMER

DIMENSIONS	
HI-LUME® 1% 2-WIRE	H 4.03", W 4.85", D 2.63"

DIMMING PERFORMANCE	
LUTRON HI-LUME® 1% 2-WIRE	0 nits to 1% with compatible Lutron controls

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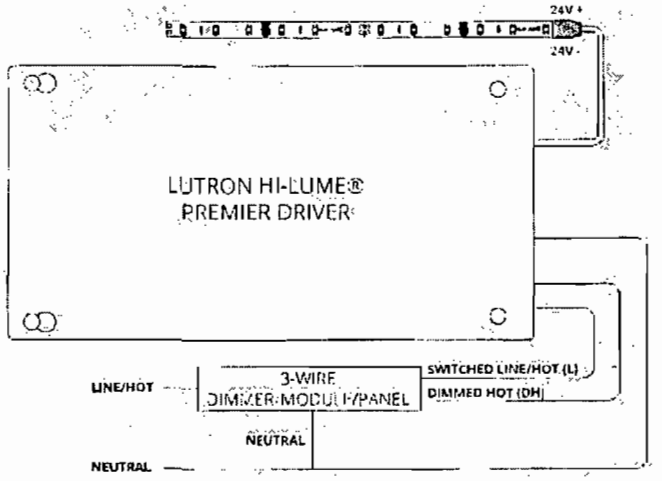
FLEX DC NEON

FIXTURE TYPE **SF**
SCHULER SHOOK
PROJECT: **RIVERLINE**

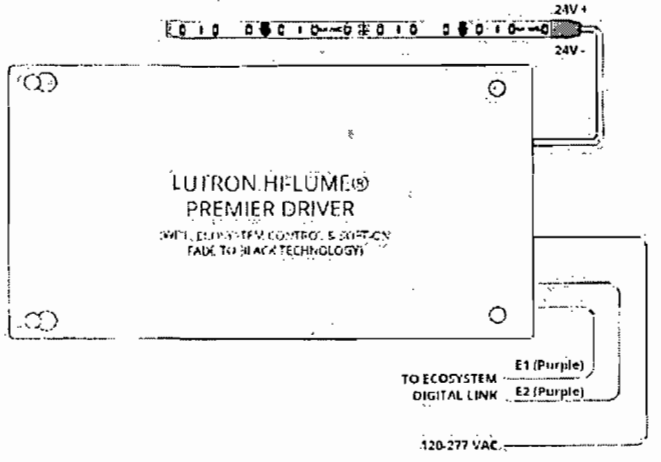
Specification Sheet

COMPATIBLE DRIVERS

3-WIRE



ECOSYSTEM



LUTRON HI-LUME® PREMIER:

3-WIRE/ECOSYSTEM

Optic Arts is a Lutron OEM Advantage Partner

PART	DESCRIPTION
L3D0-96W24V-U	25-96W, 120-277VAC, 3-WIRE/ECOSYSTEM DRIVER

DIMENSIONS	
HI-LUME® PREMIER	H 5.5"; W 0.5"; D 2.0"

DIMMING PERFORMANCE	
LUTRON HI-LUME® PREMIER	Dims to 0.1% with compatible Lutron controls

NOTE: Lutron soft-on, fade to black technology available with Ecosystem digital control only.

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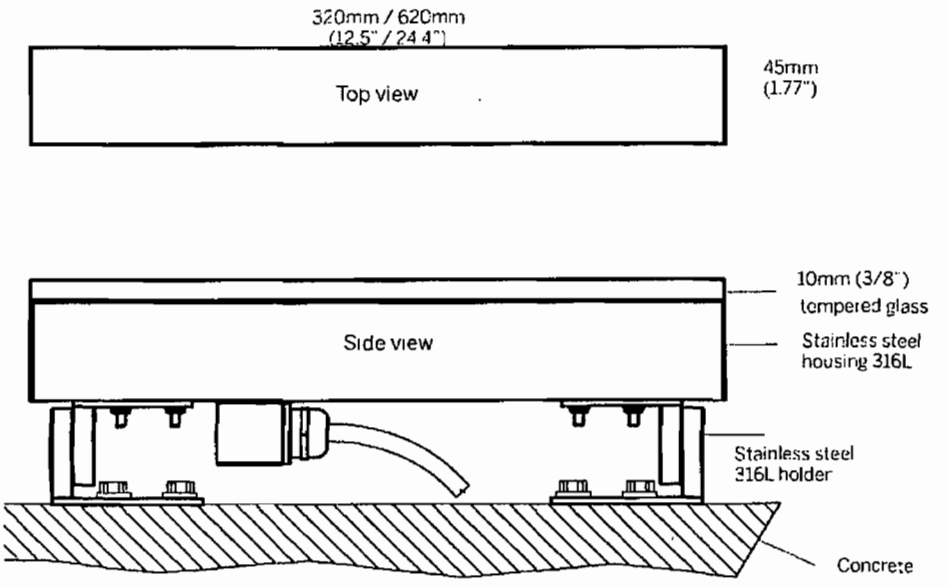
FIXTURE TYPE **SG**
SCHULER SHOOK
PROJECT: **RIVERLINE**

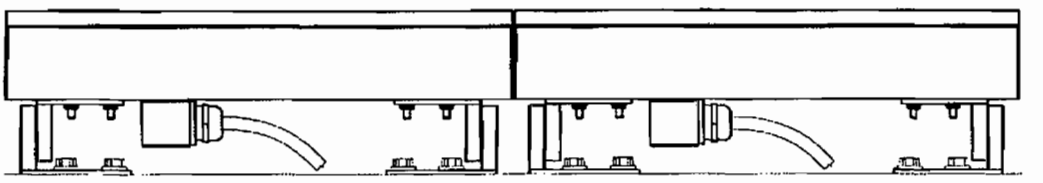
Arpool Linear *Surface*
Dimensions

FILIX

Housing



Continuous line of light



ACCLAIM LIGHTING

Flex Tube SC

Client:	
Project:	FIXTURE TYPE **SH**
Type:	SCHULER SHOOK
Order Code:	PROJECT: **RIVERLINE**
Quantity	

ORDER CODES (*Special Order Item)

FTB - 12 _ - AA_ N

All Accessories Sold Separately Including First Cables and End Caps, See Below

A - 2700K*
B - 3000K
D - 3500K*
E - 4000K
N - Red*
P - Green*
Q - Blue

3 - Flex Tube SC 32.8' Spool (10m)
4* - Flex Tube SC Injection Molded Side Mount Cable 32.8' Spool (10m)
5* - Flex Tube SC Injection Molded Rear Mount Cable 32.8' Spool (10m)

RELATED COMPONENTS

APS-480-24	Non-Dim 24VDC 480W 120/240V UL Din Rail Power Supply, Maximum Load - 3 x 10m Runs
APS-240-24	Non-Dim 24VDC 240W 120/240V UL Din Rail Power Supply, Maximum Load - 1 x 10m Run
DPW-111-FA	**AL Driver 8 RGBW 24V** - 24V Power + DMX Driver, 120VAC or 240VAC Input / 1 Spool Maximum
AL-150-24	Dry Location 24VDC 150W Transformer, 120 or 240VAC Input / 1 Spool Maximum for Non-Dim Use
CLG-150-24	Wet Location 24VDC 150W Transformer, 120V-277VAC Input / 1 Spool Maximum for Non-Dim Use
FTUBESCFC	**Flex Tube SC First Cable Kit (FTB Only)** - IP68, 300mm (12"), Includes Gasket + Screws
FTUBESCLC	**Flex Tube SC Link Cable (FTB Only)** - IP68, 300mm (12"), Includes Gasket + Screws
FTUBESCMC	**Flex Tube SC Seamless Mid Connector (FTB Only)**
FTUBEEC	**Flex Tube End Cap Kit** - IP68, Includes Gasket + Screws
FTUBELCH1M	**Flex Tube Self Lock Mounting Channel 1m (3.28')** - Aluminum, Includes 3 Clasps + 4 Screws
FTUBELCH5CM	**Flex Tube Self Lock Mounting Channel 5cm (2")** - Aluminum, Includes 1 Clasp + 1 Screw
FTTK2	**Flex Tube Install Tool Kit** - Includes Cutter, Insert Assist, and Carrying Case

FLEX DC NEON

FIXTURE TYPE **SH**
SCHULER SHOOK
PROJECT: **RIVERLINE**

Specification Sheet

FLEX NEON is a high performance flexible LED fixture designed as a neon replacement but useful in a wide variety of applications where a smooth surface of light is desired.

- Offered standard in 2700k, 3000k, 3500k, 4000k, and RGB. 4 Solid colors available as special order.
- Flex Neon is dimmable via 0-10v, MLV, or DMX.
- Flex Neon is IP67 rated.
- Available in flat or round lens cover

ELECTRICAL

Input Voltage	24VDC
Dimming Options	DMX 0-10V MLV
Power Consumption	4 Watts / ft: RGB, White, Green, Blue 2 Watts / ft: Red, Yellow, & Amber
Wire Size	18AWG, 2 wire (while still a solid color) 20AWG, 4 wire (RGB)
Certification	UL

PHYSICAL

Field Cuttable	Every 4" (Every 6.5": Red, Amber, & Yellow)
Bend Radius	2.34"
Operating Temperature	-40° C (-40°F) to +70°C (+158°F)
Environment	IP67
Maximum Run Length	23'
Dimensions (WxH)	Flat: 0.45" (11.50mm) x 0.83" (21.00mm) Round: 0.45" (11.50mm) x 1.14" (29.00mm)

OPTIONS

Mounting	Mounting Clips Self Locking Mounting Clips Mounting Channel Self Locking Mounting Channel

LUMEN OUTPUT

Flat	2400k: 91 lm/ft 2700k-4000k: 97 lm/ft
Round	2400k: 103 lm/ft 2700k-4000k: 115 lm/ft

PERFORMANCE

Color Temperature	2400k, 2700k, 3000k, 3500k, 4000k RGB
Lumen Maintenance	50,000 Hours
Binning Tolerance	+/- 150k
Warranty	3 years

PART NUMBER BUILDER

SERIES	COLOR		SHAPE	LENGTH
FLEXNEON	2400 = 2400k	4000 = 4000k	F = Flat	XX = Custom Length
	2700 = 2700k	RGB	R = Round	
	3000 = 3000k	*Solid colors by special order		
	3500 = 3500k			

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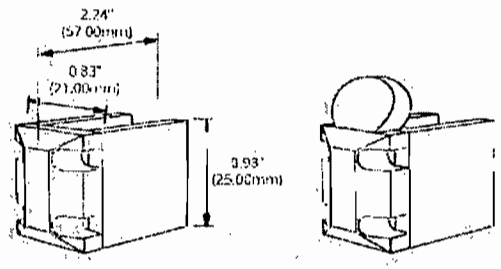
FLEX DC NEON

FIXTURE TYPE SH
SCHULER SHOOK
PROJECT. RIVERLINE

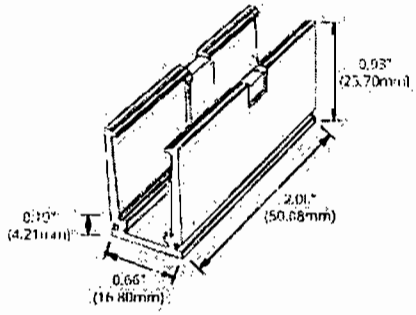
Specification Sheet

ACCESSORIES



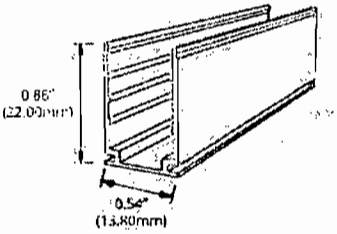
END CAP

PART #	
FLEXNEON.CAP	End Cap



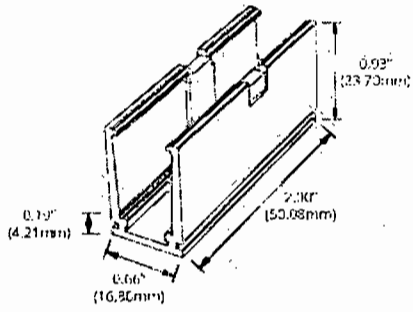
SELF-LOCKING ALUMINUM CHANNEL

PART #	
FLEXNEON.CH.1MSL	1 meter self-locking channel
FLEXNEON.CH.2MSL	2 meter self-locking channel



ALUMINUM CHANNEL

PART #	
FLEXNEON.CH.1M	1 meter channel
FLEXNEON.CH.2M	2 meter channel



SELF-LOCKING MOUNTING CLIP

PART #	
FLEXNEON.MC2.SL	Self-locking mounting clip

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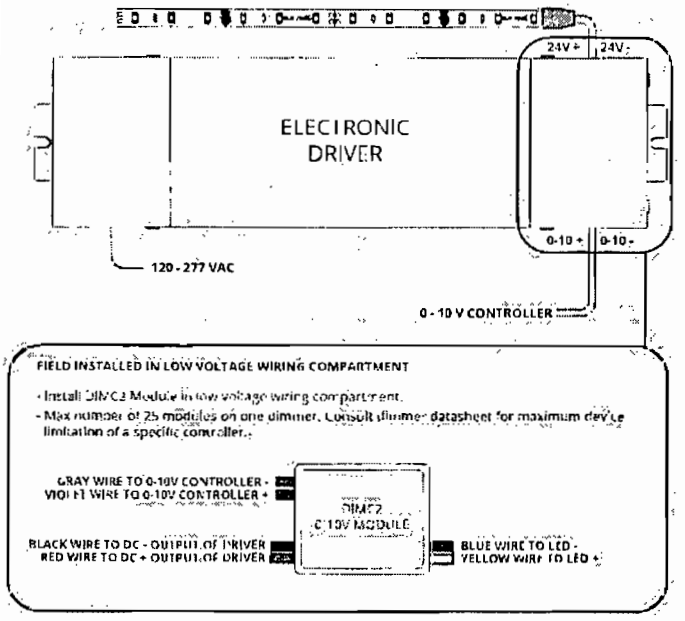
FLEX DC NEON

FIXTURE TYPE SH
SCHULER SHOOK
PROJECT: RIVERLINE

Specification Sheet

COMPATIBLE DRIVERS

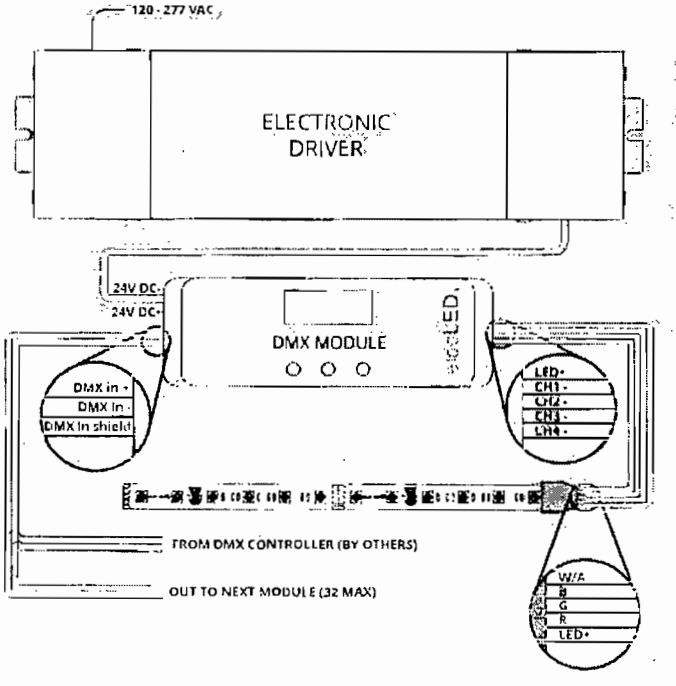


ELECTRONIC DRIVER W/0-10V MODULE

PART	DESCRIPTION
GG100E-24-UNV-010V	96W 120-277VAC ELECTRONIC DRIVER WITH 0-10V DIMMING MODULE (DMX)

DIMENSIONS	
96W	H 3.00"; W 11.46"; D 1.30"

DIMMING PERFORMANCE	
ELECTRONIC DRIVER - 0-10V	Dims to 10% on most 0-10V dimmers



ELECTRONIC DRIVER W/DMX MODULE

PART	DESCRIPTION
GG100E-24-UNV-DMX	96W 120-277VAC ELECTRONIC DRIVER WITH 4-ch LED DMX DIMMING MODULE

DIMENSIONS	
96W	H 3.00"; W 11.46"; D 1.30"
DMX MODULE	H 1.07"; W 6.02"; D 0.91"

*Must be installed in UL box (by others)

DIMMING PERFORMANCE	
ELECTRONIC DRIVER - DMX MODULE	Dims to 0.1% on most DMX systems

optic arts

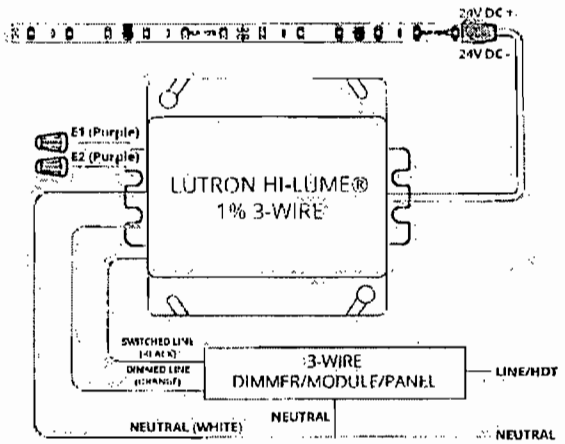
FLEX DC NEON

FIXTURE TYPE **SH**
SCHULER SHOOK
PROJECT: **RIVERLINE**

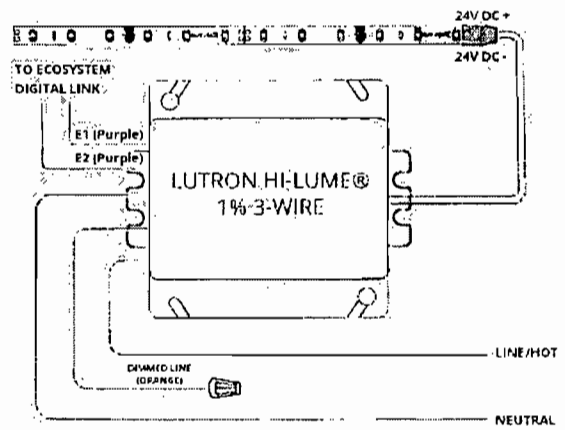
Specification Sheet

COMPATIBLE DRIVERS

3-WIRE



ECOSYSTEM



LUTRON HI-LUME® 1%:
3-WIRE/ECOSYSTEM

Optic Arts is a Lutron OEM Advantage Partner

PART	DESCRIPTION
L3DA4U1UXL-CV240	5.40W, 120-277VAC, 3-WIRE/ECOSYSTEM DRIVER
DIMENSIONS	
HI-LUME® 1%	H 4.00", W 4.89", D 1.32"
DIMMING PERFORMANCE	
LUTRON HI-LUME® 1% 3-WIRE/ECOSYSTEM	Dims to 1% with compatible Lutron controls

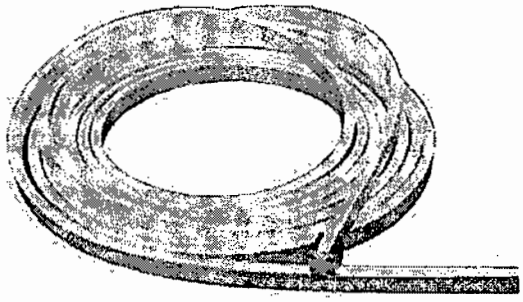
1130 Monterey Pass Rd, Monterey Park, CA 91754
213.250.6059 | info@opticarts.com | **www.opticarts.com**

optic arts

ACCLAIM LIGHTING

Flex Tube SC

Client:	
Project:	FIXTURE TYPE SJ
Type:	SCHULER SHOOK
Order Code:	PROJECT RIVERLINE
Quantity:	

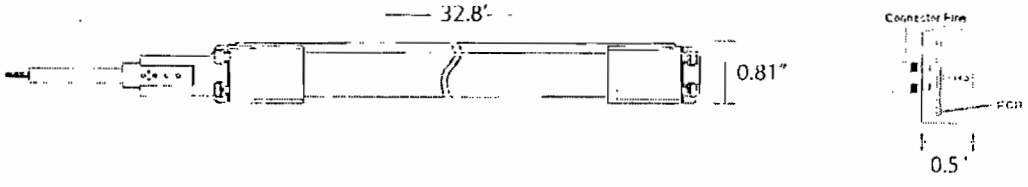


Flex Tube SC is a single color, outdoor rated, flexible LED tube. It features a bend diameter of as little as 5", can be cut to length every 4", and features an IP68, submersible rating, suitable for any exterior application. It is sold in spools of 32' (10m), and is, impact, UV, and saltwater resistant.

SPECIFICATIONS

Color	2700K, 3000K, 3500K, 4000K, Red, Green, Blue
Beam Angle	160°
Max Fixture Runs	32' (10m)
Power Consumption	3.75W Per Foot, 120W per 32' (10m) Spool
Lumens Per Foot	120
Cut & Connect Joints	Located Every 4"
Housing	UV Coated, Flexible PVC Jacket + Silicone Top
Installation Temperature	32°F to 113°F (-0°C to 45°C)
Operating Temperature	-40°F to 131°F (-40°C to 55°C)
Operating Voltage	24VDC
Dimming	via DMX-512, 1 Channel Per Spool / Section
Connectors & Hardware	All Accessories Sold Separately Including First Cables and End Caps, See Page 2
Ingress Protection	IP 68, Wet Location / Submersible Up To 10' (3m)
Impact Resistance	IK 08, Up 5 Joule Impact Energy Protection
Warranty	3 Years
Weight	7.6 lbs (3.5 kg)
Dimensions	W 0.5" x H 0.81" x L 32.8' (12.7 mm x 20.6 mm x 10m)
Certifications	c UL us LISTED CE RoHS

DIMENSIONS



Lumen measurements comply with IES LM-79-08 provided by a recognized, independent testing lab. LM79 Photometry, LM80 source compliance documents, and IES files are available at acclaimlighting.com

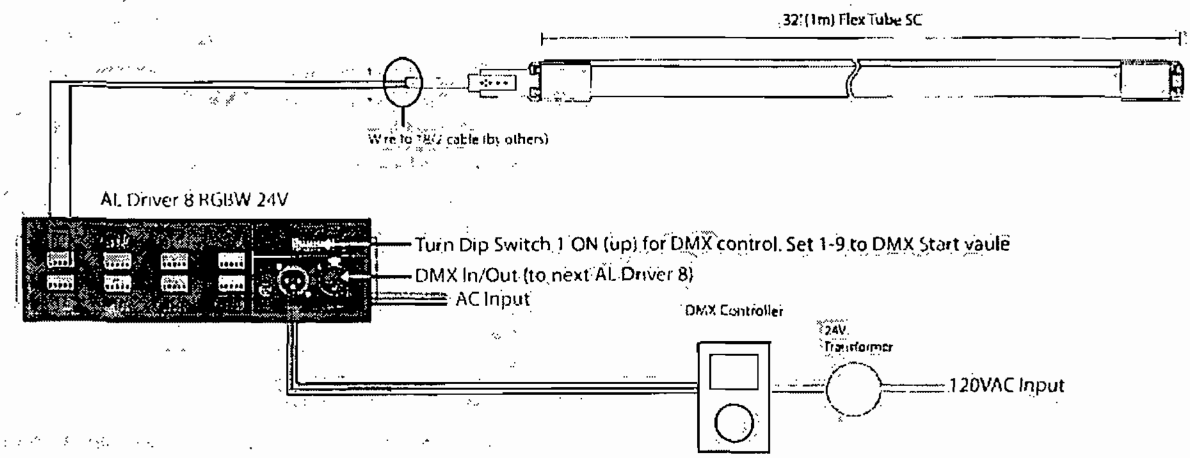
ACCLAIM LIGHTING

Flex Tube SC

Client:	
Project:	FIXTURE TYPE **SJ**
Type:	SCHULER SHOOK
Order Code	PROJECT: **RIVERLINE**
Quantity:	

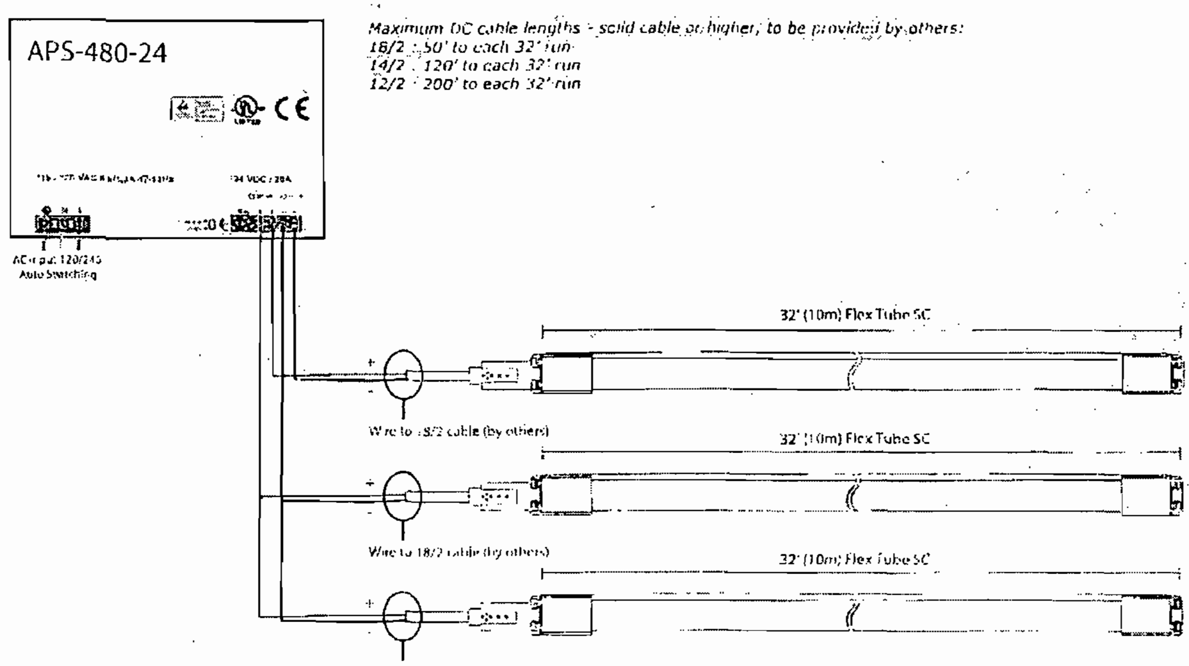
WIRING (DMX Dimming)

Maximum DC cable lengths - solid cable or higher, to be provided by others:
18/2 : 50' to each 32' run
14/2 : 120' to each 32' run
12/2 : 200' to each 32' run



WIRING (Non-dim)

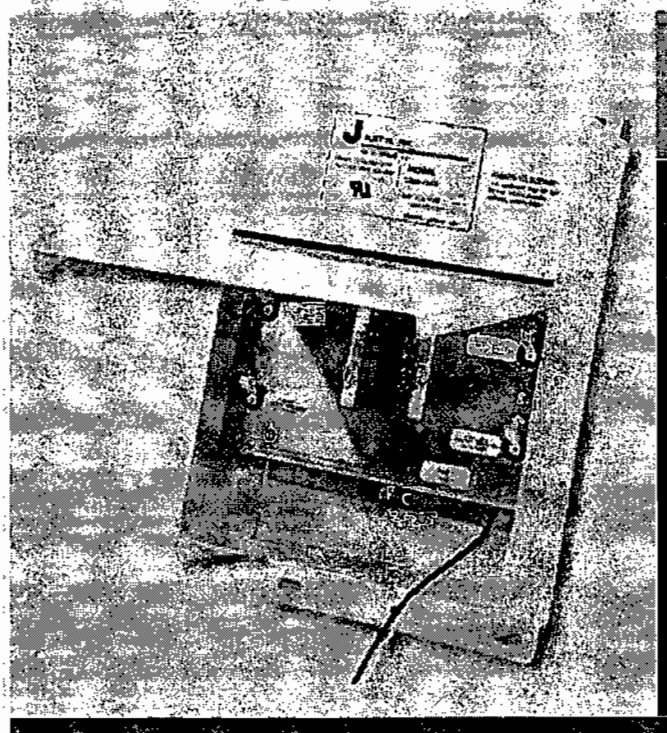
Maximum DC cable lengths - solid cable or higher, to be provided by others:
18/2 : 50' to each 32' run
14/2 : 120' to each 32' run
12/2 : 200' to each 32' run



FIXTURE TYPE **SK**
SCHULER SHOOK
PROJECT: **RIVERLINE**

CLASS 2 DC POWER SUPPLIES

UL LISTED CLASS 2 POWER **SOURCE**



36 THROUGH 300 WATT MODELS
12 AND 24 VOLT DC Output

- Indoor/Outdoor Enclosure Conduit Ready
- Magnetic Dimmer Ready Input / Dimmable
- Manual Reset Overload Protection
- Made in USA
- Multiple Inputs 120, 240, 277V, 50/60Hz
- UL Listed / UL Recognized
- Reliable Power Source for LED Lighting Applications
- CSA Approved

JUSTIN, INC.

ELECTRONIC PRODUCTS DIVISION
2663 No. Lee Avenue
South El Monte, CA 91733
626 444-4516 • Fax 626 444-9462
www.justininc.com

FIXTURE TYPE **SK**
SCHULER SHOOK
PROJECT: **RIVERLINE**

JUSTIN, INC.

FIXTURE TYPE **SK**
SCHULER SHOOK
PROJECT: **RIVERLINE**

JUSTIN POWER SUPPLIES AND TRANSFORMERS

INPUT DIMMING AND LIGHTING LOAD NOTES

Justin power supplies and transformers have been factory tested for use with various **120VAC dimmers specifically designed for only magnetic or inductive loads.**

PLEASE NOTE: Input dimming of Justin power supplies may drop voltage delivered to the lighting load below 10% of rated power supply output, depending on what model dimmer is used.

Justin power supplies and transformers are compatible with some **Lutron and Leviton low voltage dimmers for magnetic or inductive loads.** However, we strongly recommend testing in the specific end application to confirm system operation within the rated limitations of all components. In addition, use of programmable multiple station dimming systems for control of Justin power supplies and transformers has not been evaluated and is not recommended without thorough testing in the end application.

Justin, Inc. will not qualify any dimming product for use with our lighting equipment. It remains the sole responsibility of the re-seller and/or installer to determine compatibility, including all input and output connected devices.

NEVER CONNECT ANY DIMMER NOT DESIGNED FOR INDUCTIVE LOADS. DAMAGE TO THE DIMMER AND/OR THE POWER UNIT WILL RESULT, AND THE POWER UNIT WARRANTY WILL BE VOIDED.

Please contact Justin technical support for further information (800) 989-4517.

supply voltage **tensione di alimentazione (V)**	24Vdc
dimmable	not dimmable
dimmerabile	non dimmerabile
insulation class **classe di isolamento**	⧈

dimmable	. not dimmable
dimmerabile	. non dimmerabile
insulation class **classe di isolamento**	

AKRO 1.2

FIXTURE TYPE **SL1, SL2**
SCHULER SHOOK
PROJECT: **RIVERLINE**

Optical ranges: 13°—32°, 16°—42°

System of internal optics

Zoom lens to manually adjust beam

Wide range of filters (dichroic, elliptical, diffusion)

Body with three sets of graduations to ensure precise positioning of the light beam

IP66

Suitable for outdoor applications

Protective Impedance Device

AKRO 1.2

Nom. power consumption	43W
Power supply	120vAC
Power supply unit	integral
Dimming	0-10v, DALI

IP66 IK06

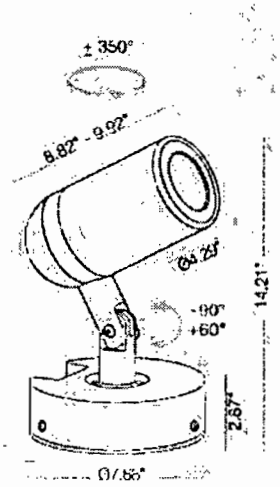
43W - 120vAC - CRI 80 - DALI + 1-10V + PUSH

☐ **AK12100** ▨ ▩ **ND** Black

43W - 120vAC - CRI 90 - DALI + 1-10V + PUSH

☐ **AK12101** ▨ ▩ **ND** Black

LED color	Optics
F - 2700K	**R1** - 13°—32°
5 - 3000K	**R2** - 16°—42°
9 - 4000K	



Job Name:

Fixture Type:

Last Modified 10.27.2016

Rated IP66

designplan

sales@designplan.com
www.designplan.com

79 Trenton Ave
Frenchtown. NJ 08825

Tel: 908-996-7710
Fax: 908-996-7042

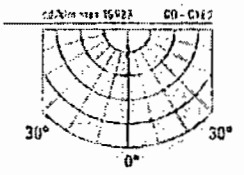
PHOTOMETRIC DATA

FIXTURE TYPE **SL1, SL2**
SCHULER SHOOK
PROJECT: **RIVERLINE**

AKRO
Photometric data

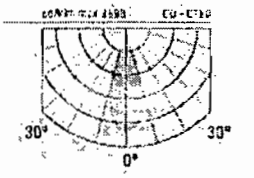
R1 - 13° (13°–32°)

H (ft)	Ø (ft)	
19.7	4.49	36
39.4	8.99	9
59.1	13.5	4
78.7	18.0	2
98.4	22.5	1



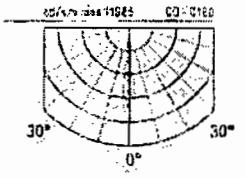
R1 - 32° (13°–32°)

H (ft)	Ø (ft)	
19.7	11.6	7
39.4	23.1	2
59.1	34.7	1
78.7	46.3	0.5
98.4	57.8	0.3



R2 - 16° (16°–42°)

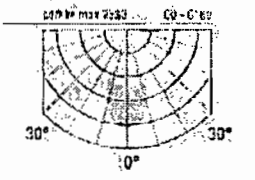
H (ft)	Ø (ft)	
19.7	5.48	37
39.4	10.9	9
59.1	16.4	4
78.7	21.3	2
98.4	27.3	1



CRI 80

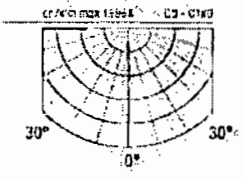
R2 - 42° (16°–42°)

H (ft)	Ø (ft)	
19.7	15.2	7
39.4	30.4	2
59.1	45.6	1
78.7	60.8	0.5
98.4	76.0	0.3



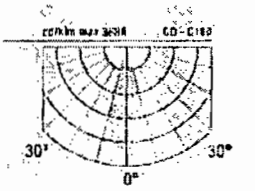
R1 - 13° (13°–32°)

H (ft)	Ø (ft)	
19.7	4.49	27
39.4	8.99	7
59.1	13.5	3
78.7	18.0	2
98.4	22.5	1



R1 - 32° (13°–32°)

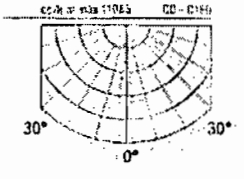
H (ft)	Ø (ft)	
19.7	11.6	5
39.4	23.1	1
59.1	34.7	0.6
78.7	46.3	0.4
98.4	57.8	0.2



CRI 90

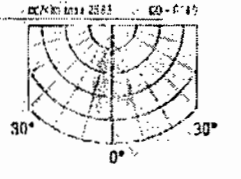
R2 - 16° (16°–42°)

H (ft)	Ø (ft)	
19.7	5.48	28
39.4	10.9	7
59.1	16.4	3
78.7	21.3	2
98.4	27.3	1



R2 - 42° (16°–42°)

H (ft)	Ø (ft)	
19.7	15.2	8
39.4	30.4	1
59.1	45.6	0.7
78.7	60.8	0.4
98.4	76.0	0.2



Job Name: _____ Fixture Type: _____ Last Modified 10.27.2016

ETL Rated IP66
Intertek

designplan

sales@designplan.com
www.designplan.com

79 Trenton Ave
Frenchtown, NJ 08825

Tel: 908-996-7710
Fax: 908-996-7042

DIFFUSION PHOTOMETRICS

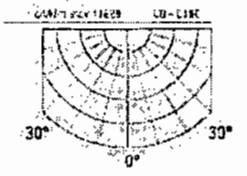
FIXTURE TYPE **SL1, SL2**
SCHULER SHOOK
PROJECT: **RIVERLINE**

AKRO Diffusion filter

Photometric data

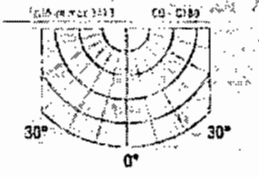
R1 + Diffusion filter 16° (16°—33°)

H (ft)	Ø (ft)	
19.7	5.51	20
39.4	11.1	5
59.1	16.6	2
78.7	22.1	1
98.4	27.6	0.9



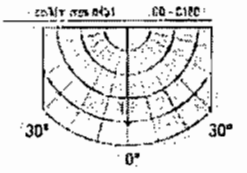
R1 + Diffusion filter 33° (16°—33°)

H (ft)	Ø (ft)	
19.7	11.6	6
39.4	23.2	1
59.1	34.8	0.7
78.7	46.4	0.4
98.4	57.9	0.2



R2 + Diffusion filter 19° (19°—42°)

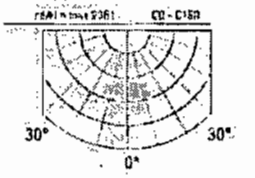
H (ft)	Ø (ft)	
19.7	6.66	22
39.4	13.3	6
59.1	20.0	3
78.7	26.6	1
98.4	33.3	1



CRI 80

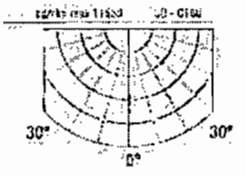
R2 + Diffusion filter 42° (19°—42°)

H (ft)	Ø (ft)	
19.7	14.5	6
39.4	29.1	2
59.1	43.6	0.7
78.7	58.2	0.4
98.4	72.7	0.3



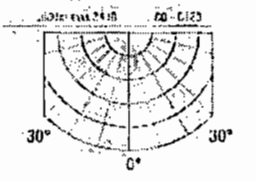
R1 + Diffusion filter 16° (16°—33°)

H (ft)	Ø (ft)	
19.7	5.51	16
39.4	11.1	4
59.1	16.6	2
78.7	22.1	1
98.4	27.6	0.7



R1 + Diffusion filter 33° (16°—33°)

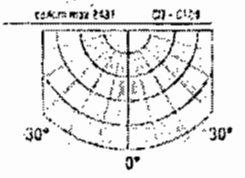
H (ft)	Ø (ft)	
19.7	11.6	5
39.4	23.2	1
59.1	34.8	0.6
78.7	46.4	0.3
98.4	57.9	0.1



CRI 90

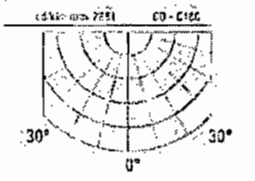
R2 + Diffusion filter 19° (19°—42°)

H (ft)	Ø (ft)	
19.7	6.66	18
39.4	13.3	4
59.1	20.0	2
78.7	26.6	1
98.4	33.3	0.8



R2 + Diffusion filter 42° (19°—42°)

H (ft)	Ø (ft)	
19.7	14.5	5
39.4	29.1	1
59.1	43.6	0.6
78.7	58.2	0.3
98.4	72.7	0.2



Filter positioning: structured side towards the source.

Job Name: | Fixture Type: | Last Modified: 10.27.2016

ETL Rated IP66 Intertek

designplan

sales@designplan.com
www.designplan.com

79 Trenton Ave
Frenchtown, NJ 08825

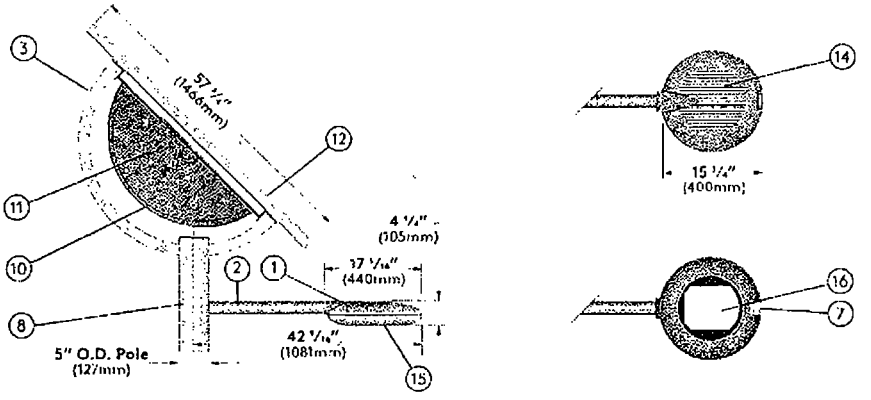
Tel. 908-996-7710
Fax. 908-996-7042

Discera 4 LED Solar

FIXTURE TYPE **SM**
SCHULER SHOOK
PROJECT: **RIVERLINE**

selux

DSCLS



Specifications

1. Luminaire Housing - High pressure die-cast low-copper aluminum housing (IP66).

2. Mounting Arm - Welded steel with powder coat finish.

3. Panel Support Frame - Steel frame supports solar panels and storage batteries. Integrated pole fitter allows orientation independent of luminaire.

4. Gasketing - (not shown) Silicone gasketing provides seal at door and glass opening

5. Optics - (not shown) Individual precision injection molded lenses consisting of total internal reflection (TIR) collimator and one of 3 precision light shaping lenses. Lenses produce a type I,II,III, or V distrubution. Luminaire is IDA-approved™ Dark sky friendly.

6. Light Engine - (not shown) 30 High Flux LEDs driven by high efficiency DC-DC programmable driver. LED light engine provides lumen maintenance of 98% at 60,000 hours. Complete light engine can be easily interchanged via plug-in terminal connectors. Excellent for cold weather starting, instant on, and dimming.

7. Access Latch - One hand operated flush latch releases lower section of luminaire housing with integral die cast hinges for easy access to light engine

8. Pole fitter - Fitter for upper assembly and luminaire secured with six stainless steel, Allen head set screws. Fitters are designed to fit 5" (127mm) poles or tenons.

9. Smart Controller - (not shown) Monitors and regulates charging and discharging of batteries Programmable to control hours of operation (in relation to dusk and dawn). Maximum power-point tracking (MPT) increases power production by up to 30%. Run Time Extension (RTE) automatically dims luminaire to avoid outages in extreme weather conditions if needed. Limited warranty by controller manufacturer for 5 years. Surge protection built in.

10. Battery Covers - Battery compartment is enclosed with molded recycled ABS with integrated UV protective outer shell. Covers are removable and lock in place.

11. Batteries - (1-2) 12 Volt 118, 146, 176 Amp Hour maintenance free, non-spillable, sealed absorbed glass matt (AGM) batteries. Battery Capacity is rated at a C-100 discharge rate. Batteries are mounted to hinged tray for easy access.

12. Solar Panels - Poly-crystalline photovoltaic modules, in (1-2) 120W or (1-2) 150W panels. Panel wattages are nominal. Panels are UL listed.

13. Motion Sensor - (not shown) 90° or 180° coverage, DC exterior type sensor mounted to pole fitter. See page 6

14. Heat Sink Fins - Fins add significant surface area for maximized thermal cooling.

15. Access Door - Lower casting features tempered glass lens and a stainless steel hinge that attaches to upper casting and is secured with a tool-less latch for ease of maintenance.

16. Lens - Tempered and screened glass lens protects and helps seal optical chamber

Exterior Luminaire Finish -
Selux utilizes a high quality Polyester Powder Coating. All Selux luminaires and poles are finished in our Tiger Drylac certified facility and undergo a five stage intensive pretreatment process where product is thoroughly cleaned, phosphated and sealed. Selux powder coated products provide excellent salt and humidity resistance as well as ultra violet resistance for color retention. All products are tested in accordance with test specifications for coatings from ASTM and FCI.

Standard exterior colors are White (WH), Black (BK), Bronze (BZ), and Silver (SV). Selux premium colors (SP) are available, please specify from your Selux color selection guide. Hot Dip Galvanized finish (GV) on all steel parts also available.

5 Year Limited LED Luminaire Warranty -
Selux offers a 5 Year Limited Warranty to the original purchaser that the Discera 4 LED Solar luminaire shall be free from defects in material and workmanship for up to five (5) years from date of shipment. This limited warranty covers the LED driver and LED array when installed and operated according to Selux instructions. Fixture suitable for ambient temperature of 40° C (104° F).

Solar Components Warranty -
PV Panels - 20 year performance warranty
Controller - 5 years
Batteries - 5 years (prorated)
For details and exclusions, see "Selux Terms and Condition of Sale."

Listings and Ratings: Tested to IESNA LM-79-08 and LM-80 test standards.

Visit selux.us for our LED End of Life recycling policy.

LED Information

	Light Engine			L65	L50	L35	L25	L17
Discera 4 LED Solar	Total Luminaire Power Consumption (W)			65.1	49.8	35.0	24.9	16.6
	Lumen Output (lm)	3500K (CCT)	R1 - Type I	4,795	3,671	2,575	1,836	1,219
			R2 - Type II	4,765	3,649	2,560	1,824	1,212
			R3 - Type III	4,612	3,531	2,477	1,766	1,173
			R5 - Type V	5,307	4,064	2,851	2,032	1,349
		5000K (CCT)	R1 - Type I	5,641	4,319	3,030	2,160	1,434
			R2 - Type II	5,606	4,293	3,011	2,146	1,426
			R3 - Type III	5,426	4,155	2,914	2,077	1,380
			R5 - Type V	6,243	4,781	3,354	2,390	1,588

Conversion Chart Values based on 16' (4.9 m) mounting height	
Mounting Height	**Multiply**
10' (3.0 m)	1.27
12' (3.7 m)	1.16
14' (4.3 m)	1.07
16' (4.9 m)	1.00
18' (5.5 m)	0.84

SO-Bright® Technology effectively manages the complex balance between key components in an autonomous solar powered LED system. LEDs are driven using a constant-current method which offers high efficiency and precise control of light levels.

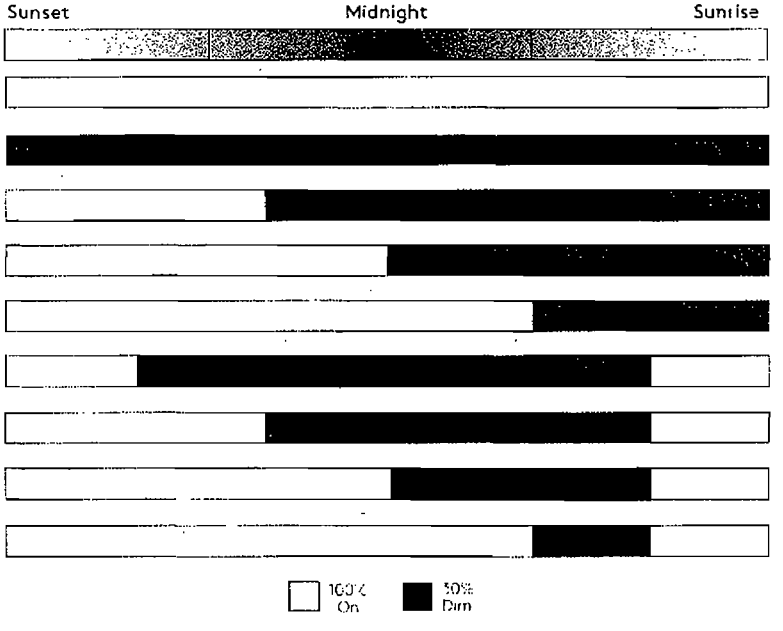
SO-Bright® Technology gives you the option to choose from 10 different pre-programmed lighting profiles pictured in the table to the right. Most systems can be programmed for all night illumination at peak level, depending on your power package. The SO-Bright® remote control allows you to change the lighting profile on your system with the push of a button.

Create a (4) digit code to design your own profile. Example:

1	5	3	4
Profile	Hours PM	Dim %	Hours AM

Operation Profile Options

Operation Profile	TIME PM	TIME AM
1	Custom	
2	All night 100%	
3	All night 30%	
4	4 hrs	0hrs
5	6 hrs	0hrs
6	8 hrs	0hrs
7	2 hrs	2hrs
8	4 hrs	2hrs
9	6 hrs	2hrs
10	8 hrs	2hrs

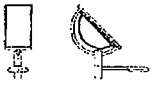
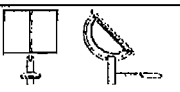
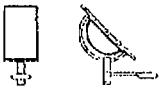
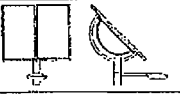


- Profiles 3-10 dim to 30% between PM and AM hours by default.
- Profile 1 provides a custom profile. Dim level can be specified with a single number between 1 and 9 (e.g. 2 = 20% LEDs dim to 20% power)

SO-BRIGHT

Weight Chart for all Configurations

Fixture Assembly Weights

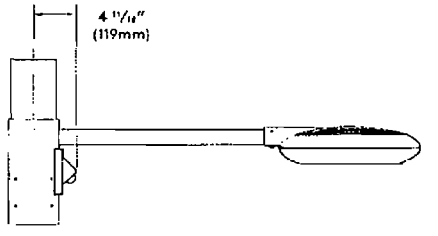
Panel	Batteries	Weights		Systems
		lbs.	kg.	
P1 120W Single Panel (120 Watt)	B1 (1 x 118Ah)	216	98	
	B2 (2 x 118Ah)	279	127	
	B3 (1 x 146Ah)	228	103	
	B4 (2 x 146Ah)	303	137	
	B5 (1 x 176Ah)	244	111	
	B6 (2 x 176Ah)	319	145	
P2 120W Double Panels (240 Watt)	B2 (2 x 118Ah)	303	137	
	B4 (2 x 146Ah)	327	148	
	B6 (2 x 176Ah)	359	163	
P3 150W Single Panel (150 Watt)	B1 (1 x 118Ah)	227	103	
	B2 (2 x 118Ah)	290	132	
	B3 (1 x 146Ah)	239	108	
	B4 (2 x 146Ah)	314	142	
	B5 (1 x 176Ah)	255	116	
	B6 (2 x 176Ah)	346	157	
P4 150W Double Panels (300 Watt)	B2 (2 x 118Ah)	317	144	
	B4 (2 x 146Ah)	341	155	
	B6 (2 x 176Ah)	373	169	

Motion Sensor Details

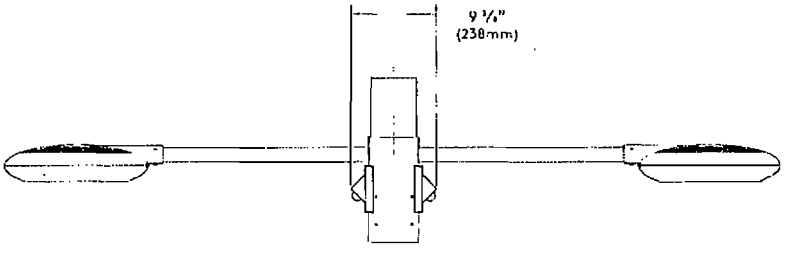
Motion Sensor (MS) option for double head uses two (2)motion sensors to provide 180° coverage as standard.

MS option for single head uses one (1) motion sensor to provide 90° coverage as standard.

Upon sensing motion, luminaire will go from dim level (30% dim standard to 100% output. System provides an adjustable delay from 0-20 minutes when used with So-Bright controller before returning luminaire to dim level (30% dim standard) after activity has ended. Sensor works optimally between 15-20 feet above ground with 90° of coverage and can be activated from 30 feet from pole.



Motion Sensor for Single Head



Motion Sensor for Double Head

Discera 4 LED Solar

FIXTURE TYPE **SM**
SCHULER SHOOK
PROJECT. **RIVERLINE**

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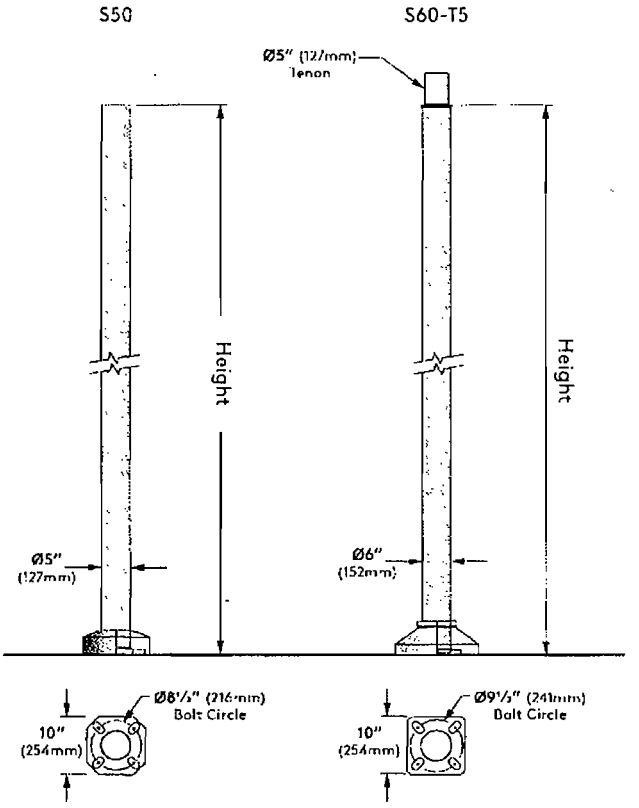
Mounting Option Details

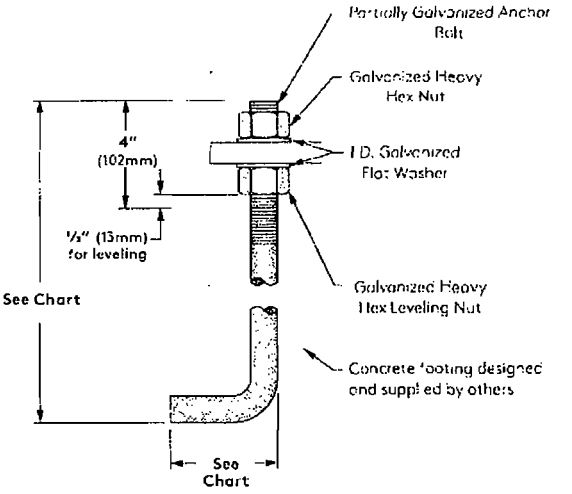
Straight Steel Pole Information



10" x 10" x .75" Base Plate for S50, and a 10" x 10" x 1" Base Plate for S60. Use caution when setting anchor bolts. Bolts must be vertical and centered on dimensions shown. A Ø5" Tenon is required for all poles over Ø5".

Straight Pole Anchor Bolt Detail

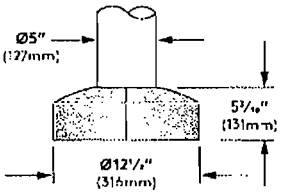
See Anchor Bolt (AB) chart below for dimensions



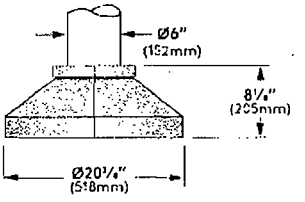
Base Cover Information

Refer to pole specification sheets for construction details, anchorage information and additional options.

BC3 Standard Base Cover for S50 poles
Two piece die cast aluminum, field installable base cover



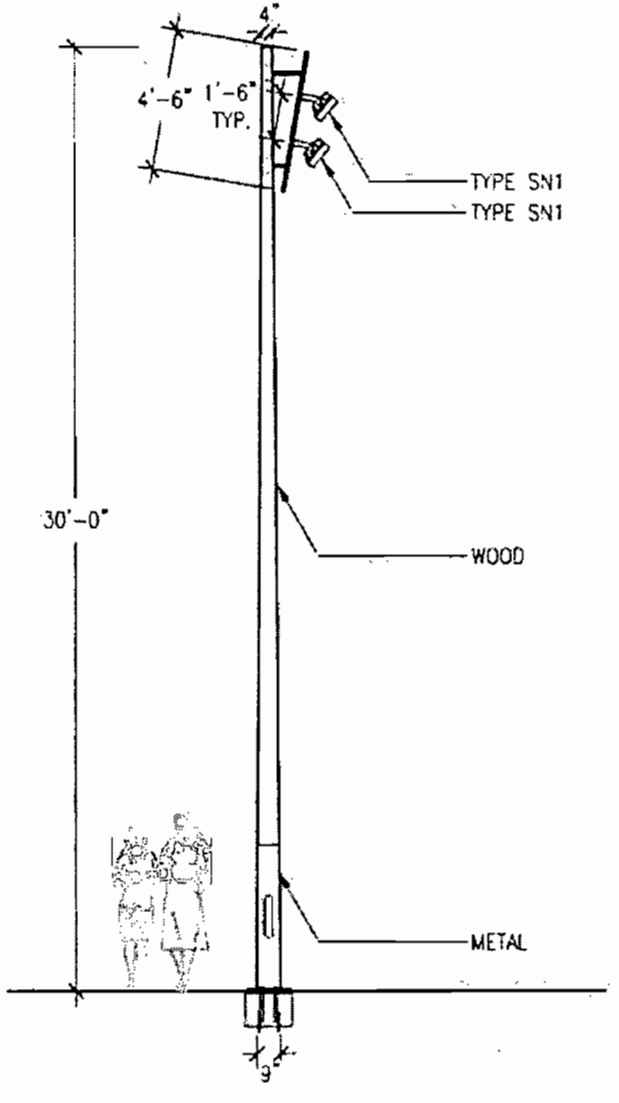
BC9 Standard Base Cover for S60 poles
Two-piece die-cast aluminum, field installable base cover



Pole Series	Bolt Circle	AB Size	EPA Information 90mph	100mph	110mph	120mph	130mph	140mph	150mph	Height	Finish	Options
S50 5" (127mm) Diameter Straight Steel Pole	Ø8 ½"	1" x 36" x 4"	34.5	28	23.5	19.5	16.5	14.5	12.5	10-10 ft	WH White	BC3 Optional Two-Piece Cast Aluminum Base Cover (for S50 poles only)
S50 5" (127mm) Diameter Straight Steel Pole	Ø8 ½"	1" x 36" x 4"	29	23.5	19.5	16.5	14	12	10.5	12-12 ft	BK Black	
S60 6" (152mm) Diameter Straight Steel Pole	Ø9 ½"	1" x 36" x 4"	60	49	40.5	34.5	29	25	22		BZ Bronze	
S50 5" (127mm) Diameter Straight Steel Pole	Ø8 ½"	1" x 36" x 4"	24.5	20	16.5	14	11.75	10	8.75	14-14 ft	SV Silver	
S60 6" (152mm) Diameter Straight Steel Pole	Ø9 ½"	1" x 36" x 4"	51	42	35	29.5	25	21.5	19		GV Galvanized	BC9 Optional Two-Piece Cast Aluminum Base Cover (for S50 poles only)
S50 5" (127mm) Diameter Straight Steel Pole	Ø8 ½"	1" x 36" x 4"	20.75	16.5	13.75	11.5	9.75	8.25	7.25	16-16 ft		
S60 6" (152mm) Diameter Straight Steel Pole	Ø9 ½"	1" x 42" x 6"	44	36	30	25	21.5	18.5	16		SP Specify Premium Color	
S50 5" (127mm) Diameter Straight Steel Pole	Ø8 ½"	1" x 36" x 4"	17.5	14	11.5	9.75	8.25	7	6	18-18 ft		
S60 6" (152mm) Diameter Straight Steel Pole	Ø9 ½"	1" x 42" x 6"	38	31	26	21.5	18.5	16	13.75			

EPA calculations designed for 3 Second Gust Wind Speeds in mph at 32 ft above ground accordance with the Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, Fifth Edition, AASHTO 2009 LTS-5-L

Please consult Selux engineering to determine wind load requirements for your specific project. See chart on p 7 for fixture and panel EPA values.



FIXTURE TYPE: SN

HEIGHT: 30'-0"

QUANTITY: AS SHOWN ON DRAWINGS

FIXTURE LOCATION: PARCEL "F"

GENERAL REQUIREMENTS: REFER TO SPECIFICATIONS, SECTION 265610 – "EXTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS" FOR ADDITIONAL REQUIREMENTS.

QUALIFICATIONS: MANUFACTURER SHALL BE A CUSTOM, ARCHITECTURAL POLE MANUFACTURER WITH AT LEAST 15 YEARS OF EXPERIENCE MANUFACTURING STREESCAPE WOOD POLES FOR OUTDOOR APPLICATIONS.

DESCRIPTION OF WORK: PROVIDE NEW WOOD ROUND POLES WITH OVERALL DIMENSIONS, MATERIALS, FINISHES, CUSTOM MOUNTING PLATES, ACCESSORIES, ETC., AS SHOWN ON THE DRAWINGS. ELECTRICAL CONDUIT TO BE ROUTED FROM WITHIN THE WOOD POLE.

FABRICATION: ROUND POLE FABRICATED FROM WOOD WITH METAL BASE AS SHOWN. EXACT DIMENSIONS T.B.D.

FINISHES: EXACT WOOD TYPE AND FINISH T.B.D.

POLES ACCESSORIES:

1. CUSTOM FIXTURE MOUNTING CHANNEL, BRACKETS, AND FITTINGS BY UTILITY METALS OR BY POLE MANUFACTURER – REFER TO TYPE SN1 FOR FIXTURE TYPE ATTACHED TO THIS POLE.
2. GFCI RECEPTACLE. REFER TO ELECTRICAL DRAWINGS FOR POLES WITH GFCI RECEPTACLES.

VOLTAGE: BY E.C.

ACCEPTABLE MANUFACTURERS:

1. VALMONT
2. STRUCTURA
3. TECHNILUM

FLC220 LED
667-3320

2/8

FIXTURE TYPE SN1
SCHULER SHOOK
PROJECT: **RIVERLINE**

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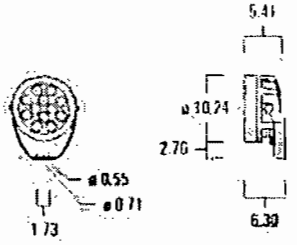

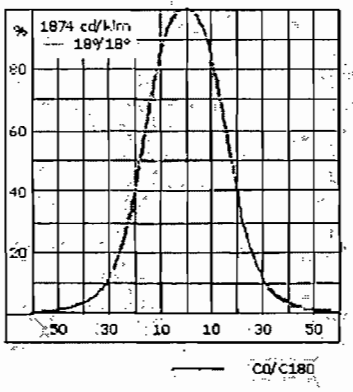

Material Specification

Body:	Marine-grade, die-cast aluminium alloy
Weight:	9.10
Lens:	Safety glass lens
Gasket:	Silicone rubber gasket
Fasteners:	PCS Polymer Coated Stainless Steel Hardware
Ingress protection:	IP66
Impact protection:	IK07
Corrosion protection:	5CE
Finish:	Powdercoat finish in Black RAL9004, White RAL9016, and Grey Metallic RAL9007 and Dark Bronze RAL8019
Mounting:	
Listings:	
Windage (EPA):	

Electrical Specification

Power supply:	Integral (ECG) electronic driver 120V, or 277V
Power factor:	> 0.9
Ballast:	Integral EC electronic converter in thermally-separated compartment
Termination:	
Cable:	

Lifetime

LED >60,000 h Ta 25°(B10/70)
Control gear >50,000 h Ta 25°

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FLC220 LED

667-3320

FIXTURE TYPE **SN1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

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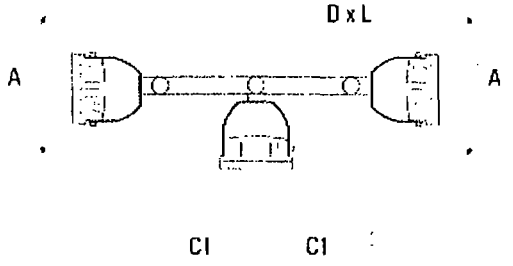
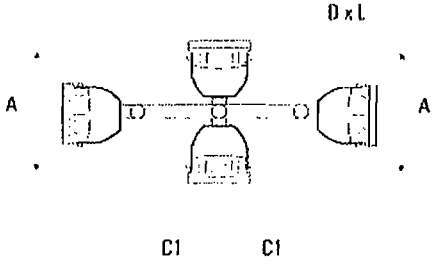
4/8

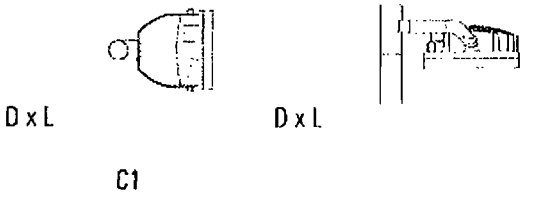
		A	C1	D x L	L	Weight (lbs)
667-9313	TA3 Mounting bracket, triple (Ø 3.5"x7.87" long)	±90°	25.59	3.50 x 7.87	3.50	39.46



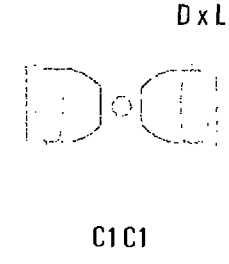
		A	C1	D x L	Weight (lbs)
667-9314	TA4 Mounting bracket, quad (Ø 3.50"x7.87")	±90°	18.84	3.50"x7.87"	53.00



		C1	D x L	L	Weight (lbs)
667-9315	TA1 Mounting bracket, single (Ø 4.25"x7.87")	5.12	4.25 x 7.87	4.25	16.53



		C1	D x L	L	Weight (lbs)
667-9316	TA2 Mounting bracket, double (Ø 4.25"x7.87")	5.12	4.25 x 7.87	4.25	16.53



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FLC220 LED

667-3320

FIXTURE TYPE **SN1**
SCHULER SHOOK
PROJECT **RIVERLINE**

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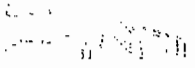
6/8

Pole clamp TS

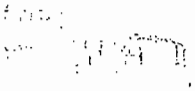
Pole clamps made from die-cast aluminium with stainless steel hardware. For mounting of one or two floodlights. Max. permissible weight per installed floodlight 22.5 kg.

		D1	Weight (lbs)
683-9301	TS1-2/M12 Pole clamp, single (Ø 3"-3.5")	3.0-3.50	3.31



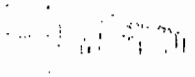
D1

		D1	Weight (lbs)
667-9348	TS1-2/M12 Pole clamp, single (Ø 4.0"-4.5")	4.0-4.50	3.53



D1

		D1	Weight (lbs)
667-9322	TS1-2/M12 Pole clamp, single (Ø 4.5"-5.25")	4.5"-5.25"	1.70



D1

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FLC220 LED

667-3320

8/8

FIXTURE TYPE **SN1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

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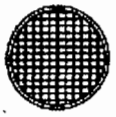
Optical Accessories

Flood lens

Broadens light distribution in all planes.

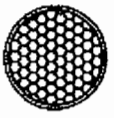
667-8120 Flood lens IO-360



Honeycomb Louvre

Honeycomb louvre, matt black Teflon® coated. For luminaires equipped with |M| |EE| |EES| light distribution.

667-8210 Honeycomb Louvre IW



Linear spread lens

Broadens light distribution in one plane only.

667-8119 Linear spread lens IO-180

Wallwash lens IO-20

Specifically developed for the lighting of architectural surfaces, in combination with WE-EF |M| symmetric medium beam LED optics. Luminaires fitted with the IO-20 wallwash lens are typically positioned at 0.125 x h away from the target surface and spaced up to 1.75 x d apart.

h = height of wall/target surface
d = 0.125 x h = distance from the wall/target surface
s = 1.75 x d = spacing between luminaires

The IO-20 LED wallwash lens is factory-installed within the luminaire. The factory-sealed qualities and advantages of the luminaire are fully maintained.

667-8118 Wallwash lens IO-20°

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STR9® Monochromatic

FIXTURE TYPE **SP**
SCHULER SHOOK
PROJECT: **RIVERLINE**

Product Specification Sheet

Product Specifications: STR9-MONO™

Rated Input Voltage (Nominal)	24VDC, 48VDC or 380VDC								
Power Consumption (Max.)	5W	5W	10W	15W	20W	25W	30W	35W	40W
	7.5W	7.5W	15W	22.5W	30W	37.5W	45W	52.5W	60W
	15W	15W	30W	45W	60W	75W	90W	105W	120W
Light Source	6 x Nichia 219 LEDs per 300mm/1ft								
CRI	83								
Lumen Output (typical)	5W	400	800	1200	1600	2000	2400	2800	3200
	7.5W	600	1200	1800	2400	3000	3600	4200	4800
	15W	1200	2400	3600	4800	6000	7200	8400	9600
Beam Angle (FWHM)	10°, 30°, 60°, 80°, 10°x60°, 30°x60°								
Control Protocol	DMX, DALI or 0-10V control through GVA Power-Data Equipment								
Size (WxH)	mm	72 x 56.4							
	inches	2.83 x 2.22							
Length	mm	298	598	898	1198	1498	1798	2098	2398
	inches	11.7	23.5	35.4	47.2	59.0	70.8	82.6	94.4
Weight	kg	1	2	3	4	5	6	7	8
	lbs	2.2	4.4	6.6	8.8	11	13.2	15.4	17.6
Housing	Solid Extruded aluminum UNIBODY, tempered flat glass lens								
Fixture Connections	IP68 rated input and output snap-in connectors for end-to-end connection (sealed unmated)								
Rated Operation Temperature	-40°C to +50°C, -22°F to 122°F								
Minimum Starting Temperature	-30°C, -22°F								
Environment	Dry, Damp or Wet Locations, 0-100% humidity								
Certifications	cULus, CE, RoHS								
IEC Classifications	Class 1 LED Luminaire								

These figures are subject to change without notice
1 - Custom configuration, consult factory

Selecting Luminaire Voltage

24V DC - for short runs only, up to 13.8m/46ft
- use when class 2 circuit is required

48V DC - for any short and medium length run, up to 34.5m/115ft

380V DC - for long runs, up to 325.5m/1085ft
- compatible with data center power grids
- compatible with solar and wind power

Maximum Run Lengths

Input Voltage	Power per 300mm/1ft		
	5W	7.5W	15W
24V DC	13.8m/46ft	12m/40ft	6m/20ft
48V DC	34.5m/115ft	24m/80ft	12m/40ft
380V DC	325.5m/1085ft	225m/750ft	117m/390ft

Ratings are for 30°C, de-rating will be used for higher ambient temperatures

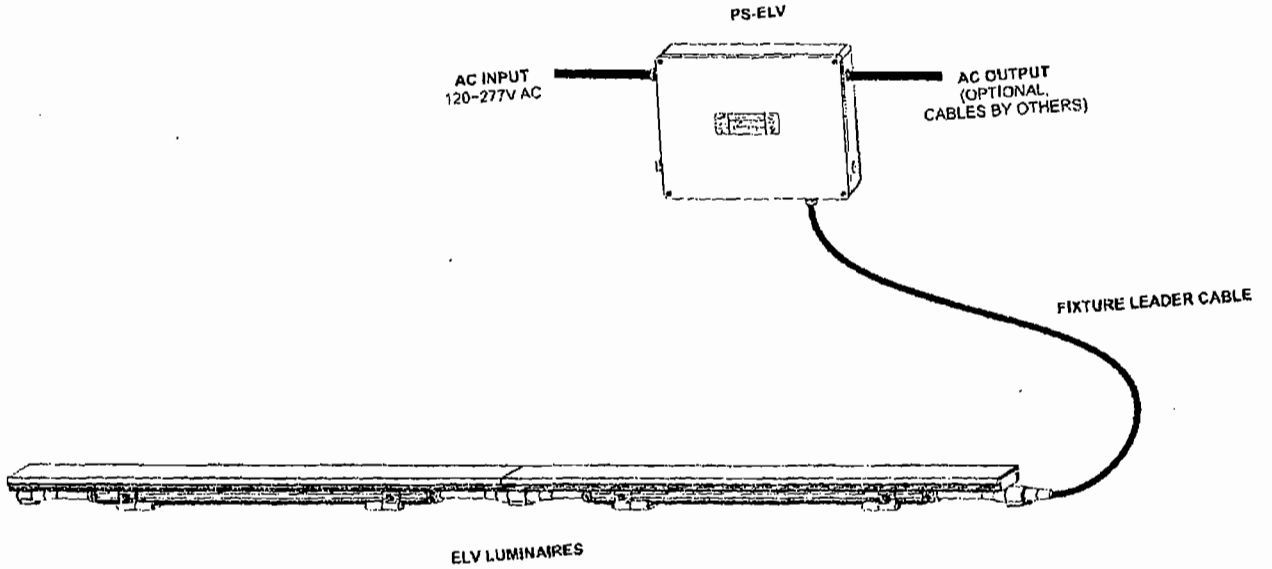
GVA Lighting, Inc. 3400 Ridgeway Drive, # 14 Mississauga, Ontario L5L 0A2, Canada
Tel: + 1 905 569 6044 Fax. + 1 905 569 8823 Email info@gvalighting.com
gvalighting.com

FIXTURE TYPE **SP**
SCHULER SHOOK
PROJECT: **RIVERLINE**

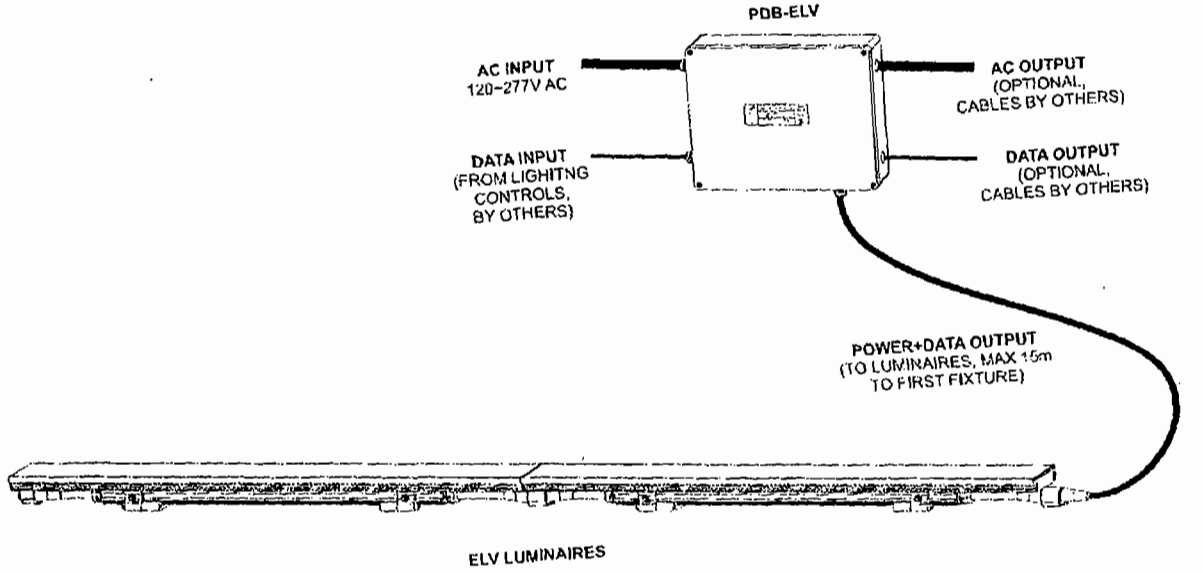
STR9® Monochromatic

Product Specification Sheet

Typical System Diagram: ELV, No Dimming Control



Typical System Diagram: ELV, with Dimming Control

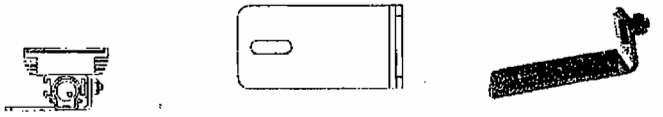


STR9® Monochromatic

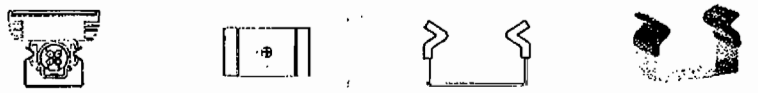
FIXTURE TYPE **SP**
SCHULER SHOOK
PROJECT· **RIVERLINE**

Product Specification Sheet

SML - Surface Mount Bracket, Non-Adjustable	**ITEM NUMBER**
MOUNTING BRACKET, KIT, STR9, SML, CLR MATTE ANDZD	121140
MOUNTING BRACKET, KIT, STR9, SML, BLK MATTE ANDZD	121141

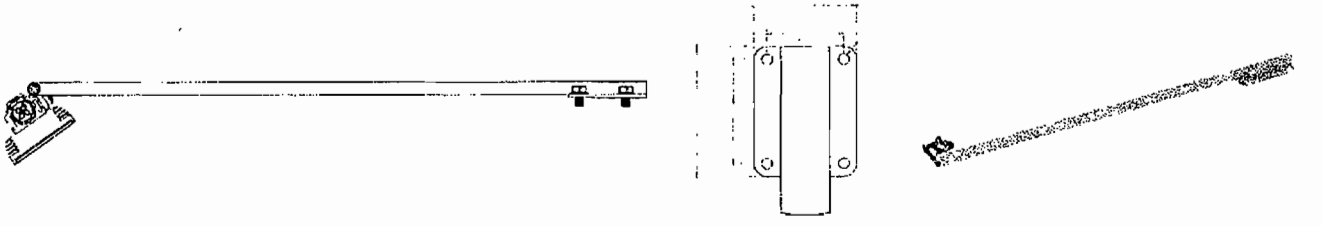


CLP - Clip Mount Non-Adjustable	**ITEM NUMBER**
MOUNTING BRACKET, KIT, STR9, CLP, STAINLESS STEEL	121147

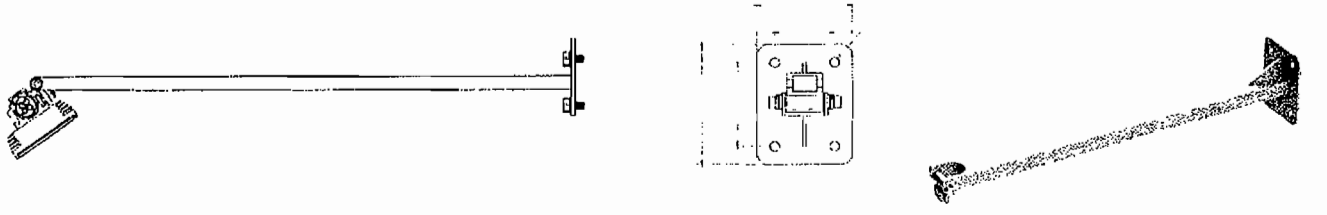


***CTLx** - Adjustable Cantilever Bracket*	**ITEM NUMBER**
MOUNTING BRACKET, KIT, STR9, CTLH, CLR MATTE ANDZD	121142
MOUNTING BRACKET, KIT, STR9, CTLH, BLK MATTE ANDZD	121143
MOUNTING BRACKET, KIT, STR9, CTLV, CLR MATTE ANDZD	121144
MOUNTING BRACKET, KIT, STR9, CTLV, BLK MATTE ANDZD	121145

CTLH - Adjustable Cantilever Bracket - Horizontal Mounting Surface



CTLV - Adjustable Cantilever Bracket - Vertical Mounting Surface



MCD - Non-Adjustable Cantilever Bracket	**ITEM NUMBER**
MOUNTING BRACKET, KIT, STR9, MCD, STAINLESS STEEL	121146

GVA Lighting, Inc. 3400 Ridgeway Drive, # 14 Mississauga, Ontario L5L 3A2, Canada
Tel + 1 905 569 6044 **Fax:** + 1 905 569 9823 **Email:** info@gvalighting.com
gvalighting.com

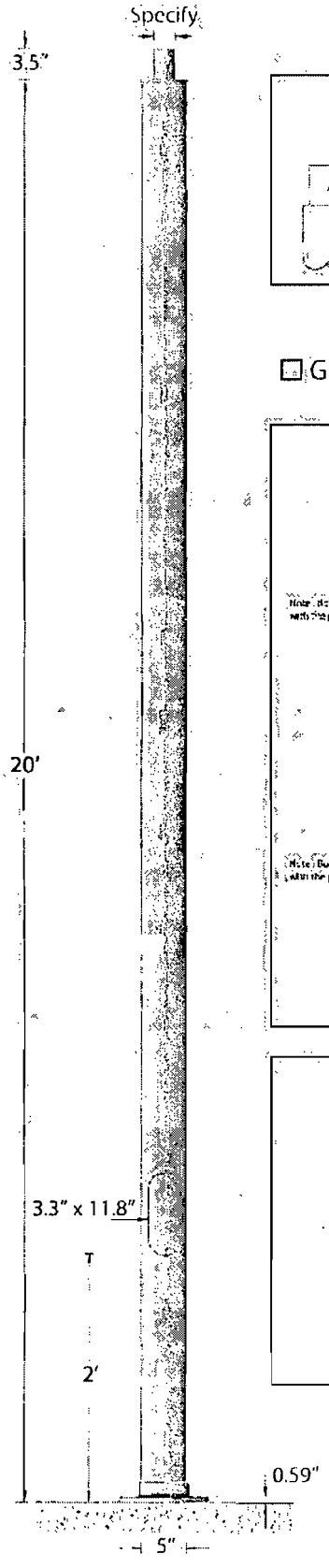
LIGMAN
LIGHTING USA

APD-RSA-5018-20' - 5" DIA - .180"

Straight Round Aluminum Powder Coated Pole

Head Office: Tel: 503-645-0500
7144 NW Progress Ct Fax: 503-645-8100
Hillsboro, Oregon 97124
www.ligmanlightingusa.com

FIXTURE TYPE SQ
SCHULER SHOOK
PROJECT: RIVERLINE



Tenon Post Top

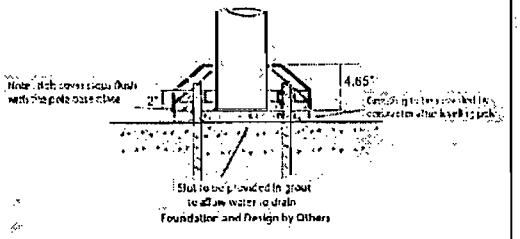
☐ Ø2.36"x3.5" ☐ Ø2.99"x3.5"

Optional

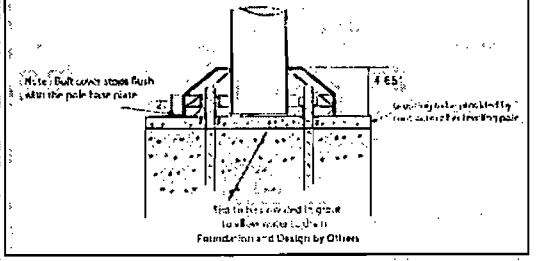
☐ GFCI Box - Specify Location _____

Pole Mount Install Notes

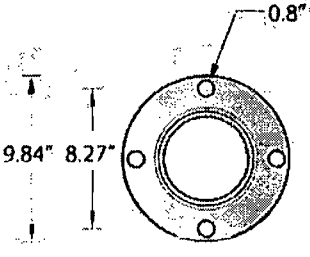
Option A



Option B



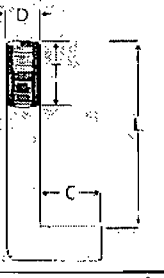
Mounting Base



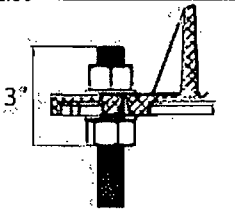
Physical Data

Pole Height: 20' Thickness: 0.18"
Pole Diameter: 5" Weight: 70.7 lbs

Anchor Bolt Size in Inches
D x L x C x T
¾ x 24 x 4 x 6



Bolt Projection



Color (Please Specify)

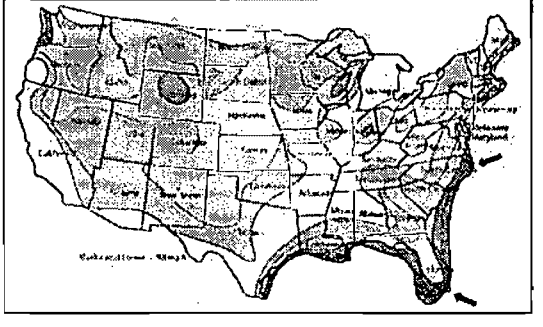
☐ 01-Black - RAL 9011
☐ 02- Dark Grey - RAL 7043
☐ 03-White - RAL 9003
☐ 04 - Metallic Silver - RAL 9006
☐ 05-Matt Silver - RAL 9006
☐ 06-Bronze - RAL 6014
☐ 07- Custom - RAL _____

Maximum EPA

Wind Speed (mph)

Mph	70	80	90	100	110
EPA	4.2	2.6	1.4	-	-

Wind Velocity Map



Not to scale template:

This drawing is being furnished for reference dimensions only and cannot be used as a template to set anchor bolts. Since it is "not to scale" Ligman accepts no responsibility for its intended use. Refer to site plans and specification before installing any anchor bolts.

*** Contact Ligman Lighting USA for bolt template prior to pouring anchor bolts.**

PROJECT: _____ DATE: _____

TYPE: _____ QUANTITY: _____ NOTE: _____

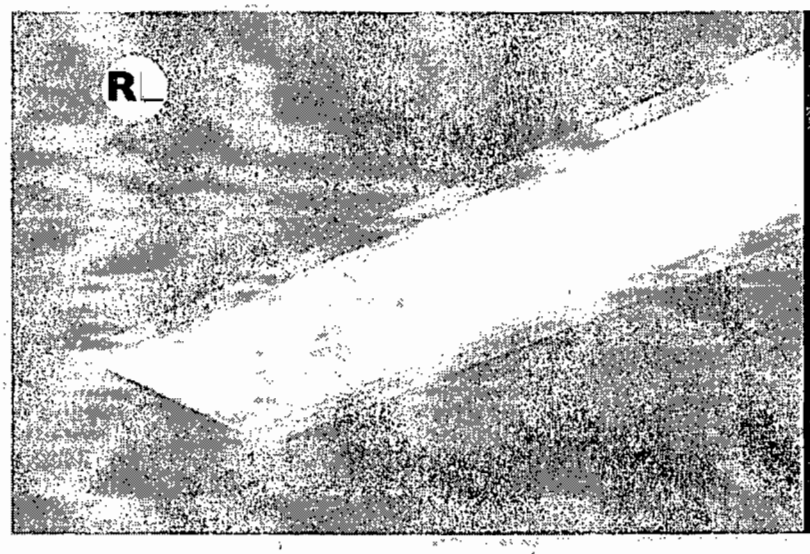
Intertek

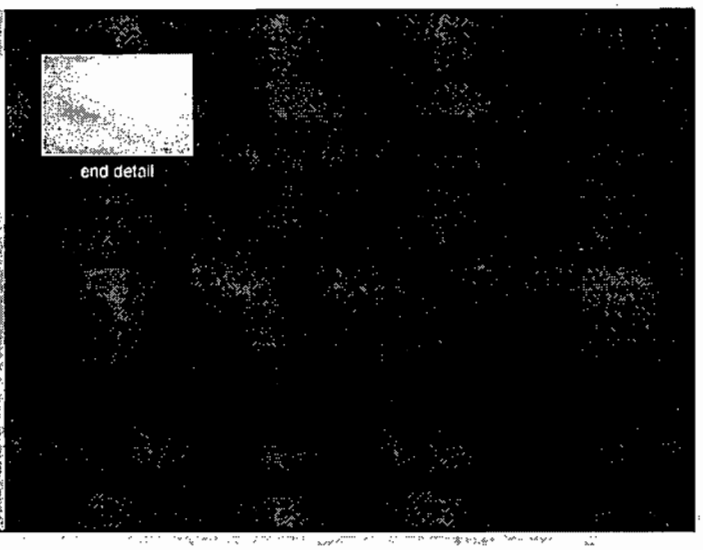
FIXTURE TYPE **SR**
SCHULER SHOOK
PROJECT: **RIVERLINE**

Seem® 4

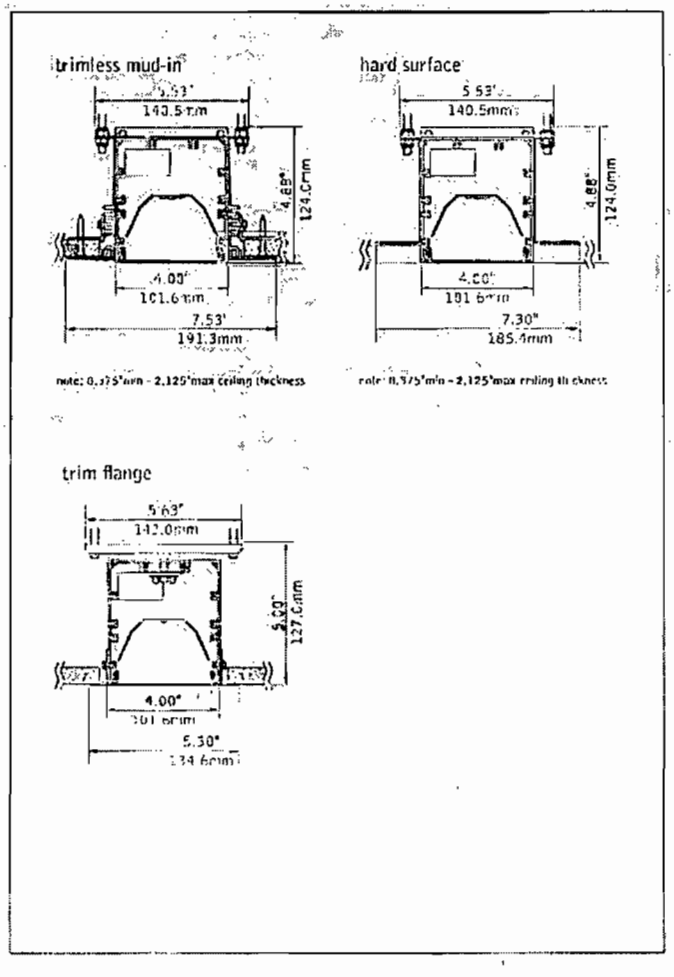
LED - WET LOCATION

FOCAL POINT





DIMENSIONAL DATA



FEATURES

Narrow extruded aluminum 4" aperture recessed slot LED suitable for wet location.

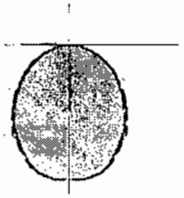
Integrates with ceiling for a clean, unobtrusive aesthetic.

Individual units in 1' increments up to 8'.

Frosted acrylic lens provides uninterrupted illumination, without pixels or shadows.

LED position and lens material optimized to provide the perfect blend of high performance and visual comfort.

PERFORMANCE



4" Flush Lens
Nominal output:
375 Lumens per foot

Delivered Lumens: 1500lm

Total System Watts: 17W

PRODUCT OVERVIEW

Lumen Output:	1500-4000lm
Wattage:	17-51W
LPW:	78-88
SDCM:	3
Lumen Maintenance:	L90 @ 131,000hrs

FIXTURE TYPE SR
SCHULER SHOOK
PROJECT: **RIVERLINE**

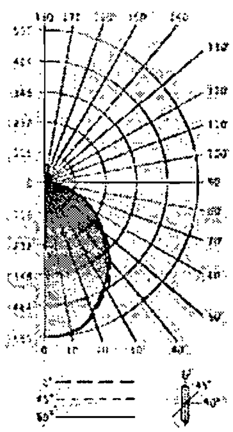
Seem® 4

LED - FLUSH LENS

FSM4L-FL-375LF-35K-LD1-WH-4'

Filename:	[illegible]	Lumens:	1459lm
Test #:	17842.0	System Watts:	17.0W
		LPW:	86

CANDLEPOWER DISTRIBUTION



Vertical Angle	0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	590	590	590	590	590	
5°	576	576	576	576	576	55
15°	550	553	553	553	553	157
25°	493	493	455	483	483	220
35°	420	425	417	41[illegible]	411	[illegible]
45°	330	337	333	325	319	[illegible]
55°	255	245	241	250	237	217
65°	165	165	165	163	163	[illegible]
75°	68	73	63	67	67	[illegible]
85°	20	20	20	20	20	20
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

	Zone	Lumens	% Fixture
	0-30°	439	30.0
	0-40°	700	48.0
	0-60°	1174	80.5
	0-90°	1459	100.0
Total Luminaire	0-180°	1459	100.0

LUMINANCE DATA (cd/m²)

Vertical Angle	Horizontal 0°	45°	90°
45°	41[illegible]	3903	3854
55°	37[illegible]	3587	3530
65°	3[illegible]	[illegible]	3280
75°	[illegible]	2917	2875
85°	2511	2511	2511

Go to www.focalpointlights.com for additional photometric data.

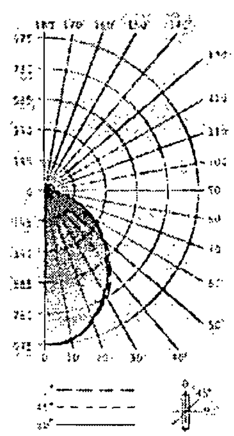
Seem® 4

LED - FLUSH LENS

FSM4L-FL-625LF-35K-LD1-WH-4'

Filename:	FSM4LFL625LF35K.IES	Lumens:	2452lm
Test #:	17843.0	System Watts:	28.3W
		LPW:	84

CANDLEPOWER DISTRIBUTION



Vertical Angle	0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	976	976	976	976	976	
5°	960	960	960	960	960	93
15°	931	930	930	930	930	264
25°	820	825	820	812	812	379
35°	717	715	702	693	691	438
45°	573	556	556	547	536	473
55°	410	413	405	400	395	[illegible]
65°	287	282	278	273	273	276
75°	140	140	140	146	146	158
85°	43	43	43	43	43	47
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

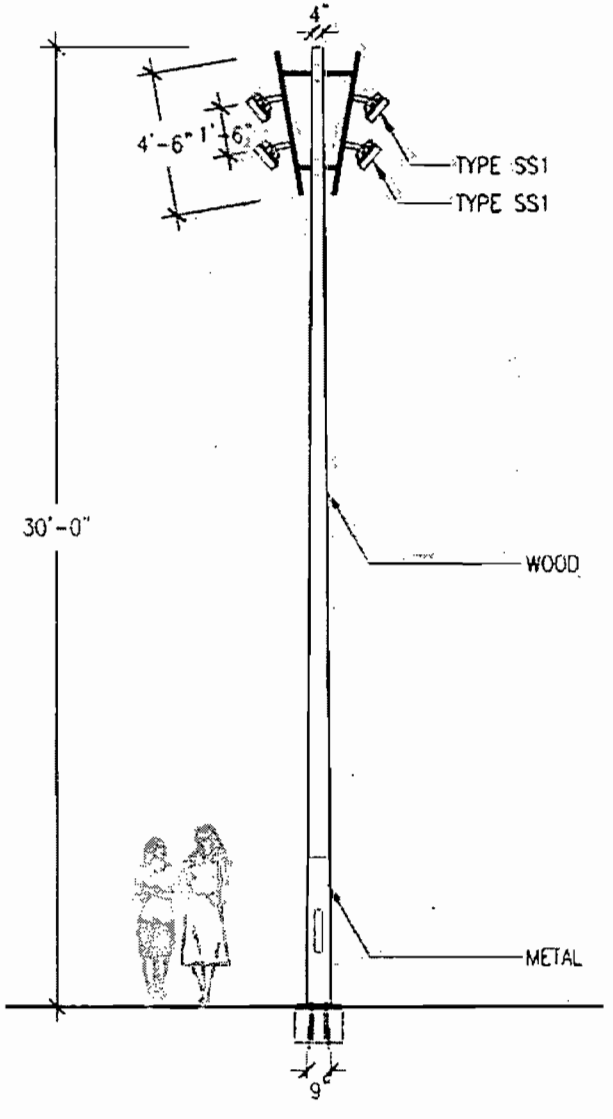
	Zone	Lumens	% Fixture
	0-30°	735	30.0
	0-40°	1174	48.0
	0-60°	1973	80.5
	0-90°	2452	100.0
Total Luminaire	0-180°	2452	100.0

LUMINANCE DATA (cd/m²)

Vertical Angle	Horizontal 0°	45°	90°
45°	[illegible]	6715	6479
55°	6[illegible]	4631	59[illegible]
65°	57[illegible]	5616	5520
75°	48[illegible]	4[illegible]	4624
85°	4[illegible]	4[illegible]	4[illegible]

Go to www.focalpointlights.com for additional photometric data.

Note: Photometric testing performed in an independent lab with standard fixtures and tubes. Lamp and ballast type and configuration will affect photometric performance.



FIXTURE TYPE: SS

HEIGHT: 30'-0"

QUANTITY: AS SHOWN ON DRAWINGS

FIXTURE LOCATION: PARCEL "F" PLAZA TREE GROVE

GENERAL REQUIREMENTS: REFER TO SPECIFICATIONS, SECTION 265610 – "EXTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS" FOR ADDITIONAL REQUIREMENTS.

QUALIFICATIONS: MANUFACTURER SHALL BE A CUSTOM, ARCHITECTURAL POLE MANUFACTURER WITH AT LEAST 15 YEARS OF EXPERIENCE MANUFACTURING STREESCAPE WOOD POLES FOR OUTDOOR APPLICATIONS.

DESCRIPTION OF WORK: PROVIDE NEW WOOD ROUND POLES WITH OVERALL DIMENSIONS, MATERIALS, FINISHES, CUSTOM MOUNTING PLATES, ACCESSORIES, ETC., AS SHOWN ON THE DRAWINGS. ELECTRICAL CONDUIT TO BE ROUTED FROM WITHIN THE WOOD POLE.

FABRICATION: ROUND POLE FABRICATED FROM WOOD WITH METAL BASE AS SHOWN. EXACT DIMENSIONS T.B.D.

FINISHES: EXACT WOOD TYPE AND FINISH T.B.D.

POLES ACCESSORIES:

1. CUSTOM FIXTURE MOUNTING CHANNEL, BRACKETS, AND FITTINGS BY UTILITY METALS OR BY POLE MANUFACTURER – REFER TO TYPE SS1 FOR FIXTURE TYPE ATTACHED TO THIS POLE.
2. GFCI RECEPTACLE. REFER TO ELECTRICAL DRAWINGS FOR POLES WITH GFCI RECEPTACLES.

VOLTAGE: BY E.C

ACCEPTABLE MANUFACTURERS:

1. VALMONT
2. STRUCTURA
3. TECHNILUM

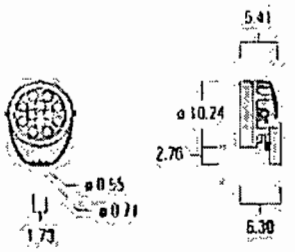
FLC220 LED

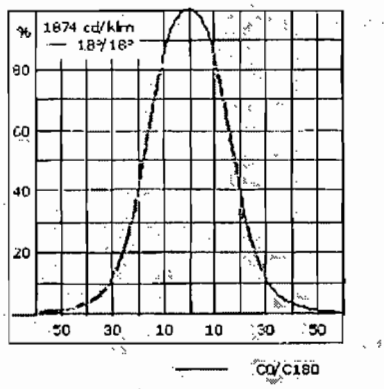
667-3320

2/8

FIXTURE TYPE **SS1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

we-ef





Material Specification

Body:	Marine-grade, die-cast aluminium alloy
Weight:	9.10
Lens:	Safety glass lens
Gasket:	Silicone rubber gasket
Fasteners:	PCS Polymer Coated Stainless Steel Hardware
Ingress protection:	IP66
Impact protection:	IK07
Corrosion protection:	5CE
Finish:	Powdercoat finish in Black RAL9004, White RAL9016, and Grey Metallic RAL9007 and Dark Bronze RAL8019
Mounting:	
Listings:	
Windage (EPA):	

Electrical Specification

Power supply:	Integral (ECG) electronic driver 120V, or 277V
Power factor:	>0.9
Ballast:	Integral EC electronic converter in thermally-separated compartment
Termination:	
Cable:	

Lifetime

LED >60,000 h Ta 25°(B10/70)
Control gear >50,000 h Ta 25°

WE-EF LIGHTING USA LLC
400 Keystone Drive | Warrendale PA 15086 | U.S.A. | Tel +1 724 742 0030 | Fax +1 724 742 0035 | info.usa@we-ef.com | www.we-ef.com

FLC220 LED

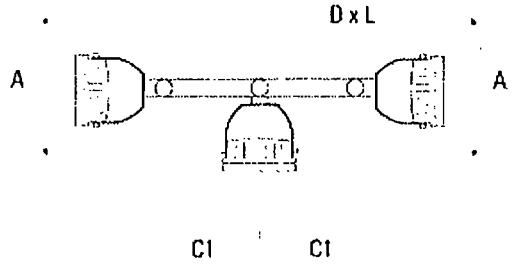
667-3320

FIXTURE TYPE **SS1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

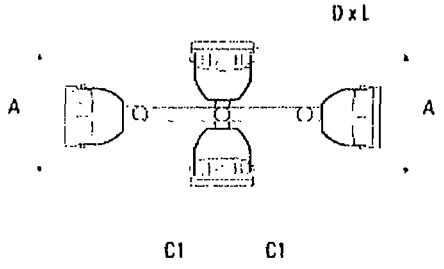
we-ef

4/8

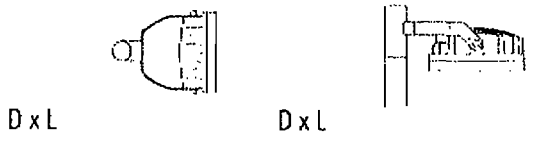
		A	C1	D x L	L	Weight (lbs)
667-9313	TA3 Mounting bracket, triple (Ø 3.5"x7.87" lcng)	±90°	25.59	3.50 x 7.87	3.50	39.46



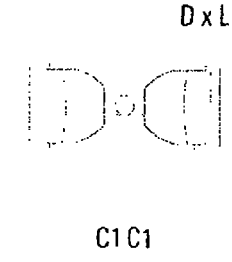
		A	C1	D x L	Weight (lbs)
667-9314	TA4 Mounting bracket, quad (Ø 3.50"x7.87")	±90°	18.84	3.50"x7.87"	53.00



		C1	D x L	L	Weight (lbs)
667-9315	TA1 Mounting bracket, single (Ø 4.25"x7.87")	5.12	4.25 x 7.87	4.25	16.53



		C1	D x L	L	Weight (lbs)
667-9316	TA2 Mounting bracket, double (Ø 4.25"x7.87")	5.12	4.25 x 7.87	4.25	16.53



WE-EF LIGHTING USA LLC
410-D Keystone Drive | Warrendale PA 15086 | U.S.A. | Tel +1 724 742 8030 | Fax +1 724 742 0055 | info.usa@we-ef.com | www.we-ef.com

FLC220 LED

667-3320

FIXTURE TYPE **SS1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

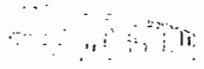
we-ef

6/8

Pole clamp TS

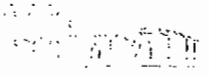
Pole clamps made from die-cast aluminium with stainless steel hardware. For mounting of one or two floodlights. Max. permissible weight per installed floodlight 22.5 kg.

		D1	Weight (lbs)
683-9301	TS1-2/M12 Pole clamp, single (Ø 3"-3.5")	3.0-3.50	3.31



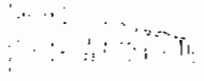
D1

		D1	Weight (lbs)
667-9348	TS1-2/M12 Pole clamp, single (Ø 4.0"-4.5")	4.0-4.50	3.53



D1

		D1	Weight (lbs)
667-9322	TS1-2/M12 Pole clamp, single (Ø 4.5"-5.25")	4.5"-5.25"	1.70



D1

WE-EF LIGHTING USA LLC
410-D Keystone Drive | Warrendale PA 15086 U.S.A. | Tel +1 724 742 0530 | Fax +1 724 742 0535 | info.usa@we-ef.com | www.we-ef.com

FLC220 LED

667-3320

8/8

FIXTURE TYPE **SS1**
SCHULER SHOOK
PROJECT: **RIVERLINE**

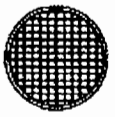
we-ef

Optical Accessories

Flood lens

Broadens light distribution in all planes.

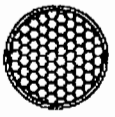
667-8120 Flood lens IO-360



Honeycomb Louvre

Honeycomb louvre, matt black Teflon® coated. For luminaires equipped with [M] [EE] [EES] light distribution.

667-8210 Honeycomb Louvre IW



Linear spread lens

Broadens light distribution in one plane only.

667-8119 Linear spread lens IO-180

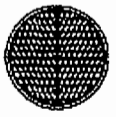
Wallwash lens IO-20

Specifically developed for the lighting of architectural surfaces, in combination with WE-EF [M] symmetric medium beam LED optics. Luminaires fitted with the IO-20 wallwash lens are typically positioned at 0.125 x h away from the target surface and spaced up to 1.75 x d apart:

h = height of wall/target surface
d = 0.125 x h = distance from the wall/target surface
s = 1.75 x d = spacing between luminaires

The IO-20 LED wallwash lens is factory-installed within the luminaire. The factory-sealed qualities and advantages of the luminaire are fully maintained.

667-8118 Wallwash lens IO-20°



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D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

C. All submittals and documentation for LEED compliance shall comply with the requirements of Section 018113 LEED Submittals.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
3. Keep roads and traffic circulation patterns clear of all mud, dirt and dust.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction. See Civil Engineer's Erosion Control Plan and SWPP Plan

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

C. Locate, identify, and disconnect utilities indicated.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

31 20 10
EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparing subgrades for slabs-on-grade.
   2. Excavating and backfilling for buildings and structures.
   3. Drainage course for concrete slabs-on-grade.
   4. Subsurface drainage (granular) backfill for walls and trenches.
   5. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:
   1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section. Also Section 01 56 30 "Erosion and Sediment Control".
   2. Divisions 21, 22, 23, 26, 27, 28, and 33 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
   3. Division 33 Section "Subdrainage" for drainage of foundations.

1.2 REFERENCES

A. See Section 31 20 00.1 for "Geotechinical Exploration Report" dated Augut 8th, 2012.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

F. Fill: Soil materials used to raise existing grades.

D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension, refuse, roots larger than ½" in diameter, noxious seeds, sticks, brush, litter, or other substances deleterious to plant growth, debris, waste, frozen materials, and other deleterious matter.
   1. Liquid Limit: Less than 45.
   2. Plasticity Index: Less than 20.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Drainage Course (Granular Backfill): Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel, meeting the requirements of IDOT Section 4131 or equivalent.

G. Sand: ASTM C 33; fine aggregate.

H. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
   1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.6 SUBGRADE INSPECTION

A. Notify Geotechnical Engineer when excavations have reached required subgrade.

B. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slab with a heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Engineer, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Geotechnical Engineer.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations.
   2. Stockpile soil materials to prevent compaction.
   3. Stockpile maximum height not to exceed 6 feet tall with maximum 3:1 side slopes.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
3. See also Section 31 20 00.1 "Geotechnical Exploration Report".

3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

Construction Application	Standard Proctor (ASTM D 698) Cohesive Soil	Standard Proctor (ASTM D 698) Cohesionless Soil	*Relative Density (D 4253 & D 4254) Cohesionless Soil
Class 1	95%	98%	70%
Class 2	90%	93%	45%
Class 2	85%	88%	20%

Class 1: Subgrade for building foundations, slabs-on-grade, pavements and other critical backfill areas.
Class 2: Backfill adjacent to structures not supporting other structures; minor subsidence possible.
Class 3: Backfill in non-critical areas; moderate subsidence possible.

*Use Relative Density technique (ASTM D 4253 & D 4254) where Standard Proctor technique (ASTM D 698) does not result in a definable maximum dry density and optimum moisture content.

3.14 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch Insert dimension when tested with a 10-foot straightedge.

soil materials to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

C. Straw mulch shall be clean, seed-free hay, or threshed straw of wheat, rye, oats, or barley.

D. Metal pins shall be 18" long, 3/16" diameter steel with 1-1/2" OD steel washers.

E. Topsoil – All topsoil shall be from approved on-site sources, except as allowed in writing by the Landscape Architect.

F. Soil separator fabric shall be 12 oz/yd^3, non-woven, needle punched, polypropylene, such as 1120N by T.C. Mirafi, or equivalent if approved in writing by Landscape Architect.

PART 3. EXECUTION

3.1 METHOD

A. Excavate trench for rip rap toe foundation at locations and elevations shown on the plans.

B. Place rip rap in trench to the dimensions shown on the plans.

C. Place soil separator fabric over rip rap as shown on the plans.

D. Secure bottom edge of geotextile and soil separator fabric (bottom lift only) with steel pins as shown on the plans.

E. Place a 2" x 8" batter board at the toe of the lift to be constructed. Place topsoil in lifts of not more than 12" and lightly tamp to minimize settling.

F. Remove batter board.

G. Seed all soil surfaces that will not be covered by subsequent lifts.

H. After seeding, loosely and evenly place straw mulch to a depth of approximately 1/4 - 3/8" over all bare soil surfaces.

I. Fold geotextile over lift and secure with steel pins as shown on the plans. Place geotextile loosely but in full intimate contact with topsoil.

J. When butting short ends of geotextile to one another, overlap edges not less than six inches and install metal pins over seam every 24". Seams shall overlap in the downstream direction. Stagger seams not less than 10' O.C. in adjacent lifts.

K. Bury top edge of geotextile of uppermost lift in a 4-6" deep trench. Backfill trench with excavated topsoil and lightly tamp.

L. Construct the number of lifts indicated on the plans by repeating 3.1 D – L.

3.2 CLEAN-UP, REMOVAL AND REPAIR

A. Clean up: Contractor shall keep the work area free of debris. After the work is complete, clean up any remaining materials, debris, trash, etc. Avoid driving or walking over area to minimize disturbance.

B. Removal: after work has been completed remove any tools, equipment, empty containers, and all other debris generated by the Contractor.

C. Repair: repair any damages caused by the Contractor during completion of the work described in this section.

31 25 14
FIBER ROLL

PART 1. GENERAL

1.1 DESCRIPTION
- A. This section includes the installation of coir fiber rolls.

1.2 RELATED SECTIONS
- A. Earthwork, Herbaceous perennial planting, Seeding.

1.3 QUALITY ASSURANCE
- A. Qualifications of workmen: provide at least one person who shall be present at all times during execution of this portion of the work, who shall be thoroughly familiar with the type and operation of equipment being used. Said person shall direct all work performed under this section.
- B. Standards: all materials used during this portion of the work shall meet or exceed applicable federal, state, county and local laws and regulations. All plant materials shall be free from insects and disease. Species shall be true to their scientific name as specified.

1.4 SUBMITTALS
- A. Materials: Prior to delivery of any materials to the site, submit to the Owner a complete list of all plant materials to be used during this portion of the work. Include complete data on source, quantity and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Owner.
- B. Equipment: Prior to commencement of any work, submit to the Owner a written description of all mechanical equipment and its intended use during the execution of the work.
- C. After the work is complete submit to the Owner "as-built" plans including a listing of all species installed, and quantities installed. Mark in red ink on the original planting plan any field changes or deviations from the original plans.

PART 2. PRODUCTS

2.1 MATERIALS
- A. Fiber rolls shall be 12 " diameter, have an outer 2'x2' mesh made of bristle coir twine with 80 pound dry tensile strength, and 7 pound per cubic foot density inner core made of compacted mattress coir, such as BioD-Roll by RoLanka or equivalent if approved in writing by the owner.
- B. Rope shall be bristle coir machine spun twine 0.2-0.3 inches in diameter, with a minimum dry tensile strength of 70 pounds.
- C. Wood stakes shall be 2"x2"x48" kiln dried southern yellow pine, APP grade, with a pencil point on one end, solid, free of rot or other flaws.

31 25 15
LIVE STAKES AND POSTS

PART 1. GENERAL

1.1 DESCRIPTION
- A. This section includes the installation of unrooted woody cuttings.

1.2 RELATED SECTIONS
- A. Live Fascines, Seeding, Erosion Control Blanket

1.3 QUALITY ASSURANCE
- A. Qualifications of workmen: provide at least one person who shall be present at all times during execution of this portion of the work, who shall be thoroughly familiar with the type and operation of equipment being used. Said person shall direct all work performed under this section.
- B. Standards: all materials used during this portion of the work shall meet or exceed applicable federal, state, county and local laws and regulations. All plant materials shall be free from insects and disease. Species shall be true to their scientific name as specified.

1.4 SUBMITTALS
- A. Materials: Prior to delivery of any materials to the site, submit to the Owner a complete list of all plant materials to be used during this portion of the work. Include complete data on source, quantity and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Owner.
- B. Equipment: Prior to commencement of any work, submit to the Owner a written description of all mechanical equipment and its intended use during the execution of the work.
- C. After the work is complete submit to the Owner "as-built" plans including a listing of all species installed, and quantities installed. Mark in red ink on the original planting plan any field changes or deviations from the original plans.

PART 2. PRODUCTS

2.1 LIVE STAKES

SCIENTIFIC NAME	COMMON NAME
Cornus amomum	Silky dogwood
Cornus stolonifera	Redtwig dogwood
Salix interior	Sandbar willow
Salix discolor	Pussy willow

A. After completion of the work, the Contractor shall schedule with the Owner a provisional acceptance inspection of the work.

3.4 ACCEPTANCE AND GUARANTEE

A. Provisional acceptance: the work shall be considered 90% complete after initial installation of live stakes and posts, and after the Contractor has completed all required clean up, removal, and repair as described in 3.2 of this section.

B. Final acceptance: the work shall be considered 100% complete after the Contractor has met or exceeded the performance standards given in 3.4C. of this section, and has completed all required clean up, removal, and repair as described in 3.2 of this section.

C. The Contractor shall guarantee live stakes and posts will meet or exceed the following performance criteria until after provisional acceptance which shall be the fall of the first full growing season: 80% survivorship/sprouting of all live stakes and posts.

END OF SECTION

C. Apply a single thin layer of straw over seeded area. Straw should spread uniformly and cover 40% to 70% of the surface in a layer that is no more than 2 or 3 straws thick.
D. Place lower edge of blanket approximately 1 foot out from the shore into the water (assuming normal water flow).
E. Place erosion control blanket loosely but in full intimate contact with topsoil and straw. Anchor at the top of the slope.
F. Secure erosion control blanket as recommended by the manufacturer using the maximum water flow parameters.
G. If installation occurs between July 15 and November 1, install cover crop at the time of construction and hold native seed mix until the specified planting dates.

3.2 CLEAN-UP, REMOVAL AND REPAIR

A. Clean up: Contractor shall keep the work area free of debris. After the work is complete, clean up any remaining materials, debris, trash, etc. Avoid driving or walking over area to minimize disturbance.
B. Removal: after work has been completed remove any tools, equipment, empty containers, and all other debris generated by the Contractor.
C. Repair: repair any damages caused by the Contractor during completion of the work described in this section.

3.3 INSPECTION

A. After installation of erosion control blanket, the Contractor shall schedule with the Owner a provisional acceptance inspection of the work.

3.4 ACCEPTANCE AND GUARANTEE

A. Provisional acceptance: the work shall be considered 100% complete after installation of erosion control blanket, and after the Contractor has completed all required clean up, removal, and repair as described in 3.2 of this section.

END OF SECTION

B. Product Data: For the following:

1. Unit pavers
2. Sealants

C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.

D. Samples for Verification:

1. All Paving: Five (5) Full-size units of each type of paver in intended color and finish as indicated. Samples to show full range of color variations. Samples to be approved prior to purchase of material.

E. Mockups: Construct mockups for each phase of work for demonstration and verification of construction method, dimension, finish and color.

1. Mockups shall be reworked and reconstructed as necessary until the required standard of work has been achieved at no cost to the Owner.
2. Mockups shall remain in place until completion of the work and shall be demolished afterward unless incorporated into the work at the direction of the Owner and Landscape Architect. Mockups may be completed on site or an appropriate offsite location for review by Landscape Architect. If completed off site, samples should be completed such that samples can be moved to the site at Owner/Architects request.
3. Approved mockups shall be used as a standard for construction of the same type of material throughout the project. Completed work shall be reviewed in comparison to the mockup.
4. The following mockups shall be constructed.

a. Construct minimum 100 square foot minimum section for each type/pattern of stone paving, 10 linear foot of all curb type/pattern and 15 square foot minimum section for ADA clay paver modules that includes each paving type for verification of form of every type of finish, mix quality, color, jointing etc. Mockup may be incorporated into the work.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed paving Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

3. Color: Submit full range of manufacturer's colors. Color to be approved by Landscape Architect during review of mock-up.
4. Contact: 1-800-465-7325
5. Hand tight stone with polymeric sand swept joints. Install per manufacturer's recommendations.

B. Bedding Sand for Granite pavers
1. General: Bedding Sand shall be ASTM C33/M10 crushed granite sand from Illinois source.
2. Submit samples for verification.
3. Install per paving manufacturer's instructions
4. Provide geotextile screen over weeps, joints or voids in sub-slab.

2.4 MORTAR AND GROUT MIXES AND SETTING BED PROFILE

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

B. For Granite Pavers:

1. Manufactured By: Laticrete International.
2. Contact: Jeff Kimmerling, 203-314-4240.
3. Drain Mat: Laticrete Drain Mat.
4. Mortar Mix: Laticrete 3701 Fortified Mortar Bed.
5. Waterproofing and Crack Suppression Membrane: Laticrete Hydro Ban Membrane.
6. Slurry Bond Coat: Laticrete 254 Platinum.
7. Grout Mix: Laticrete PermaColor and Laticrete 1776 Grout Enhancer, color to be approved by Landscape Architect during review of mock-up.
8. Install per manufacturer's recommendations.

C. For ClayDetectable and Non-detectable Warning Paving:

1. Manufactured By: Laticrete International.
2. Contact: Jeff Kimmerling, 203-314-4240.
3. Drain Mat: Laticrete Drain Mat.
4. Mortar Mix: Laticrete 3701 Fortified Mortar Bed.
5. Waterproofing and Crack Suppression Membrane: Laticrete Hydro Ban Membrane.
6. Slurry Bond Coat: Laticrete 254 Platinum.
7. Grout Mix: Laticrete PermaColor and Laticrete 1776 Grout Enhancer, color to be approved by Landscape Architect during review of mock-up.
8. Install per manufacturer's recommendations.

2.5 SEALERS

A. For ALL Granite Pavers:

coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.

E. Joint Pattern: Per plans and shop drawings.

3.4 MORTAR SETTING-BED APPLICATIONS

A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Place pavers before initial set of mortar occurs. Immediately before applying slurry coat and placing pavers on mortar bed

C. Apply Latlcrete 254 Platinum Slurry Coat to bottom of all pavers: Per manufacturers specifications and instructions.

D. Apply Laticrete 254 Platinum Slurry Coat to substrate: Per manufacturers specifications and instructions

E. Apply Laticrete 3701 Fortified Thick Mortar bed over slurry coat to uniform thickness at subgrade elevations required for accurate setting for pavers to finished grades indicated and per manufacturers specifications and instructions

F. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

G. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

H. Spaced Joint Widths: as indicated on plans and approved shop drawings.

I. Grouted Joints: Grout paver joints complying with ANSI A108.10. with Laticrete PermaColor Grout per manufacturers specifications and instructions

J. Grout joints as soon as possible after initial set of setting bed.

1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.

SECTION 32 18 16
PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.1 SUMMARY (0.0)

A. Unitary poured play surfacing system, including the following:
   1. PebbleFlex 2.0 is a porous thermoplastic aliphatic polyurethane designed to be used as the impact attenuating surface for play areas over concrete, asphalt, and crushed stone aggregate base. It will bond to most surfaces and will resist surface movements. It has been designed to be light-stable and durable.
   2. Work: Provide all necessary materials, labor, tools, and equipment to perform the work included in section "Installation."

B. Related Sections:
   1. Section 00 00 00; for Playground Equipment
   2. Section 00 00 00; for Sub-Base Construction.
   3. Section 00 00 00; for Grading

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: As per drawings and details.

B. Performance Criteria:
   1. Impact Attenuation: ASTM F1292
   2. Accessibility of Surface Systems: ASTM F 1951.

1.3 SUBMITTALS

A. Product Data;
   1. Manufacturer's Product Literature and Specification Data.
   2. Manufacturer's written instructions for recommended maintenance practices.

B. Shop drawings: Layout of surfacing area showing thickness changes (if any), Graphic details (if any).

C. Calculations: Test results from a Zenon Arc Weatherometer exposure test from a third party shall be submitted by the installer to the requiring agency prior to installation of the surface. The surfacing system (pebbles and binder) shall be tested for a minimum of 10,000 hours and show no less than 15% tensile strength (PSI) degradation

D. Certifications:
   1. ASTM 1292 – If critical fall height is required, impact attenuation test results shall be submitted to the requiring agency prior to installation of the surface. The results shall be submitted on the letterhead of the independent testing lab. Impact attenuation results must comply with ASTM 1292 Standard

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver and store materials in manufacturer's original containers, with seals unbroken and identification labels intact until time of use.

1.6 PROJECT/SITE CONDITIONS

A. Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Prior to start of the protective surfacing work, and at the Contractor's direction, meet at the Site and review the construction schedule, availability of materials, Installer's personnel qualifications, submittals, equipment and facilities needed to make progress and avoid delays, installation procedures, condition of substrates, and coordination with other work.

1.7 MOCK-UP INSTALLATION

A. Not Available.

1.8 WARRANTY

A. Five years against manufacturing defects.

1.9 DEFINITIONS

A. Vulcanize: To harden a polymer by crosslinking to make it more durable.

B. EPDM: Ethylene Propylene Diene Monomer Rubber, a synthetic polymer based material that is formed and vulcanized to a rubber in large solid blocks. These blocks are then ground into the granules used in surfacing. Not UV light stable.

C. TPV: Thermoplastic Vulcanized Rubber, an EPDM synthetic polymer based material that is formed and vulcanized to a rubber by an extrusion process. Not UV light stable.

D. TPE: Thermoplastic Elastomer, a synthetic polymer made by extrusion that is not vulcanized and therefore not as durable as EPDM and TPV, which are vulcanized. More UV light stable than EPDM and TPV but not as UV light stable as PebbleFlex.

E. SBR: Styrene Butadiene Rubber, a synthetic polymer vulcanized to rubber used in car and truck tires. Ground up SBR from used tires and trucks is used as the cushion layer in many safety surfaces.

F. Polyurethane: Durable synthetic polymer formed by reacting polyisocyanates with polyols chemically. Aliphatic polyurethanes are inherently UV light stable. Aromatic polyurethanes are inherently not UV light stable and change color and degrade in UV light. PebbleFlex® 2.0 and AquaFlex® are aliphatic polyurethanes. Another common use for polyurethanes is the plastic bumpers on cars.

C. Color: Custom blend; 25% small Moss Green, 25% small Dark Green, 50% large Moss Green.

2.2 FABRICATION

A. Provide all necessary materials, labor, tools, and equipment to perform the work included Installation section. Fabrication of surfacing system will be done onsite.

B. Temperature must remain above 50° F throughout the installation and curing processes. Surface must be dry, and there should be no rain in the immediate forecast.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, subgrade and substrate conditions, drainage, and other conditions affecting performance of the Work. Notify Architect if areas are not acceptable

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. New or Existing Concrete: If PebbleFlex 2.0 is being applied directly to concrete, then the concrete must be cured for at least 28 days. If an SBR layer is used between the concrete and PebbleFlex 2.0, then the concrete must be cured a minimum of 14 days. New concrete must be light broom finish and can be prepared simply by acid etching. Add acid slowly to water in clean polyethylene buckets at a ratio of eight parts water to one part acid. Care should be taken to prevent splashing on workers. Protective clothes such as safety glasses, rubber gloves, boots, etc. should be used. The acid solution should be used on the concrete at a rate of 100 square feet per 5 gallons of acid solution. Concrete needs to be damp before applying acid. Using a stiff broom, scrub acid solution into the surface where the solution was poured and continue the process to other areas. Never let the concrete dry with acid on it. After 5 minutes, rinse the concrete with large amounts of clean water to remove all the acid solutions, and then allow the concrete to dry. Old concrete that is contaminated with grease or oil can be cleaned with a power-washer. Use a degreasing agent before power-washing. For concrete where a power-washer cannot be used, a diamond grinder can be used to lightly grind the surface to remove contamination. Concrete shall have a minimum of 1/8"/ft. slope to a drain to ensure proper drainage.

B. Asphalt Preparation: New asphalt must be 15 days old. Broom scrub using a degreaser to remove any surface oils. Power wash any contaminants off the surface. Allow 24 hours for the surface to dry. PebbleFlex 2.0 CANNOT BE

ensure that no gaps or separation will occur. All cold joints must be coated with binder prior to the application of the adjacent PebbleFlex 2.0 layer.

3.4 FIELD QUALITY CONTROL

A. Remove and replace applications of playground surface system it does not comply with requirements.

3.5 CLEANING AND PROTECTION

A. Site must be secured against vandalism during the installation and 72-hour curing processes.

B. The contractor should clean the job site and remove any excess materials.

C. The contractor shall instruct the owner's personnel on proper maintenance and repair of the PebbleFlex 2.0 surface.

END OF SECTION

R. F 934 (1989) Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.

S. F 1184 (1988) Standard Specification for industrial and commercial horizontal slide gates.

T. F 1043-11A Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework

U. F2919 Standard Specification for Welded Wire Mesh Fence Fabric (Metallic-Coated or Polymer Coated) with Variable Mesh Patterns or Meshes Greater than 6 sq. in. [3871 mm2] in Panels

V. A121 Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

W. F626 Standard Specification for Fence Fittings

1.4 SUBMITTALS

A. Product Data: Material descriptions, construction details, dimension of individual components and profiles, and finishes for the following:
   1. Fence and gate posts, rails, and fittings.
   2. Gates and hardware.
   3. Gate operators, including operating instructions.
   4. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: Show locations of fence, each gate, posts, rails, and details of gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, elevations, sections, gate swing and other required installation and operational clearances, and details of post anchorage, attachment and bracing. Installation procedures and instructions by manufacturer describing all details for a typical fence and gates.

C. Samples for Initial Selection: Manufacturer's color charts shown on its Internet site.

D. Samples for Verification: Request a color chip from the manufacturer.

E. Qualification Data: For firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Maintenance Data: Request the maintenance manual for the gate operator.

1.5 SUBSTITUTE PRODUCTS

A. To enable all tenders to be judged equitably, they shall be based on the specified products in this document and shown on the drawings:

B. The proposal for any substitute products must be attached to their tender separately, identifying the substitute product by its trade name along with any savings it may represent.

C. Following the opening of the tender, only those substitutes proposed by the lowest bidder of the specified products will be considered.

A. OMEGA II FENCE SYSTEMS ™
A division of Metaltech - Omega inc.
1735, St-Elzear west
Laval (Quebec), Canada
H7L 3N6
Tel: 800-836-6342 / 450-686-9600
Fax: 450-681-5318
Email: customerservice@omegatwo.com
Web site: www.omegafence.com

B. Products from qualified manufacturers who have five years or more experience manufacturing galvanized chain link fencing framework and swing gates will be considered by the architect if they meet all specifications for design, size, gauge of metal parts and fabrication.

C. Panel, eye-U-brackets and end-to end connector manufactured by Omega II Fence Systems. Other chain link fences hardware, posts and gates must be obtained from another single source.

2.3 COATINGS

A. Zinc coating:

1. The wire meshes is coated with 0.5 oz./sq.ft. (150 g/m2) zinc in conformity with ASTM A 641 (1989) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire, known as galvanized before welding (GBW).
2. The fence posts, the swing gate frame and posts are zinc coated (galvalume process) - 0.90 oz/sq.ft. (275 g/m2) as per ASTM A653.

B. The polyester surface coating color shall be standard black.

C. Polyester coating to be minimum 4 mils applied by an electrostatic method. Coating shall cover all surfaces of the wire and post sections. Coating shall be capable of withstanding the following tests:
1. Mechanical adhesion test as per ASTMD 3359 (1990) - Method B.
2. Shock resistance tests as per ASTM D 2794 (1990).
3. Salt spray testing with a min. of 1,000 hrs without red rust appearance, as per ASTM B 117 (1990).
4. Humidity resistance in a weather meter chamber as per ASTM D 2247 (1988).
5. Exposure to ultraviolet light with exposure of 1000 hours using apparatus Type E and 63°C as per ASTM D1499

2.4 MATERIALS
MODEL "ELITE" FENCE AND ACCESSORIES

A. Height shall be: 4 ft. (1230 mm).

B. Model "ELITE" - Steel Mesh Fence Panels: Fabricated welded wire mesh panels , 98-7/8" (2511mm) wide, formed by one vertical wire of 0.192" (4.88 mm) placed between two horizontal wires of 0.225" (5.72 mm), as per ASTM-A185 & A853. The wires are welded by resistance weld at each crossing to form rectangles 1-15/16" x 7 7/8" (50mm x 200mm). The cold rolled wire shall have a tensile strength of at least 75,000 psi (515 Mpa) and a 3150 lbs (1430 Kg) break strength for an individual wire. One end of the vertical wires of the panel shall exceed 1" (25 mm)

G. Barbed wire supporting arms: Pressed steel arms with provisions for attaching 3 rows of barbed wire. Arms shall withstand 250 lb. (113 kg) downward pull at outermost end of arm without failure. Arms are fastened to the posts.

H. Barbed wire: Zinc or aluminum coated steel wire, double strand, 12 gauge, twisted line wire with 4 point barbs, spaced approximately (choose one) 3" (75 mm) or 5" (125 mm) on center conforming to ASTM A121.

2.5 SINGLE / DOUBLE SWING GATES

A. Gate frames: Omega swing gates shall be made in accordance with ASTM F900 (1984) using galvanized square steel tube 16 ga (1.6 mm). The frame is made from two vertical tubes of 1-1/2 in. x 1-1/2 in. (38 mm X 38 mm) and from two horizontal tubes of 2 in. x 2 in. (50 mm X 50 mm) welded at intersections to create a rigid frame. If the gate is over 8 ft. (2430mm) high or 8 ft. (2430 mm) wide, a supplementary vertical support of 1-1/2 in. x 1-1/2 in. (38 mm X 38 mm) is needed.

- If the gate height or width exceeds 7 ft. (2134 mm), both vertical tubes must be 11 Ga (3,0 mm)

B. The gate posts are cold rolled from 1008 grade steel. Dimension corresponding Dimensions correspond Posts are to include cap and SPF-W kit for adjacent panel mounting.

Single frame gate opening	Square post size
6 ft. or less (1830 mm) or less	3 in. x 3 in. (76 mm X 76 mm)
6.1 ft. (1860 mm) to 13.5 (4115 mm)	4 in. x 4 in. (102 mm x 102 mm)
13.6 ft. (4145 mm) to 16 ft. (4875 mm)	6 in. x 6 in. (152 mm x 152 mm)
16 ft. (4876 mm) and over	Custom by manufacturer

C. Double gates hardware: Consists of
1. One drop bar to secure in closed position one of the gate leaves, complete with stop pipe to engage the center drop rod. 2) Self-locking device with padlock eyes as an integral part of latch.

D. OPTIONAL Keyed lock-box: LOCINOX [single-lever] or [double-lever] model.

2.6 CANTILEVER GATES

A. Omega II cantilever slide gates shall be fabricated in accordance with ASTM F1184, Class 2, using 2 in. (50 mm) square aluminum members, ASTM B221, alloy and temper 6063-T6, weighing 1.39 kg/m (0.94 lb/ft). Members shall be welded together forming a rigid one-piece frame integral with top track. Provide 2 track and wheel assemblies for each gate leaf, except as indicated for gates larger than 30 ft. (9144 mm). Gates over 27 ft. (8230mm) in single opening shall be shipped in 2 parts and field spliced with special attachments provided by manufacturer. Vertical uprights: 2 in. X 2 in. (50 mm X 50 mm) shall be made of aluminum welded to the gate frame, at approximately 2430mm (8 ft.) apart and dividing the frame into equal sections.

Gate leaf single opening	Cantilever support (overhang)
6 ft. (1830 mm) to 10 ft. (3040	6.5 ft. (1980 mm)

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 ft. (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.4 INSTALLATION GENERAL

A. Install fencing on established boundary lines inside property line

B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacing indicated, in firm, undisturbed or compacted soil.

C. Post Setting: Set posts in concrete footing. Protect portion of posts above ground from concrete splatter. Place concrete around posts and consolidation. Using mechanical devices to set posts is not permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.

1. Dimensions and Profile: As indicated on Drawings.
2. Space line posts uniformly at center to center.
3. Exposed Concrete Footings: Extend concrete 2 in. (50 mm) above grade, smooth, and shape to shed water.
4. Concealed Concrete Footings: Stop footings 2 in. (50 mm) <Insert dimension> below grade [as indicated on Drawings] to allow covering with surface material.
5. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with [non shrink, non-metallic grout,] [anchoring cement,] mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
6. Posts Set into Concrete in Voids: Form or core drill holes not less than 5 in. (125 mm) deep and ¾ in. (20 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill granular space between post and concrete with [non shrink, non-metallic grout,] [anchoring cement,] mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
7. Flange Post Installation: Bolt mounting plates attached to each post to slab or structure as indicated, using expansion bolts.

3.5 FENCE INSTALLATION – Model ELITE

A. Terminal Posts: Locate terminal end, corner, and gate posts at changes in horizontal or vertical alignment of [15 degrees or more] [30 degrees or more] [as indicated on Drawings] <Insert requirement>.

B. Square post installation 2 in. or 3 in. (50 mm or 75 mm): Post hole shall be a minimum of 8 in. (200 mm) in diameter and 42 in. (1070 mm) in depth. Once the concrete is set, the mesh sections are installed with the Universal Bracket kits 2 in. or 3 in.(50mm or 75 mm), always install flush with horizontal wire of the panel (no gap). Post spacing are for 2 in.(50mm) post 97-3/4 in. (2483 mm) c/c with an adjustment of ± 1-1/2 in. (38 mm) and for the 3 in.(75mm) post 98-3/4 in. (2508 mm) c/c of the post with an adjustment of ± 1-1/2 in. (38 mm) on each side.

vertical and top alignment, and maintain in position during placement and finishing operations.

C. Install gates perfectly horizontal and levelled (at junction), plumb, and secure for full opening without interference.

D. Attach hardware so to have the nuts inside the property thus making the assembly tamper-proof which will prevent unauthorized removal. Install ground-set items in concrete for anchorage.

E. Adjust hardware for smooth operation and lubricate where necessary to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.9 GROUNDING AND BONDING
(Indicative only. Consult local professional for proper design.)

A. Fence Grounding: Install at maximum intervals of [1500 ft. (450 m)] <Insert a lesser distance where grounding resistance is high> except as follows:

1. Fences within 100 ft. (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of [750 ft. (225 m)]
2. Gates and Other Fence Openings: Ground fence on each side of opening.
3. Bond metal gates to gate posts.
4. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 in. (460 mm) below finished grade.
5. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
6. Material Above Finished Grade: [Copper] [Aluminum].
7. Material On or Below Finished Grade: Copper.
8. Bonding Jumpers: Braided copper tape, 1 in. (25 mm) wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
9. Connectors and Ground Rods: Listed in UL 467.
10. Connectors for Below-Grade Use: Exothermic welded type.
11. Ground Rods: Copper-clad steel. Size: 5/8 in. by 96 in. (16 mm by 2400 mm).

B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 ft. (45 m) on each side of crossing.

C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2, unless otherwise indicated.

D. Grounding Method: At each grounding location, drive a ground rod vertically until the top is 6 in. (150 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.

E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

F. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

3. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout." and/ or Section "Operation and Maintenance Data."
4. Schedule training with Owner (, through Architect,) with at least seven days' advance notice. END OF SECTION 02821

3.13 MAINTENANCE

A. Inspection
   1. A thorough visual inspection shall be done annually.
   2. This inspection must include overall verification of physical condition.

B. Moveable parts shall be adjusted, if needed, every 5 years.

C. In areas of extreme winter conditions, entire installation must be free of excessive ice and snow accumulation.

END OF SECTION 32 31 19

1. Product Data for Credit EQ 4.1: For paints, primers, coatings, adhesives and sealants, including printed statement of VOC content.
2. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
3. Include statement indicating costs for each product having recycled content.
4. Product Data for Credit MR 5.1 and Credit MR 5.2: For products that are manufactured within a radius of 500 miles from project site.
5. Include a statement indicating the percentage by weight which is extracted, harvested, or recovered and manufactured within 500 miles of the Project site.

1.3 INFORMATIONAL SUBMITTALS

A. Submit samples under provisions of Section -Submittal Procedures.

B. Materials List: At a minimum include the following, valves, sprinklers, controller, wire, wire connectors, pipe, fittings, valve boxes, swing joints, pipe hangers, electric valves, wire splices, sprinklers, nozzles, fusing devices, grounding components and quick couplers to be used on the project prior to purchasing materials. Quantities of material need not be included.

C. Manufacturer's Data: Submit manufacturer's catalog cuts, specifications, and operating instructions for the equipment mentioned above and equipment shown on the materials list.

D. Shop Drawings: If there is a change in the design, submit shop drawings for acceptance, submit written operating and maintenance instructions. Provide format and contents as directed by the Landscape Architect. Include instruction sheets and parts lists for all operating equipment.

1.4 CLOSEOUT SUBMITTALS

A. Project Record (As-Built) Drawings
   1. The CONTRACTOR is to provide the OWNER a scaled drawing of the completed field "As-Built" of the system.
   2. All components of the system are to be drawn and referenced to (2) fixed locations on the site.
   3. Components of the system but not limited to, sprinkler heads, electric valves, isolation valves, all PVC piping, quick couplers, PVC pipe sizing, grounding, power wire routes and size and decoder routes from the controller to the electric valves including common runs, sensors, grounding locations, decoder fusing devices and any other installed components. For decoders, all decoder ID's and numbering must be documented and provided to the Owner.

1.5 QUALITY ASSURANCE

A. The "Contractor" shall maintain continuously a competent superintendent, satisfactory to the Owner, with authority to act for him in all matters pertaining to the work. The "Contractor" shall coordinate his work with the other trades.

B. The "Contractor" shall confine his operations to the area to be improved and to the areas allotted him by the Owner's representative for material and equipment storage.

C. The "Contractor" shall have a minimum of 5 years of experience installing irrigation systems of comparable size and complexity. The contractor shall also have suitable financial status to meet obligations for this project.

D. The "Contractor" shall have completed Baseline training prior to the beginning of the irrigation installation.

1.6 RULES AND REGULATIONS

A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.

B. When the contract documents call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, provide the quality and size required by the contract documents.

C. If quantities are provided either in these specifications or on the drawings, these quantities are provided for information only. It is the "Contractor's" responsibility to determine the actual quantities of all material, equipment, and supplies required by the project and to complete an independent estimate of quantities and wastage.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.

B. Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends either threaded or plain.

C. Store and handle materials to prevent damage and deterioration.

D. Provide secure, locked storage for valves, sprinkler heads and similar components that cannot be immediately replaced, to prevent installation delays.

1.8 CODES AND STANDARDS

4. All necessary testing equipment shall be furnished by CONTRACTOR.
5. Cement or caulking to seal leaks is prohibited.

F. Operational Test:
1. Activate each remote control valve in sequence from controller. The Consultant representative will visually observe operation, water application patterns, and leakage.
2. Replace defective remote control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.
4. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to the owner.

1.10 CONSTRUCTION REVIEW

A. The purpose of on-site reviews by the consultant representative is to periodically observe the work in progress, the "Contractor's" interpretation of the construction documents, and to address questions with regard to the installation.

B. Scheduled reviews such as those for irrigation system layout or testing must be scheduled with the consultant representative as required by these specifications.

C. Impromptu reviews may occur at any time during the project.

D. A review may occur at the completion of the irrigation system installation and project record (as-built) drawing submittal.

1.11 GUARANTEE/WARRANTY AND REPLACEMENT

A. It shall be the "Contractor's" responsibility to ensure and guarantee satisfactory operation of the entire system and the workmanship and restoration of the area. The entire system shall be guaranteed to be complete and perfect in every detail for a period of one year from the final acceptance and he hereby agrees to repair or replace any such defects occurring within that year, free of expense to the Owner. The warranty shall be a complete system warranty.

B. Minor maintenance and adjustment shall be by the Owner.

C. For a period of one year from commencement of the final acceptance, fill and repair depressions or settling more than one inch (1"). Restore landscape or structural features damaged by the settlement of irrigation trenches or excavation. Repair damage to the premises caused by a defective item.

D. All equipment shall be listed, approved or rated by a nationally recognized testing and rating bureau of recognized manufacturer's association responsible for setting industry standards. All electrical equipment and apparatus shall be U.L. listed.
   1. Acceptable irrigation manufacturers – As indicated on the drawings.

2.3 SUBSTITUTIONS

A. Equipment Substitutions
   1. Whenever a piece of equipment or material is identified by a manufacturer's trade name, catalog number, etc., it is intended merely to establish a standard; and any equipment of another manufacturer which will perform adequately the requirements of design and is of equal or greater quality than the specifications in the opinion of the LANDSCAPE ARCHITECT will be considered equally acceptable.
   2. The specifications shall permit use of materials of any nationally recognized manufacturer so long as they are fully equal to quality and performance of named item in opinion of LANDSCAPE ARCHITECT. Materials or equipment of other manufacturers may be used upon following conditions.
      a. Proposed substitute is equal in design, materials, construction and performance in opinion of LANDSCAPE ARCHITECT. No compromise in quality level will be allowed.
      b. Service capabilities, availability of service parts, and stability of manufacturer are adequate in opinion of LANDSCAPE ARCHITECT.
      c. CONTRACTOR assumes responsibility for any modifications required for installation of substitute equipment and accommodation of such substitution by work of other contractors.
      Any additional expense on part of other contractors or OWNER due to substitution of equipment shall be borne by CONTRACTOR making such substitution.
      d. Substitute equipment shall fit into space provided with adequate provisions for service and maintenance.

The Contractor shall use materials as specified. Material other than specified will be permitted only after written application by the "Contractor" and written approval by the Landscape Architect PRIOR TO BIDDING. Substitutions will only be allowed when in the best interest of the Owner.

2.4 SLEEVING

A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.
   1. Sleeving material beneath pedestrian pavements shall be SDR21 PVC Class 200 pipe with solvent welded joints.

terminated in valve boxes. Loop tape into and out of all valve boxes.

B. Lateral Pipe and Fitting (Ground Plane)

1. All sprinkler laterals pipe downstream from the zone valves, sized 21/2" and smaller shall be flexible non-toxic polyethylene (PE) pipe. Use SDR-11.5, PE23, rated at 100 PSI that is National Sanitation Foundation (NSF) approved, conforming to ASTM Standard D2239. Use Type 1, PVC insert fitting conforming to ASTM Standard D2609 designed for use with flexible polyethylene (PE) pipe. Use stainless steel worm gear clamps (including stainless steel screw) to join pipe and fittings.
2. Lateral piping on spray heads and small gear drives shall be PE pipe.

D. Specialized Pipe and Fittings:

1. Assemblies calling for threaded pipe connections shall use PVC Schedule 80 nipples and PVC Schedule 40 threaded fittings.
2. Joint sealant: Use only Teflon-type tape on plastic threads.
3. Ductile iron fittings: Joint Restraints - all isolation valves shall have a joint restraint system by LEEMCO or approved equal. All ductile iron fittings shall be slanted, deep bell, gasketed style made in accordance with ASTM-A-536, Grade 65-45-12. Fittings shall have four lugs to accommodate joint restraints and other fittings. Bell sections shall allow 5 degree freedom of pipe deflection within the bell end. Gasket design shall be rib-enforced "U-Cup" configuration to seal and assist in restraining pipe at all pressures. Fittings shall be manufactured by LEEMCO or approved equal.
4. When called for on main lines, use joint restraints on pipe to pipe gasketed joints by LEEMCO or approved equal.
5. Contractor may substitute joint restraints in place of thrust blocks. If joint restraints were to be used, a joint restraint plan must be submitted for approval prior to construction.

E. Thrust Blocks:

1. Use thrust blocks for fitting on pipe utilizing a rubber gasket pipe.
2. Use 3,000 -PSI concrete.
3. Use 2-mil plastic to encapsulate the fitting or valve.

2.6 MAINLINE COMPONENTS

A. Isolation Gate Valve Assembly: As presented in the installation details. Install in a separate valve box over a 3-inch depth of 3/8"-inch washed stone for each assembly.

B. Quick Coupling Valve Assembly: PVC S-80 double swing joint arrangements as presented in the installation details.

2.7 SPRINKLER COMPONENTS

G. Power Wire:
1. Electric wire from the power source to control unit shall be solid or stranded copper. Type UF single-conductor cable, UL approved for direct underground burial. Power wires shall be black, white and green in color.
2. Splices: Use approved connectors.
3. Condult: PVC Schedule 40.
4. Follow all local and state codes.

H. Electric Control Valves
1. All valves shall be of globe or globe/angle configuration with a female pipe thread inlet and outlet connections. Diaphragm assembly shall be sonically welded to form a solid-piece component. The diaphragm shall be of rubber construction to retain flexibility and provide maximum sealing throughout its area.
2. Electric valves shall be 1" Hunter PGV-101G and 1.5" Hunter PGV-151 series electric valves or approved equal. The valve shall have a manual flow control with a hand-operated, rising-type flow control stem with control wheel/handle and an internal manual bleed assembly. Size per plan.
3. All parts shall be serviceable without removing valve from line. Valve may be installed at any angle without affecting valve operation.
4. 22" solenoid lead wires shall be attached to a 24 VAC solenoid with waterproof molded coil capable of being removed by turning coil. Valve shall be held normally closed by internal water pressure with manual bleed screw.
5. The legend and flow arrow shall be applied at all valve locations. Valve numbering shall be located so as to be conspicuous and legible. The controller and valve numbering can be engraved in black on a yellow plastic tag, by Christy's Enterprise or equal. The tag size shall be standard size of 2.25" x 2.66". An additional ID tag is to be attached by plastic zip tie to all electric valves on the green roof.

H. Valve Boxes
1. Valve boxes shall be manufactured by Rainbird VB Series or approved equal and shall be rectangular, 12" /w 6" extension or 7" and 10" round and have "T" lid tops. Use black covers in landscape beds and green covers when located in turf.
2. Valve box shall be of a size that provides adequate space for valve repairs. For decoder systems and valve boxes with the decoder, two valves per 12" rectangular box, other wise 1 electric valve per smaller valve box. A 10" round valve box may be used for isolation valves, quick couplers and wire drops only.
3. The valve box cover shall have the component markings heat stamped into the cover. Use the following symbols for corresponding component in the valve box.
GV - for Gate Valves
EV - for Electric Valves
WS - for Wire Splice

Sprinkler housing shall be of high impact molded plastic. Sprinkler shall have a large strainer so as to prevent nozzle clogging. Sprinkler shall be constructed such that it is serviceable from top in that drive assembly, screen, and all internal components are accessible throughout top of sprinkler without disturbing case installation. The sprinkler shall have a built-in pressure regulation devise to regulate nozzle pressure regardless of the inlet pressure. The sprinkler shall have a drain check valve for up to 10 feet of elevation change.

3. Type and location of nozzles shall be RainBird HeVAN, Hunter Pro-Sprays and PRO adjustable; nozzle patterns vary, see plan for arcs and radius.

L. Sprinkler heads shall be mounted on funny/flex pipe flexible connection. Maximum funny pipe length to be 18". Appropriate saddles may be used on lateral piping. Contractor may use a Hunter SJ-012 series swing joint or approved equal in place of the flex pipe and barb fitting.

M. Sprinkler Heads – MP Rotators

1. The MP rotator sprinklers shall be a 4" or 12" Hunter PROS-PRS40-CV or approved equal, w/check Series pop up sprinkler or approved equal. Sprinkler shall be mounted flush with final grade.
2. Retraction shall be achieved by a heavy-duty stainless steel retraction spring. Sprinkler shall have a riser seal and a wiper. Sprinkler housing shall be of high impact molded plastic. Sprinkler shall have a large strainer so as to prevent nozzle clogging. Sprinkler shall be constructed such that it is serviceable from top in that drive assembly, screen, and all internal components are accessible throughout top of sprinkler without disturbing case installation. The sprinkler shall have a built-in pressure regulation devise to regulate nozzle pressure regardless of the inlet pressure. The sprinkler shall have a drain check valve for up to 10 feet of elevation change. Type and location of nozzles shall be Hunter MP Rotator. Nozzles vary.

O. Solvent Weld Fittings

1. Solvent weld PVC fittings shall be Schedule 40, ASTM D-2466 and ASTM D-1784. PVC Schedule-40 fittings shall be produced from PVC Type 1, Cell classification 1245B. Fittings shall be manufactured by Lasco or approved equal. All solvents and cements shall be that recommended by the manufacturer.
2. S-80 PVC fittings may be used and may be threaded or solvent weld. S-80 TOE Nipples with S-80 couplings for plastic to metal connections. (S-80 nipples cut in half will not be allowed)

P. Gate/Isolation Valves

1. Isolation valves 2", 2.5", 3" & 4" shall be ductile iron resilient seated globe valves. Valve body and restraint clamps shall be constructed of ductile iron per ASTM A-536, Grade 65-42-12. Epoxy coating on all interior and exterior surfaces shall be fusion bonded epoxy, 10-12 mil thickness. Valve mechanism and hardware shall be made of 100% 304-series stainless steel. The valve stem shall be fine threaded stainless steel, O-ring sealed for

B. Utility Locations:
   1. The exact location of all existing utilities and structures and underground utilities are not indicated on the drawings; their locations shall be determined by the "Contractor", and he shall conduct his work so as to prevent interruption of service or damage to them.
   2. Arrange for and coordinate with local authorities the location of all underground utilities.
   3. Repair any underground utilities damaged during construction. Make repairs at no additional cost above the contract price.
   4. The "Contractor" shall protect existing structures and utility services and be responsible for their replacement if damaged by him.

C. Irrigation System Layout Review:
   1. Irrigation system layout review will occur after the staking has been completed unless specifically waived by the Landscape Architect. Notify the engineer/landscape architect one week in advance of review.
   2. The engineer/landscape architect at this review will identify modifications.

3.2 LAYOUT OF WORK

A. Stake out the irrigation system. Items staked include: sprinklers, pipe, control valves, manual drains, quick coupling valves, controller, isolation valves and any misc. components.

B. Install all mainline pipe and mainline components inside of project property lines.

C. Minor adjustments in system layout will be permitted to clear existing fixed obstructions. Final system layout shall be acceptable to the Landscape Architect.

3.3 EXCAVATION, TRENCHING, AND BACKFILLING

A. Excavating shall be considered unclassified and shall include all materials encountered, except materials that cannot be excavated by normal mechanical means.

B. Excavate to permit the pipes to be laid at the intended elevations and to permit work space for installing connections and fittings.

C. Minimum cover (distance from top of pipe or control wire to finish grade):
   1. 18-inch over top of pipe mainline pipe.
   2. 10-inch over control wire, follow local and state requirements if they dictate a deeper bury depth.
   3. 12-inch over top of pipe lateral pipe to sprinklers.

D. PVC mainlines or PVC lateral pipes 2-1/2" and smaller may be pulled into the soil using a vibratory plow device specifically manufactured for

Installation methods, procedures and materials shall be in accordance with accepted industry practice and with standards of manufacturing and contracting associations applicable to the work. All work shall be neatly done with special emphasis on appearance of work exposed to view.

3.5 SLEEVING AND BORING

A. Install sleeving at a depth that permits the encased pipe or wiring to remain at the specified burial depth.

B. Extend sleeve ends 3 feet beyond the edge of the paved surface. Cover pipe ends and mark with stakes.

C. Bore for sleeves under obstructions that cannot be removed. Employ equipment and methods designed for horizontal boring.

3.6 ASSEMBLING PIPE AND FITTING:

A. General:
1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends.
2. Keep ends of assembled pipe capped. Removed caps only when necessary to continue assembly.
3. All mainline and continuously pressurized pipe is to be installed using open trenches. Lateral pipe may be installed by "Plowing" if soil conditions permit, and soils do not contain gravel, rock, construction debris, or other potential damaging material.
4. Trenches may be curved to change direction or avoid obstructions within the limits of the curvature of the pipe.

B. Mainline, lateral piping and Fittings:
1. Use only strap-type friction wrenches for threaded plastic pipe.
2. PVC Rubber-Gasketed Pipe:
   a. Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
   b. Epoxy-coated steel fittings shall not be struck with a metallic tool. Cushion blows with a wood block or similar shock absorber.
3. PVC Solvent Weld Pipe:
   a. Use a primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.
   b. Cure for 30 minutes before handling and 24 hours before allowing water in pipe.
   c. Snake pipe from side to side within the trench.
4. Fittings: the uses of cross type fittings are not permitted.
5. Install thrust blocks on the mainline pipe work in accordance with pipe manufacturer's written instructions.

C. Specialized Pipe and Fitting:
1. Low-Density Polyethylene Hose: Install per manufacturer's recommendations.

2. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with the identification numbers (see drawings) of the remote control valve to which the control wire is connected.
3. Connect control wires to the corresponding controller terminal.

B. Control Wire:
1. For decoder systems, bundle control wires where two or more are in the same trench. Bundle with pipe wrapping tape at 15-foot intervals.
2. Control wiring may be chiseled into the soil using a vibratory plow device specifically manufactured for pipe pulling and wire installation. Appropriate chisel must be used so that wire is fed into a chute on the chisel, and wire is not subject to pulling tension. Minimum burial depth must equal minimum cover previously listed.
3. Provide a 24-inch excess length of wire in an 8-inch diameter loop at each 90-degree change of direction, at both ends of sleeves and at 100-foot intervals along continuous runs of wiring. Do not tie wiring loop. Coil 24-inch length of wire within each remote control valve box.
4. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box that contains an irrigation valve assembly, or in a separate 10-inch round valve box.
5. Use same procedure for connection to valves as for in-line splices.
6. Protect wire not installed with PVC mainline pipe with a continuous run of warning tape placed in the backfill six inches above the wiring.
7. Allow 5 feet of extra wire on the decoder cable and allow 5' of extra wire for decoder to solenoid wiring to allow for above grade maintenance.

C. Instrumentation:
1. Install sensor per the installation details and manufacturer's recommendations. Install at locations shown on the drawings.
2. Install electrical connections between central control unit components and sensors per manufacturer's recommendations.

3.9 INSTALLATION OF OTHER COMPONENTS:

A. Tools and Spare Parts: Prior to the review at completion of construction, supply to the owner operating keys, servicing tools, spare parts, test equipment and any other items indicated in general notes on the drawings.

B. Other Materials: Install other materials or equipment shown on the drawings or installation details which are part of the irrigation system, even though such items may not have been referenced in these specifications.

to operate the system. This tablet is to be accessible to the designer for any walk troughs that are scheduled.

D. If a site visit to verify Substantial Completion and final acceptance has been scheduled and the Landscape Architect or Irrigation Consultant arrives at the site and determines that the irrigation system is not substantially complete or ready for final acceptance (all system components in place, operational and checked) the Contractor shall be responsible for all costs incurred by the Landscape Architect or Irrigation Consultant to visit the site for the incomplete final acceptance. Reimbursable expenses include but are not limited to the following: Mileage, airfare, consultants' time, parking fee, meals, rental car, etc. All incurred expenses will be deducted from the final contract amount.

3.14 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work.
Remove from site all excess materials, soils, debris and equipment. Repair damage resulting from sprinkler system installation.

END OF SECTION

1. ASTM: American Society of Testing Materials cited section numbers.
2. U.S. Department of Agriculture, Natural Resources Conservation Service, 2003. National Soil Survey Handbook, title 430-VI. Available Online.
3. US Composting Council www.compostingcouncil.org
4. *Methods of Soil Analysis*, as published by the Soil Science Society of America (http://www.soils.org/).
5. Up by Roots: healthy soils and trees in the built environment. 2008. J. Urban. International Society of Arboriculture, Champaign, IL.

1.4 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exist between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Landscape Architect in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Landscape Architect shall determine which shall govern.

1.5 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to the Contractor's actions.

1.6 CHANGES IN WORK

A. The Landscape Architect may order changes in the work, and the contract sum adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

1.7 CORRECTION OF WORK

A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Landscape Architect, at the soonest possible time that can be coordinated with other work and seasonal weather demands but not more than 180 (one hundred and eighty) days after notification.

1.8 DEFINITIONS

A. Acceptable drainage: Drainage rate is sufficient for the plants to be grown and

Q. Pine Bark Fines: Horticultural grade, coarsely ground, 5/8" screened, and aged Southern Yellow or Northern Red Pine bark fines with cambium and wood fiber removed and further defined in this specification.

R. Planting Soil: Topsoil, or Planting Soil Mixes which are imported or existing at the site, or made from components that exist at the site, or are imported to the site; used as the Planting Soil and further defined in this specification.

S. Scarify: Loosening and roughening the surface of soil and sub soil prior to adding additional soil on top, and as further defined in this specification.

T. Soil Fracturing: Deep loosening the soil to the depths specified by using a back hoe, and as further defined in this specification.

U. Soil Horizons: as defined in the USDA National Soil Survey Handbook, or constructed layers in a fabricated soil profile.

V. Soil Ripping: Loosening the soil by dragging a ripping shank or chisel thru the soil to the depths and spacing specified and as further defined in this specification.

W. Soil Tilling: Loosening the surface of the soil to the depths specified with a rotary tine tilling machine, or rototiller and further defined in this specification.

X. Subgrade: surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, or the top of the drainage layer before placing Planting Soil.

Y. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil, and Irrigation installation where the Landscape Architect accepts that all work in these sections is complete and the Warranty period has begun. This date may be different than the date of substantial completion for the other sections of the project, and as further defined in this specification.

Z. End of Warranty Acceptance: The date when the Landscape Architect accepts that the plants and work in this section meet all the requirements of the warranty. It is intended that the materials and workmanship warranty for Planting, Planting Soil, and Irrigation work run concurrent with each other.

1.9 SUBMITTALS

A. See the contract General Conditions for policy and procedures related to submittals.

B. Submit all product submittals twelve (12) weeks prior to the start of the soil work with the exception of Planting Soil Mixes, noted below, which are dependent on the approval of previous component submittals.

C. Product data and certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:

1. Submit manufacturers or supplier's product data and literature certified analysis for standard products and bulk materials, complying with testing requirements and referenced standards and specific requested testing.

a. For Imported Topsoil submit the following analysis by an approved laboratory:
1.) Soil texture: Particle size analysis (% dry weight) and USDA soil

No 50 (0.297mm)

D. Samples: Submit samples of each product and material, where required by Part 2 of the specification, to the Landscape Architect for approval. Label samples to indicate product, characteristics, and locations in the work. Samples will be reviewed for appearance only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1. Submit samples a minimum of 8 weeks prior to the anticipated date of the start of soil installation.
2. Samples of all Topsoil, Coarse Sand, Compost, and Planting Soil shall be submitted at the same time as the particle size and physical analysis of that material.

E. Soil testing for Planting Soil Mixes.

1. Planting Soil Mix testing: Submit soil test analysis report for each sample of Planting Soil from an approved soil-testing laboratory and where indicated in Part 2 of the specification as follows:
   a. Submit Topsoil, Compost, Peat Moss, and Pine Bark Fines for testing at least 8 weeks before scheduled installation of Planting Soil Mixes. Submit Planting Soil Mix test no more than 2 weeks after the approval of the Topsoil, Compost, Peat Moss, and Pine Bark Fines. Do not submit to the testing laboratory, Planting Soil Mixes for testing until all Topsoil, Compost, Peat Moss, and Pine Bark Fines have been approved.
   b. If tests fail to meet the specifications, obtain other sources of material, retest and resubmit until accepted by the Landscape Architect.
   c. All soil testing will be at the expense of the Contractor.
2. Provide a particle size analysis (% dry weight) and USDA soil texture analysis. Soil testing of Planting Soil Mixes shall also include USDA gradation (percentage) of gravel, coarse sand, medium sand, and fine sand in addition to silt and clay.
3. Provide the following other soil properties:
   a. pH (in $CaCl_2$) and buffer pH.
   b. Organic Matter Content %, by LOI (loss on ignition)
   c. Nutrient levels by parts per million including: phosphorus, potassium magnesium, manganese, iron, zinc and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified.
   d. Salinity (electrical conductivity) in mmho/cm (Sat Paste Extract).
   e. Cation Exchange Capacity (CEC)
   f. Bulk Density at 85% Standard Proctor.
   g. Coefficient of Uniformity (Cu)
   h. Coefficient of Curvature (Cc)
   i. D50 in mm
   j. USDA Textural Classification
   k. Infiltration Rate (Ksat) in/hr

F. LEED SUBMITTALS SOIL

1. All submittals and documentation for LEED compliance shall comply with the

soil moisture readings to the Landscape Architect.

4. The mockup area may remain as part of the installed work at the end of the project if protected from further compaction, contamination or other disturbance.

5. Provide a protective 4 foot high fence on metal post around each mockup to keep all work and equipment from entering the surface of the mockup area.

1.11 INSPECTION AND OBSERVATION OF THE WORK

A. The Landscape Architect may inspect the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.

1. The Landscape Architect may utilize the Contractor's penetrometer and moisture meter at any time to check soil compaction and moisture.

B. The Landscape Architect shall be informed of the progress of the work so the work may be observed at the following key times in the construction process. The Landscape Architect shall be afforded sufficient time to schedule visit to the site. Failure of the Landscape Architect to make field observations shall not relieve the Contractor from meeting all the requirements of this specification.

1. SOIL MOCKUP REVIEW: At the time of construction of all soil mockups.

2. EXISTING SOIL CONDITIONS REVIEW: Prior to the start of any soil modification that will utilize or modify the existing soil.

3. EXCAVATION REVIEW: Inspect each area of excavation prior to the installation of any Planting Soil.

4. DRAIN LINE INSTALLATION REVIEW: Upon completion of the installation of drain lines and prior to the installation of any Planting Soil

5. COMPLETION of SOIL MODIFICATIONS REVIEW: Upon completion of all soil modification and installation of planting soil.

6. COMPLETION OF FINE GRADING AND SURFACE SOIL MODIFICATIONS REVIEW: Upon completion of all surface soil modifications and fine grading but prior to the installation of shrubs, ground covers, or lawns.

1.12 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction meeting with the Landscape Architect at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1.13 QUALITY ASSURANCE

A. Installer Qualifications: The installer shall be a firm having at least 5 years of successful experience of a scope similar to that required for the Work, including the preparation, mixing and installation of custom planting. The installer of the work in Section: Planting, shall be the same firm installing the work in this

in the approved mockup when at similar moisture levels.

1.14 SITE CONDITIONS

A. It is the responsibility of the Contractor to be aware of all surface and subsurface conditions, and to notify the Landscape Architect, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.

1. Should subsurface drainage or soil conditions be encountered which would be detrimental to growth or survival of plant material, the Contractor shall notify the Landscape Architect in writing, stating the conditions and submit a proposal covering cost of corrections. If the Contractor fails to notify the Landscape Architect of such conditions, he/she shall remain responsible for plant material under the warrantee clause of the specifications.

2. This specification requires that all Planting Soil and Irrigation work be completed and accepted prior to the installation of any plants.

1.15 SOIL COMPACTION – GENERAL REQUIREMENTS

A. Except where more stringent requirements are defined in this specification. The following parameters shall define the general description of the threshold points of soil compaction in existing, modified or installed soil and subsoil.

B. The following are threshold levels of compaction as determined by each method.

1. Acceptable Compaction: Good rooting anticipated, but increasing settlement expected as compaction is reduced and/or in soil with a high organic matter content.
   a. Bulk Density Method – Varies by soil type see Chart on page 32 in Up By Roots.
   b. Standard Proctor Method – 75-85%; soil below 75% is unstable and will settle excessively.
   c. Penetration Resistance Method – about 75-250 psi, below 75 psi soil becomes increasingly unstable and will settle excessively

2. Root limiting Compaction: Root growth is limited with fewer, shorter and slower growing roots.
   a. Bulk Density Method – Varies by soil type see Chart on page 32 in Up By Roots.
   b. Standard Proctor Method – above approximately 85%.
   c. Penetration Resistance Method – about 300 psi.

3. Excessive Compaction: Roots not likely to grow but can penetrate when soil moisture is above field capacity.
   a. Bulk Density Method – Varies by soil type see Chart on page 32 in Up By Roots.
   b. Standard Proctor Method – Above 90%.
   c. Penetration Resistance Method – Approximately above 400 psi

1.16 DELIVERY, STORAGE, AND HANDLING

A. Weather: Do not mix, deliver, place or grade soils when frozen or with moisture above field capacity.

f. Soil chemistry suitable for growing the plants specified.
g. Bulk density suitable for plant growth (based on soil texture) when compacted to 85% of maximum dry weight (standard proctor test).
h. Saturated Hydraulic Conductivity (Ksat): Minimum of 12"/hr when compacted to 85% of maximum dry weight (standard proctor). Or as further defined in this specification.
i. Provide a two gallon sample with manufacturer's literature and material certification that the product meets the requirements.

4. Imported Topsoil shall be a harvested soil from fields or development sites. The organic content and particle size distribution shall be the result of natural soil formation. Manufactured soils where Coarse Sand, Composted organic matter or chemical additives has been added to the soil to meet the requirements of this specification section shall not be acceptable.

5. Imported Topsoil for Planting Soil shall be **screened through a 2" grid** and shall retain all soil peds or clods ≤ 2 inches in diameter throughout the stockpile after harvesting. Retained soil peds shall be the same color on the inside as is visible on the outside.

6. Provide a two gallon sample from each Imported Topsoil source with required soil testing results. The sample shall be a mixture of the random samples taken around the source stockpile or field.

B. Compost

1. Compost: Organic blended material, composted for a minimum of 9 months and at temperatures sufficient to break down all woody fibers, seeds and leaf structures, free of toxic and non-organic matter. Source material shall be yard waste trimmings blended with other organic material designed to produce Compost high in fungal material.

2. Compost shall meet US Compost Council STA/TMECC criteria.

3. Compost shall comply with the following parameters:
   a. pH: 5.5 - 8.0.
   b. Salinity (electrical conductivity): maximum 5 dS/m (mmhos/cm).
   c. Moisture content %, wet weight basis: 30 - 50.
   d. Particle size, dry weight basis: 98% pass through 3/4 inch screen.
   e. Stability carbon dioxide evolution rate: mg CO_2-C/ g OM/ day < 2.
   f. Solvita maturity test: > 6.
   g. Physical contaminants (inerts), %, dry weight basis: <1%.
   h. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3 levels.
   i. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements.

4. Provide a two gallon sample with manufacturer's literature and material certification that the product meets the requirements.

C. Pine Bark Fines

1. Pine Bark Fines shall be aged Southern Yellow Pine bark finely ground, 5/8"

2. Provide manufacturer's literature and material certification that the product meets the requirements.

G. Biological Soil Fertility Amendments

1. Vermamax™ - Organic Pre-Plant Fertilizer Amendment. Apply at half the label rates for each plant type. Apply 40lbs per 1000sf for turf areas and annual bedding areas.
   a. Southern Organics and Supply

      Phone: (866) 240-8501
      Email: vermaplex@live.com

2. VermaPlex™ - Liquid Soil Inoculant Amendment. Apply at specified rates for each plant type or planting area.
   a. Southern Organics and Supply

      Phone: (866) 240-8501
      Email: vermaplex@live.com

3. Nutri-Cast™ - Granular Pre-Plant Bio-Stimulant Amendment with biological nitrogen fixation bacteria. Apply at specified rates for each plant type or planting area.
   a. Southern Organics and Supply

      Phone: (866) 240-8501
      Email: vermaplex@live.com

H. PRE-EMERGENT HERBICIDES

1. Chemical herbicides are designed to prevent seeds of selective plants from germinating. Exact type of herbicide shall be based on the specific plants to be controlled and the most effective date of application.

2. Submit report of expected weed problems and the recommendation of the most effective control for approval by Landscape Architect. Provide manufacturer's literature and material certification that the product meets the requirements.

2.2 PLANTING SOIL MIXES

A. General definition: Mixes of Imported Topsoil, Pine Bark Fines, Peat Moss, and/or Compost to make a new soil that meets the project goals for the indicated planting area. These will vary in mix components and proportions as indicated.

B. LAWN SOIL MIX: Lawn Areas (24" depth) over clean fill (12" depth)

1. Imported Topsoil and Peat Moss thoroughly blended into a uniform mixture.

2. The approximate mix ratio shall be 85-95% Topsoil and 5-15% Peat Moss. Adjust the mix proportions to achieve the following:
   a. Infiltration rate (Ksat) of 6-8"/hr
   b. Bulk density of1.5-1.6 g/cc when compacted to 85% of maximum dry weight (standard proctor)

1. Imported Topsoil and Peat Moss thoroughly blended into a uniform mixture.
2. The approximate mix ratio shall be 60% Topsoil and 40% Peat Moss. Adjust the mix proportions to achieve the following:
   a. Organic Matter (LOI) of 30-40%
   b. Soil pH of 6.0-7.0
3. Provide two gallon sample with mix proportions and testing data per SECTION 1.9.A-E for approval. Samples and testing data shall be submitted at the same time.
4. DO NOT add Fertilizer or Biological Soil Fertility amendments.

2.3 SITE EXAMINATION

A. Prior to installation of Planting Soil, examine site to confirm that existing conditions are satisfactory for the work of this section to proceed.

1. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope toward the under drain lines as shown on the drawings.
2. Confirm that surface all areas of the to be filled with Planting Soil are free of construction debris, refuse, compressible or biodegradable materials, stones greater than 2 inches diameter, soil crusting films of silt or clay that reduces or stops drainage from the Planting Soil into the subsoil; and/or standing water. Remove unsuitable material from the site.
3. Confirm that no adverse drainage conditions are present.
4. Confirm that no conditions are present which are detrimental to plant growth.
5. Confirm that utility work has been completed per the drawings.
6. Confirm that irrigation work, which is shown to be installed below prepared soil levels, has been completed.

B. If unsatisfactory conditions are encountered, notify the Landscape Architect immediately to determine corrective action before proceeding.

2.4 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines, heads or the conduits of other utility lines that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Landscape Architect of any conflicts encountered.

2.5 GRADE AND ELEVATION CONTROL

A. Provide grade and elevation control during installation of Planting Soil. Utilize grade stakes, surveying equipment, and other means and methods to assure that grades and contours conform to the grades indicated on the plans.

planting holes shall be filled with water and allowed to drain before starting any planting operations. If the moisture is too high, suspend planting operations until the soil moisture drains to below field capacity.

2.8 PLANTING SOIL AND PLANTING SOIL MIX INSTALLATION

A. Prior to installing any Planting Soil from stockpiles or Planting Soil Mixes blended off site, the Landscape Architect shall approve the condition of the subgrade and the previously installed subgrade preparation and the installation of subsurface drainage.

B. All equipment utilized to install or grade Planting Soils shall be wide track or balloon tire machines rated with a ground pressure of 4 PSI or less. All grading and soil delivery equipment shall have buckets equipped with 6 inch long teeth to scarify any soil that becomes compacted.

C. In areas of soil installation above existing subsoil, loosen the subgrade material prior to installing Planting Soil.

1. Loosen the subsoil of the subgrade to a depth of 3 – 6 inches with the teeth of the back hoe or loader bucket, tiller or other suitable device.

2. Immediately install the Planting Soil. Protect the loosened area from traffic. DO NOT allow the loosened subgrade to become compacted.

3. In the event that the loosened area becomes overly compacted, loosen the area again prior to installing the Planting Soil.

D. Install the Planting Soil in 12 - 18 inch lifts to the required depths. Apply compacting forces to each lift as required to attain the required compaction. Scarify the top of each lift prior to adding more Planting Soil.

E. Phase work such that equipment to deliver or grade soil does not have to operate over previously installed Planting Soil. Work in rows of lifts the width of the extension of the bucket on the loader. Install all lifts in one row before proceeding to the next. Work out from the furthest part of each bed from the soil delivery point to the edge of the each bed area.

F. Where possible place large trees first and fill Planting Soil around the root ball.

G. Installing soil with soil or mulch blowers or soil slingers shall not be permitted due to the over mixing and soil ped breakdown cause by this type of equipment.

H. Where travel over installed soil is unavoidable, limit paths of traffic to reduce the impact of compaction in Planting Soil. Each time equipment passes over the installed soil it shall reverse out of the area along the same path with the teeth of the bucket dropped to scarify the soil. Comply with the paragraph "Compaction Reduction" (section 3.8) in the event that soil becomes over compacted.

I. The depths and grades shown on the drawings are the final grades after settlement and shrinkage of the organic material. The Contractor shall install the Planting Soil at a higher level to anticipate this reduction of Planting Soil volume. A minimum settlement of approximately 10 - 15% of the soil depth is expected. All grade increases are assumed to be as measured prior to addition of surface Compost till layer, mulch, or sod.

consultant, as indicated in this specification, and as appropriate for the soil condition and specific plants to be installed.

B. Types, application rates and methods of application shall be approved by the Landscape Architect prior to any applications.

2.12 FINE GRADING

A. The Landscape Architect shall approve all rough grading prior to the installation of organic matter, fine grading, planting, and mulching.

B. Grade the finish surface of all planted areas to meet the grades shown on the drawings, allowing the finished grades to remain higher (10 - 15% of depth of soil modification) than the grades on the grading plan, as defined in paragraph Planting Soil Installation, to anticipate settlement over the first year.

C. Utilize hand equipment or small garden tractors with rakes or buckets with teeth for fine grading to keep surface rough without further compaction. Do not use the bottom of a loader bucket that will cause the finished grade the smooth and or slightly compress.

D. Provide for positive drainage from all areas toward the existing inlets, drainage structures and or the edges of planting beds. Adjust grades as directed to reflect actual constructed field conditions of paving, wall and inlet elevations. Notify the Landscape Architect in the event that conditions make it impossible to achieve positive drainage.

E. Provide smooth, rounded transitions between slopes of different gradients and direction. Modify the grade so that the finish grade before adding mulch and after settlement is one or two inches below all paving surfaces or as directed by the drawings.

F. Fill all dips and remove any bumps in the overall plane of the slope. The tolerance for dips and bumps in shrub and ground cover planting areas shall be a 2 inches deviation from the plane in 10 feet. The tolerance for dips and bumps in lawn areas shall be a 1 inch deviation from the plane in 10 feet.

2.13 INSTALLATION OF COMPOST TILL LAYER

A. After Planting Soil Mixes are installed in planting bed areas noted on the drawing and just prior to the installation of shrub or groundcover plantings, spread 2 - 3 inches of Compost over the beds and roto till into the top 4 - 6 inches of the Planting Soil. This step will raise grades slightly above the grades required in paragraph "Fine Grading". This specification anticipates that the raise in grade due to this tilling will settle within a few months after installation as Compost breaks down. Additional settlement as defined in paragraph "Planting Soil and Planting Soil Mix installation" must still be accounted for in the setting of final grades.

2.14 APPLICATION OF BIOLOGICAL SOIL FERTILITY AMENDMENTS

A. Tree pit planting areas:

1. After placement of tree root ball, incorporate the following products.
   a. Tree Drench: Prepare and apply 1 gallon of 20% VermaPlex solution from concentrate per 1 inch caliper of tree, drenched over the rootball.

2.17 PROTECTION DURING CONSTRUCTION

A. The Contractor shall protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers.

1. Maintain protection during installation until the date of plant acceptance (see specifications section - Planting). Treat, repair or replace damaged work immediately.

2. Provide temporary erosion control as needed to stop soil erosion until the site is stabilized with mulch, plantings or turf.

B. Damage done by the Contractor, or any of their subcontractors to existing or installed plants, or any other parts of the work or existing features to remain, including large existing trees, soil, paving, utilities, lighting, irrigation, other finished work and surfaces including those on adjacent property, shall be cleaned, repaired or replaced by the Contractor at no expense to the Owner. The Landscape Architect shall determine when such cleaning, replacement or repair is satisfactory.

2.18 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Landscape Architect shall review the work and make a determination if the work is substantially complete.

B. The date of substantial completion of the planting soil shall be the date when the Landscape Architect accepts that all work in Planting, Planting Soil, and Irrigation installation sections is complete.

2.19 FINAL ACCEPTANCE / SOIL SETTLEMENT

A. At the end of the plant warrantee and maintenance period, (see Specification section - Planting) the Landscape Architect shall inspect the soil installation work and establish that all provisions of the contract are complete and the work is satisfactory.

1. Restore any soil settlement and or erosion areas to the grades shown on the drawings. When restoring soil grades remove and plants and mulch and add soil before restoring the planting. Do not add soil over the root balls of plants or on top of mulch.

B. Failure to pass inspection: If the work falls to pass final inspection, any subsequent inspections must be rescheduled as per above. The cost to the Owner for additional inspections will be charged to the Contractor at the prevailing hourly rate of the inspector.

PART 3 - STRUCTURAL SOIL

3.1 GENERAL

A. The specifications provided in this section consist of and are applicable to the research-based structural soil, urban tree soil mix, to safely increase rooting volumes and marketed under the registered trademarks CU-Structural Soil® and/or CU-Soil®. Only AMEREQ-licensed companies are authorized to produce

compliance with ASTM D422 after destruction of organic matter by hydrogen peroxide.

2. Contractor to submit from AMEREQ-licensed producer, a chemical analysis, performed in accordance with current AOAC Standards, including the following:
   1.) pH and buffer pH.
   2.) Percent organic matter as determined by the loss of ignition of oven dried samples. Test samples shall be oven dried to a constant weight at a temperature of 230 degrees F, plus or minus 9 degrees.
   3.) Analysis for nutrient levels by parts per million.
   4.) Soluble salt by electrical conductivity of a 1:2 soil/water sample measured in Milliohm per cm.
   5.) Cation Exchange Capacity (CEC).
   6.) Carbon/Nitrogen Ratio.

C. Contractor to submit from AMEREQ-licensed producer, one cubic foot sample of crushed stone which will be used in production of CU-Soil®.

1. Provide particle size analysis:

USDA Designation	Size in mm.
3"	+76 mm
$2^1/_2$"	63-76 mm
2"	50-63 mm
$1^1/_2$"	37-50 mm
1"	25-37 mm
¾"	19-25 mm
Fine gravel	2-19 mm

2. Provide the manufacturers analysis of the loose and rodded unit weight
3. Losses from LA Abrasion tests- not to exceed 40%
4. Minimum 90% with 2 or more fractured faces
5. Percent pore space analysis

D. At the engineer's discretion, the sample of CU-Structural Soil® may be tested for the following:

1. Compaction in accordance with ASTM D698/AASHTO T99 without removing oversize aggregate
2. California Bearing Ratio in accordance with ASTM D1883- soaked CBR shall equal or exceed a value of 50
3. Measured dry-weight percentage of stone in the mixture

E. The approved CU-Structural Soil® sample shall be the standard.

F. Any deviation from the specified crushed stone and clay loam specifications shall be approved by Amereq, Inc.

3.4 DELIVERY, STORAGE AND HANDLING

1. Should nutrient analysis suggest that the loam or clay loam need additional nutrients, it shall be amended by Amereq's licensed producer.

C. SULFUR (if needed)

1. Sulfur shall be a commercial granular, 96% pure sulfur, with material and analysis appearing on the labeled container.
2. Sulfur used to lower pH shall be a ferrous sulfate formulation.
3. Application rates shall be dependent on soil test results.

D. CRUSHED STONE

1. The size of the crushed stone shall be 0.75 inches to 1.5 inches allowing for up to 10% being greater than 1.5 inches, and up to 10% less than 0.75 inches.
2. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions.
3. Minimum 90% with two or more fractured faces.
4. Results of Aggregate Soundness Loss test shall not exceed 18%.
5. Losses from LA Abrasion tests shall not exceed 40%.

E. HYDROGEL

1. Hydrogel shall be a coated potassium propenoate-propenamide copolymer (Gelscape® Hydrogel Tackifier) as manufactured by Amereq, Inc. 800-832-8788.

F. WATER

1. The installing contractor shall be responsible to furnish his own supply of water (if needed) free of impurities, to the site.

G. CU-STRUCTURAL SOIL®

1. A uniformly blended urban tree mixture of crushed stone, clay loam and Gelscape® Hydrogel Tackifier, as produced by an Amereq-licensed company, mixed in the following proportion:

Material	Unit of Weight
specified crushed Stone	100 units dry weight
specified clay loam	20 – 25 units (to achieve minimum CBR of 50)
Gelscape® Hydrogel Tackifier	0.035 units dry weight
	ASTM D698/AASHTO T-99 optimum moisture

3.8 PRODUCTION AND INSTALLATION GUIDELINES

A. CU-SOIL® MIXING AND QUALITY CONTROL TESTING

1. All CU-Structural Soil® mixing shall be performed at the licensed producer's yard using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. No mixing of CU-Structural Soil® at the project site shall be permitted.

7. Protect adjacent walls, walks and utilities from damage. Use ½" plywood and/or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
   a. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
   b. Any damage to the paving or architectural work caused by the installing contractor shall be repaired, as directed by the engineer.
8. Maintain all silt and sediment control devices required by applicable regulations. Provide adequate methods to assure that trucks and other equipment do not track soil from the site onto adjacent property and the public right of way.

D. INSTALLATION OF CU-STRUCTURAL SOIL® MATERIAL

1. Install CU-Structural Soil® in 6 inch lifts and compact each lift.
2. Compact all materials to at least 95% Proctor Density from a standard compaction curve AASHTO T 99 (ASTM D 698). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction if moisture content exceeds maximum allowable and protect CU-Structural Soil® during delays in compaction with plastic or plywood as directed by the engineer.
3. Bring CU-Structural Soil® to finished grades as shown on the drawings. Immediately protect the CU-Structural Soil® from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the engineer.
4. The engineer may periodically check the material being delivered, prior to installation for color and texture consistency with the approved sample provided by the installing contractor as part of the submittal for CU-Structural Soil®. If the engineer determines that the delivered CU-Soil® varies significantly from the approved samples, the engineer shall contact the licensed producer.
5. Engineer shall ensure that the delivered structural soil was produced by the approved CU-Soil® licensee by inspecting weight tickets showing source of material.
6. CU-Soil® should not be stockpiled long-term. Any CU-Soil® not installed immediately should be protected by a tarp or other waterproof covering.

E. FINE GRADING

1. After the initial placement and rough grading of the CU-Structural Soil® but prior to the start of fine grading, the installing contractor shall request review of the rough grading by the engineer. The installing contractor shall set sufficient grade stakes for checking the finished grades.
2. Adjust the finish grades to meet field conditions as directed.
   Provide smooth transitions between slopes of different gradients and direction.
   Fill all dips with CU-Soil® and remove any bumps in the overall plane of the

32 92 00
LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Sodding.

B. Related Sections include the following:
   1. Division 32 Section "Earthwork" for excavation, filling and backfilling, and rough grading.
   2. Division 32 "Finish grading"
   3. Division 32 "Topsoil".

1.3 SUBMITTALS

A. Product Data.

B. Certification of Sod: From vendor identifying the botanical and common name and percentage by weight of each species and variety.

C. Sod: Development photos to be provided to the Landscape Architect through the growing season. Sod inspection to be conducted by the Landscape Architect and Contractor prior to cutting and delivering to site.

D. Product Certificates: For fertilizers, signed by product manufacturer.

E. Qualification Data: For landscape Installer.

F. Planting Schedule: Indicating anticipated planting dates.

G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns and grasses during a calendar year. Submit before expiration of required maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and grass establishment.

0.5 percent inert contaminants and free of substances toxic to plantings; and with organic matter content of 50-60% range.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
   1. Protect adjacent and adjoining areas from damage and overspray.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 LAWN BED PREPARATION

A. Newly Graded Areas: Loosen planting soil mix subgrade to a minimum depth of 4 inches Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

B. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil by Remove existing grass, vegetation, and turf. Do not mix into surface soil. Loosen surface soil to a depth of at least of 4 inches.

3.3 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
   1. Lay sod across angle of slopes exceeding 1:3.
   2. Anchor sod on slopes exceeding 1:4 with biodegradable staples spaced as recommended by sod supplier but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION

1. Certification of seed mixture(s) from supplier, stating the botanical and common names of each species, composition by weight of each species; including the year of production and date of packaging.
2. Documentation of PLS (Pure Live Seed) testing from qualified independent testing laboratory for each species.
3. Product data sheets for all herbicides, erosion-control materials and nuisance species control products used on project.

C. Documentation of amended soils and topsoil testing by qualified testing lab, refer to section 325103 Topsoil.

D. Planting schedule for all seeding and planting shall be submitted to Owner before installation begins.

E. Recommended maintenance procedures to be established by Owner for maintenance of native prairie area for period of three years. Submit to Owner before start of required initial maintenance periods.

1.5 PRODUCT HANDLING

A. Seed shall be shipped and stored in the supplier's original packaging until installed. Seed shall be stored in a manner to protect from moisture, heat, or other conditions that would jeopardize viability or cause germination before installation.

B. If seed blends are to be provided, seed shall be mixed prior to delivery by the supplier or contractor.

C. Deliver seed in original sealed, labeled, and undamaged containers. Retain all labels and/or containers in an on-site location, through substantial completion date.

1.6 JOB CONDITIONS

A. Seed in accordance with scheduling specifications as defined in section 4.7.

B. Coordinate planting periods with initial maintenance periods to provide maintenance from date of substantial completion.

C. Proceed with planting only when existing and forecasted weather conditions permit.

1.7 SCHEDULING

A. Site schedule and preparation overview. Provide a schedule to Landscape Architect for preparations, coordinate with Leopardo and make recommendations. Contractor shall be aware that multiple applications of cover crop and herbicide are required.

B. Methods of installation will vary according to the time of year. Following are general guidelines and should be modified according to site conditions, slopes, local weather patterns, seed mix type, and other factors.

1. *November 1 Thru February 28.* Seed must be protected from displacement by water and wind erosion. Seeding on bare, graded

3. **Stormwater System Seed Mix** listed on page 24 of the Taylor Creek restoration Nurseries 2016 supply catalogue, that include Dry Swale/Pond Mix , Emergent Mix, Shoreline mix, Swale and Basin Mix, Wetland Grass and Sedge Mix (meeting IDOT Class 4B requirements) and others available at Taylor Creek Restoration Nurseries, 17921 Smith Road, P.O. Box 256, Brodhead, WI 53520; F (608-897-8641/608-897-2044) nurseryservice@appliedeco.com.
4. **Upland Prairie Seed Mixes** listed on page 23 of the Taylor Creek restoration Nurseries 2016 supply catalogue, that include Clay soils, mesic prairie mix, Dry Prairie General Mix, Fob with annuals mix (Idot Class 5 mix), High Diversity prai4rie Mis, Landfill Basic mix, Large Flower Native Forb mix (IDOT Class 5A mix), Low Profile Native grass Mix (IDOT Class 4A mix), Short Grass Prairie Mix, and Woodland Mix. and others available at Taylor Creek Restoration Nurseries, 17921 Smith Road, P.O. Box 256, Brodhead, WI 53520; F (608-897-8641/608-897-2044) nurseryservice@appliedeco.com.

2.2 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, glyphosate herbicide of the type recommended by manufacturer for application.

2.3 EROSION CONTROL MATERIALS

B. Erosion-Control Blankets: Biodegradable wood excelsior, straw or coconut-fiber mat enclosed in a biodegradable mesh. Include manufacturer's recommended steel wire staples, of a length appropriate for site soil conditions.

PART 3- EXECUTION

3.1 EXAMINATION

A. Excavated or newly graded planting areas shall have topsoil stockpiled onsite and re-applied after earthwork is complete.
B. Acceptable topsoil shall consist of loose friable loam, free of heavy clay, refuse, stumps and large roots, rocks over 2 inches in diameter, brush, weeds and weed seeds, or other material which would be detrimental to the proper development of vegetative growth. Topsoil should contain 3 to 5 percent organic matter by test. See Soil Specifications – Section 329100.
C. Measure compaction of subsoil before application of topsoil, and again in the topsoil after application of the full 6 inches. Measure compaction in the subgrade before topsoil application utilizing proctor test (ASTM D 698-91), or equal, to a depth of 12 inches. One sample should be taken per 400 square feet (every 20 feet). If readings average greater than 85% standard proctor, the soil must be ripped, disced, or otherwise loosened to a depth of at least 12 inches until compaction readings average below

topsoil, measure soil compaction as specified below and decompact as necessary.

2. After decompaction, the surface should be prepared for seeding by any method which leaves the upper 2-3 inches broken down into a fine-particle seedbed with no clods larger than 3" diameter. The final graded surface should conform to the elevations shown in the plans to +/- .25 foot.

D. If crusting from rainfall has occurred, re-scarification is required. Scarification may not be required if drill seeding is to occur.

E. The seedbed must not be too soft or seed may become buried too deep. As a test, if adult human footsteps in the seedbed average more than ½ inch deep, the seedbed should be cultipacked or rolled to create a firmer surface.

3.3 SEEDING

A.

B. No-till Drill seeding

1. A rangeland-type no-till drill designed to plant native grasses and forbs may be used in bare soils although this equipment is specifically designed to plant through existing vegetation which normally has been killed with a herbicide (see *3.2.A. Vegetated sites,* above). Cultipacking or rolling before seeding may be required to prevent seed placement depths exceeding ¼ inch, but cultipacking or rolling after seeding is not required. Small seed can be broadcast by removal of the seed distribution tubes from applying the seed behind the coulter disks on the drill and allowing the seed to fall upon the disked surface of soil.

C. All seeding equipment, should be calibrated to deliver the seed at the rates and proportions specified in the plans. Equipment should be operated in such a manner as to ensure complete coverage of the entire area to be seeded, and seed must be placed no deeper than ¼ inch in the soil.

D. No fertilizers or soil conditioners will be required or allowed.

3.4 EROSION-CONTROL MATERIALS

A. Seeding on steep slopes (greater than 3:1 as specified) shall be protected with erosion control blankets.

B. Seeding on lesser slopes shall be protected with blown and crimped straw mulch at 1.5 tons per acre.

C. Seed drilled into existing vegetation or on flat ground may not require erosion control protection.

3.5 NATIVE SEEDED AREA MAINTENANCE

A. Maintain a satisfactory prairie by weeding, mowing, and replanting for 12 months after final planting.

as red clover (*Trifolium spp.),* white or yellow sweet clover (*Melilotus spp*), canada thistle (*Cirsium arvense*), tall fescue (*Festuca elatior),* etc.

G. Survival percentages shall be established by sampling of one square meter quadrats located at regular intervals along transects. The number of quadrants shall be as needed to sample a minimum of 0.2% of the total planting area in each planting zone, and there shall be at least one randomly-located transect in each planting zone. The sampling plan shall be approved by the project designer after consultation with the project restoration ecologist.

H. If these standards are not met, the contractor should be responsible for supplemental seedings in accordance with the specifications and with input from a restoration ecologist if necessary. Losses due to animal depredation, extremes in weather such as drought or excessive precipitation, or lack of water control, should not be covered under this warranty.

END OF SECTION

1.3 DEFINITIONS

A. Natural Disaster: The term "Natural Disaster" shall be defined as any event that is unpredictable and uncontrollable by Landscape Architect, Owner, or contractor. Any predictable and preventable events made known to the Contractor prior to installation shall not be defined as a natural disaster.

B. Supplemental Planting Aids: The term "Supplemental Plant Aids" shall be defined as any and all supportive measures employed to ensure that installed plant material meets the requirements outlined in this specification at the end of the warranty period.

C. Large Caliper Tree: The term "Large Caliper Tree" shall be defined as any specified tree or approved substitute tree 4 inches or greater in caliper in size.

D. Hard to find Plants: Plants that may be difficult to locate because of size, variety, quantity or other market conditions, such that the contractor may be required purchase the plants early in the construction process to secure supply. Early purchase allows the plant to grow to the required size during part of the construction period. Plants may need to be custom propagated and grown to assure supply.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer product data and literature describing all products required by this section to Landscape Architect for approval. Provide submittal twelve weeks before the installation of plant material.

B. Material Certificates: Submit material certificates for all natural and bulk material indicating that the material meets the requirements of the specification to Landscape Architect for approval. Provide submittal twelve weeks before the installation of plant material.

C. Samples: Submit samples of each product and material where required by the specification to Landscape Architect for approval. Label samples to indicate product, characteristics, and locations in the Work. Samples will be reviewed for appearance only. Compliance with all other requirements is the exclusive responsibility of the contractor.

D. Percolation Test: After the Contractor has performed percolation tests (as outlined in Part 3 - Execution, Percolation Test), the Contractor shall submit a log of the percolation rates, with a plan outlining the locations of each test pit before planting trees. Provide submittal before beginning construction.

E. Plant Material Sources: Submit sources of all plants as required by Article - "Selection of Plant Materials" to Landscape Architect for approval.

1.5 SEQUENCING AND SCHEDULING

A. Prior to the start of Work, prepare a detailed schedule of the work for coordination with other trades. Prepare planting schedule in accordance with normal planting time of the specified plant material.

B. Do not schedule installation of plant material in areas that require additional access for other work.

1.6 QUALITY ASSURANCE

A. Plant Acceptance:

1. Landscape Architect will inspect all work for substantial completion upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection. Acceptance of plant material by Landscape Architect shall be for general conformance to specified size, character and quality and not relieve the Contractor of responsibility for full conformance to the contract documents, including correct species.
2. The Contractor is responsible for the condition and quality of work and materials during construction, and until Final Acceptance. Contractor shall bear the total cost of replacing any and all plant material until this time.

B. Warranty: See 3.20 Maintenance and Warranty (this section is void if Owner is self warranting material, refer to the Contract Documents).

1. Submit for the Owner's documentation. Furnish written warranty in form stipulated by Landscape Architect, signed by the contractor and the installer, agreeing to replace defective Work, which has failed as a result of defects in the growth or health of the plant materials. Defective plant materials are defined as plant materials that are dead or not in a healthy, attractive condition as defined below.
2. Plant material warranty shall begin on the date of Substantial Completion and continue for the following periods: See 3.20 Maintenance and Warranty.

C. Final Acceptance (this section is void if Owner is self warranting material, refer to the Contract Documents):

1. At the end of the warranty period, Landscape Architect, shall inspect all warranted work, upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date for final inspection.
2. Final Acceptance will be given only when all the requirements of this specification have been met.

D. Contractor's Quality Assurance Responsibilities: contractor is solely responsible for quality control of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Follow the requirements of Article "Execution."

1.8 SELECTION OF PLANT MATERIAL

A. Trees are to be pre-selected and will be ribboned/sealed by the Landscape Architect or approved via photos provided by the Contractor. Trees are to be held at nursery locations and maintained at Contractors expense until time of delivery. Contractor price to include maintenance at nursery locations, delivery/freight to Project site, installation and on-site maintenance until acceptance by Owner at substantial completion.
   1. The Contractor shall have the right to assume that pre-selected trees are from a nursery source and will be properly and appropriately maintained in-ground or above-ground until the time of harvest/delivery. The Contractor shall notify the Landscape Architect of any trees failing to meet standards of quality defined in this specification. Maintenance practices at nursery locations to be completed by the nursery at the Contractor's expense shall include but not necessarily be limited to the following:
      a. In a protected area, shrink wrap sides of root balls, properly secure root balls with gravel or other approved materials in order to maintain properly orientated form and completely surround with mulch until time of delivery. Re-mulch as necessary to maintain coverage. Ensure the protected site is well drained and free of standing water.
      b. Provide irrigation system and monitor root balls for appropriate soil moisture based on individual species requirements.
      c. Provide fertilizer as appropriate based on individual species requirements. Fertilizer to be applied through irrigation system, all other methods to be approved by Landscape Architect.
      d. Monitor trees for pests and diseases; consult an arborist and the Landscape Architect at the first sign of symptoms. Provide treatment as necessary based on arborist review of plant material.
      e. Provide systemic borer preventative root drench treatment to species such as Betula and/or other potentially susceptible species.
      f. Nursery to re-burlap all root balls if necessary prior to shipment to project site.
   2. The Contractor shall have the right to visit the nursery where the pre-selected and pre-purchased trees are growing to review and accept the plant material quality and condition prior to or during the bidding process.
   3. Contractor to coordinate necessary root pruning, harvest, installation procedures, timelines, and warranties with terms and conditions of the pre-selection contract.
   4. Maintenance practices prior to planting once material is delivered to the project site and in the Contractor's possession shall include but not necessarily be limited to the following:

d. For all hard to find plants including shrubs, perennials and ground covers, the contractor shall secure from the grower an additional number of plants equal to 20 percent of the total required. These plants may be used as replacement plants or in the event of design changes requiring additional plants and shall be maintained by the contract grower during the warranty period. At the end of the warrantee period, the contractor shall retain Ownership of any remaining plants, however, the Owner shall have first right of refusal to purchase any remaining custom grown plants at the end of the warranty period.

2. Sources for hard to find plants, that will be custom propagated and grown, shall be viewed by Landscape Architect no less than two months prior to the date that propagation processes.

C. Maintain a Plant Source Location Log, including; the botanical and common name of the plant, the botanical and common name of the root stock if different from the top of the plant, the source nursery where the material is tagged, location within nursery, size of trees, any tag or seal numbers, colors of flagging tape, canopy height, spread, branching height, required root ball size, depth of roots prior to digging, container size and any root remediation or special harvesting requirements. Submit the Plant Source Location Log for approval by Landscape Architect. The Plant Source Location Log shall be submitted periodically after each nursery viewing trip and kept up dated during the contract period. The Plant Source Location Log shall be submitted for final approval.

D. Schedule with Landscape Architect for viewing plant materials at nurseries. Ensure that there is sufficient material of the required size, quality and quantity at the nursery before scheduling a trip. The trips to the nurseries shall be efficiently arranged to allow Landscape Architect to maximize viewing time. Where possible each trip should include visiting more than one nursery. Compliance with all other requirements is the exclusive responsibility of the contractor.

E. For B&B plants, viewing of plants shall, where possible, be at the growing nursery prior to the harvesting of the plant.

F. Landscape Architect may choose to attach their seal to each plant, or a representative sample and/or photo. Viewing and/or sealing of plant materials by Landscape Architect at the nursery does not preclude Landscape Architect's right to reject material while on site. The Contractor is responsible for paying any up charge for Landscape Architect to attach their seal to specific plant material.

G. As requested by Landscape Architect, submit photographs of plant materials or representative samples of plants. At minimum, provide photographs of all custom propagated and grown material. Photographs shall be legible and clearly depict the plant specimen. Each submitted image shall contain a height reference, such as a person and/or measuring stick. The approval of plant materials by Landscape Architect via

improper transportation or, maneuvering or handling, improper installation or improper watering.

1.9 PLANT SUBSTITUTIONS FOR PLANT MATERIAL NOT AVAILABLE

A. Submit all requests for substitutions of plant material species, or size to Landscape Architect for approval, prior to purchasing the proposed substitution. Request for substitution shall be accompanied with a list of nurseries contacted in the search for the required plant and a record of other attempts to locate the required material including advertisements in nursery trade journals such as the "Landscape Materials Information Service" or consultations with recognized plant brokers and a record of the response to those attempts. Request shall also include sources of plants found that may be of a smaller or larger size than specified, or plants of the same genus and species but different cultivar origin, or which may otherwise not meet the requirements of the specifications, which may be available for substitution. Suggested alternatives that are of a different size from the required plant shall be accompanied with a price proposal if the alternative substitution will change the terms of the contract.

1.10 REJECTION OF PLANT MATERIALS

A. Landscape Architect has the right to reject any and all plant material that does not conform to the requirements of this specification at anytime regardless of any previous approval.

B. When a plant has been rejected by the Landscape Architect and/or Owner immediately remove it from the area of the Work and replace it with a plant of the required species, size and quality at the earliest planting period consistent with these specifications. Replacement plant material shall meet all the requirements of this specification. Rejected plants shall be replaced at no cost to the Owner.

C. Acceptance shall not be given for the planting Work until all plants rejected during the course of the Work are replaced.

D. Any plant that has the following characteristics shall be cause for rejection:

1. Any plant that has a canopy with 25 percent or more dead or removed limbs.
2. Evidence of damage to plant material, which diminishes the aesthetic character and form or structural integrity of the plant or group of plants
3. Evidence of improper digging; inadequate protection following digging carelessness while in transit; evidence of desiccation or wind-related damage; cold damage; improper handing or storage; root zones that have dried to the point of leaf wilt; cracked, loose, damaged or distorted root balls.
4. Plants with undersized root balls or containers, kinked or girding roots, matted roots on the top, and edges of the container, excessive surface

PART 2 - PRODUCTS

2.1 PLANT MATERIAL: GENERAL

A. Provide trees and plants of quantity, size, genus, species, and variety or cultivars as shown and scheduled in contract documents. All plant material shall conform to ANSI Z60.1 "American Standard for Nursery Stock", unless specified otherwise by this specification.

1. Caliper Measurement shall be taken at a point on the trunk 6 inches above natural ground line for trees smaller than 4 inch caliper, and at a point 12 inch above the natural ground line for trees 4 inch caliper or larger.
2. Plants larger than specified may be used if acceptable to Landscape Architect. Use of such plants shall not increase the contract price. If larger plants are accepted the ball-of-earth shall be increased in proportion to the size of the plant.
3. Plants shall be measured when branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to tip.
4. If a range of size is given, no plant shall be less than the minimum size and not less than 50 percent of the plants shall be as large as the maximum size specified. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required.

B. Plants shall have outstanding form; symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight distinct leader where this is characteristic of the species. Plants that meet the measurements specified, but do not possess a normal balance between height and spread, shall be rejected. Landscape Architect shall be the final arbiter of acceptability of plant form.

C. Plants shall be true species and variety and shall conform to measurements, specified in the plant list.

D. Trees or large shrubs shall not have co-dominant leaders or branch crotch unions without evidence of a bark ridge.

E. Provide healthy, vigorous stock, grown in a recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, scrapes, broken or split branches, fresh limb cuts, sunscald, injuries, abrasions, or disfigurement. All graft unions shall be completely healed, free of extreme succulence. All graft unions shall be visible above the soil line.

F. Plants shall not be pruned before delivery. Trees, which have a damaged or crooked leader, or multiple leaders, unless specifically specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots, or fresh cut of limbs over 1 inch diameter which have not completely callused, will be rejected.

4. Alternative nursery sources shall be presented for approval by the Landscape Architect

2.3 BALLED AND BURLAPPED PLANT MATERIAL

A. Provide quality plant material of height or caliper scheduled or shown and with branching configurations and spread characteristics as recommended by ANSI Z60.1.

B. Shrubs: Provide quality single-stem or caned balled and burlapped (B&B) deciduous shrub, except where special forms are shown or listed.

C. Evergreens: Provide quality balled and burlapped (B&B) evergreens with well-balanced form complying with requirements for other size relationships to the primary dimension shown. Landscape Architect has the option to specify evergreen shrubs by height.

D. Large-Caliper Trees:

1. Trees shall be root-pruned a minimum of one growing season before transplanting. All root pruning shall be done by hand, with sharp, clean, rust-free shears.

   a. A trench shall be dug around the tree at the limit of the proposed root ball to a minimum depth of 24 inch and back-filled.
   b. A 3" high saucer shall be built around the tree outside the edge of the trench.
   c. The tree shall be guyed or braced.
   d. After tree has been root-pruned, ensure that the root ball is watered regularly by hand and by using watering bags. Do not rely on automatic spray irrigation, and do not over water. Check the soil moisture of the root ball with a soil probe; making sure that the moisture level remains moist.
   e. When the tree is dug, the digging shall be done using methods that preserve the new root growth growing in the soft soil of the trench.

2. At the time of root pruning, any remedial pruning required by Landscape Architect shall be performed.
3. Large-caliper trees shall be dug prior to bud-break in the spring, for spring-dig only plants. Trees shall not be dug between bud-break and hardening-off period in early summer. Trees shall not be dug in the summer, without the written permission from Landscape Architect.

E. Harvesting and Root Ball Requirements: All balled and burlapped trees and shrubs shall be harvested with the following modifications to standard nursery practices.

1. Prior to digging each tree and any shrub greater than 3 feet in height, check for the location of the structural roots within the root ball area. Using a surveyor's chain pin, or other suitable device, probe into the

2.4 BOX GROWN PLANT MATERIAL

A. Box grown plants shall consist of trees and shrubs.

B. Provide plants established and well rooted with not less than the minimum number and length of runners required by ANSI Z60.1 for the box size shown or listed.

C. Box class size shall conform to ANSI Z60.1 for each size and type of plant.

D. Box-grown stock shall have been grown in a box long enough for the root system to have developed sufficiently to hold its soil together but not so long as to have developed a girdling root mat around the edge of the container.

E. The root system of each box grown plant shall be inspected by the contractor to determine the condition of the roots. Remedial action to remove circling and matted roots on the edge of the container as described in part 3 of this section shall be performed.

2.5 CONTAINER GROWN PLANT MATERIAL

A. Container grown plants shall consist of trees, shrubs, groundcovers, vines, annuals, and perennials. Container grown trees and shrubs may be permitted when indicated on the drawing or approved by Landscape Architect.

B. Provide plants established and well rooted in removable containers or integral peat pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.

C. Container class size shall conform to ANSI Z60.1 for each size and type of plant.

D. Container-grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil together but not so long as to have developed a girdling root mat around the edge of the container.

E. The root system of each container grown plant shall be inspected by the contractor to determine the condition of the roots. Remedial action to remove circling and matted roots on the edge of the container as described in part 3 of this section shall be performed.

F. Initiate contract growing vines within 20 days of being awarded the contract to allow for as mature growth as possible.

2.6 ROTATIONAL PLANTS

A. Plants shall be well rooted, filling the pot size indicated on the plans.

2.10 TREE WRAPPING

A. A. Tree wrapping to be Osnaburg Cloth, 4-7/8 inch wide, unbleached, pinked on both edges, manufactured by Carnegie Textile Co., 6501 Hough Avenue, Cleveland, OH 44103 secured with a 3-ply jute twine. Submit manufacturer's product data for approval.

2.11 WATERING BAGS - USED AT CONTRACTOR'S DISCRETION

A. Watering bags shall be Treegator Irrigation Bags, sized to the appropriate model for the requirements of the plant, manufactured by Spectrum Products, Inc, Youngsville, NC 27596. Submit manufacturer's product data for approval.

1. Watering bags used for this project shall become the property of the Owner at the end of the warranty period.

2.12 FERTILIZER

A. Fertilizer for planting shall be a complete fertilizer, part of the elements of which from organic sources, and shall contain the following percentages by weight:

1. Determine percentage based on soil analysis. Example below:

2. (5-10-5). Nitrogen 5 percent, Phosphoric Acid 10 percent, Potash 5 percent. It shall be uniform in composition, dry, free-flowing, and shall be delivered to the site in the original unopened containers, all bearing the manufacturer's guaranteed analysis.

B. Fertilizer for refertilization during maintenance period shall be (20-20-20).

C. Microrhyzome Stimulant: M-Roots dry ROOTS with mycorrhiza 3-3-3m or approved equal. Supply specifications for an "approved equal" before Landscape Architect's approval. Stiumulant shall be watered in at the root zone to promote root growth. Decidduous and evergreen microrhyzome products shall be used according to manufacturer's recommendations.

1. Source:

Roots Inc.
3120 Weatherford Road
Independence, MO 64055
Phone: 800-342-6173

2.13 RODENT PROTECTION

A. Provide minimum ¼ inch 18 gauge galvanized woven/welded hardware cloth below lava rock at all tree grate and tree vault locations. Overlap at

each pit with water and allow water to percolate out. Test pits shall be roped off at all times, and filled in when test is complete. If water does not percolate out over a 12 hour period, contact Landscape Architect. Although only one tree percolation test is required for every 15 trees, the Landscape Contractor is still responsible for ensuring that every tree drains properly. Landscape Contractor to submit Percolation Test Log to Landscape Architect before installing plant material on site.

3.2 DELIVERY, STORAGE AND HANDLING

A. Contractor is responsible for all shipping and transporting. Do not bend or bind-tie trees or plants in a way that damages bark, breaks branches, or destroys natural shape. Transport all plants at night. Use tree stands for specimen plants seven feet of larger in size. Provide protective nursery tarp during all transportation. Rubber and/or plastic tarps are not acceptable. Improper shipping techniques shall be cause of rejection. Use drop deck trailers for all large and specimen plant material.

B. When weather conditions are such that exposure to sun, wind, and extremes of heat or cold temperatures during transit may adversely affect health of plants, transport plant material to site in controlled environment trailer. Use carrier experienced in handling live plants.

C. Protect materials from deterioration during delivery and while stored at the site. Adequately protect plants from drying out, exposure of roots to sun, wind or extremes of heat and cold temperatures. If planting is delayed more than 24 hours after delivery, set plants in shade and cover balled and burlapped root balls with moist mulch. Provide adequate water to the root ball or container during the storage period. Heel in bare rootstock in mulch, wet moss or other acceptable material. Do not remove container stock from containers until planting time.

D. Provide systemic borer preventative root drench to all susceptible plant species prior to delivery to project site.

E. Do not prune prior to delivery unless otherwise approved by Landscape Architect. Do not bend or bind-tie trees or plants in a way that damages bark, breaks branches, or destroys natural shape.

F. Provide protective covering over all vehicles during delivery of all plants.

G. If deciduous trees are moved when in full-leaf, spray with an approved anti-desiccant per manufacturer's recommendations at nursery no greater than 48 hours prior to digging, and again two weeks after transplanting. Spraying should take place in early morning hours with foliage at maximum turgidity. It is the responsibility of the contractor to decide if anti-desiccant shall be applied to the tree before delivery.

H. Store bulbs, corms, and tubers in a dry place at 60 to 6 deg F until planting. Confirm holding containers.

3.5 LAYOUT AND PLANTING SEQUENCE

A. When applicable, plant trees before adjacent shrubs, groundcovers, vines and other plants are in place. Where spacing dimensions or locations are not clear, notify Landscape Architect before installation.

B. The Landscape Architect shall be present during the plant layout. Notify Landscape Architect, one (1) week prior to layout for approval. Layout trips shall be arranged to maximize Landscape Architects viewing time for layout of all individual plant locations. Place plants above surface at planting location or place a labeled stake at planting location. Layout bed lines with paint for Landscape Architect's approval. Secure Landscape Architect's acceptance *before* digging and start of planting work.

C. Shrub layout can take place prior or simultaneous to herbaceous and annual layout.

D. All plants shall be located on site in close proximity to their install beds prior to layout with Landscape Architect.

E. It is understood that plants are not precise objects and that minor adjustments in the layout will be required as the planting plan is constructed. These adjustments may not be apparent until some or all of the plants are installed. Make adjustments as required by Landscape Architect, including relocating previously installed plants.

F. To layout herbaceous and annual material in any bed, ALL plants must be on site and available for layout. The layout cannot take place in parts or with missing material.

G. Contractor to verify size and spacing to provide continuous hedges as shown in the Drawings at time of installation unless otherwise noted.

3.6 INSTALLATION OF B&B TREES AND SHRUBS

A. Inspect each plant after delivery and prior to installation for damage of other characteristics that may cause rejection of the plant. Notify Landscape Architect of any condition observed.

B. Note the location of the white dot on the tree base and record the distance from the center of the dot to the top of the root ball on the Plant Source Location Log. Note any discrepancies from the required dimension and immediately notify Landscape Architect if the distance is greater than +/- 2 inches. Trees that do not comply with the required remediation of the root ball soil level may be rejected, or Landscape Architect may direct the contractor to remove soil from the top of the structural roots.

C. Excavate pits, beds, and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect

3.7 INSTALLATION OF CONTAINER GROWN PLANTS

A. Remove plastic, paper or fiber pots from containerized plant material. Inspect the root system. Plants that have girdling roots that cannot be removed without severely stressing the plant shall be rejected. Notify Landscape Architect of any plants with girdling roots. Landscape Architect may request that random containerized plants be dug up after planting to inspect the roots for compliance with these specifications.

B. Pull roots out of the root mat, cut circling roots with a sharp knife. Loosen the potting medium and shake away from the root mat. Pack planting mix with fingers around the exposed roots while planting.

C. Dig holes large enough to allow for spreading of roots and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soil.

D. Install the plant such that the top of the root ball is at the finish grade of the surrounding soil.

E. Water each plant on the day of installation to saturate the soil around the roots and wash the soil into the root zone. After the soil has drained, reset any settled plants or grades around the plant, adding soil if required.

3.8 INSTALLATION OF GROUND COVER, PERENNIAL, ANNUAL, AND BULB PLANTINGS

A. Ground cover plantings and bulb holes shall be dug with a hand trowel, bulb planter, or hoe. If beds have been mulched prior to planting, remove all mulch around the hole before digging so that each plant and bulb is planted in the plant mix. Do not mix mulch into the plant mix.

B. Before planting, biodegradable pots shall be crushed and non-biodegradable pots shall be removed. Root systems of all potted plants shall be split or crumbled to eliminate circling roots.

C. Each plant shall be planted so that the roots of the plants are surrounded by soil below the mulch. Potted plants shall be set so that the top of the pot is even with existing grade. Bare root plants shall be covered up to the crown of the plant or soil level.

D. Plant all bulbs at equal depths approximate to the species. All bulbs shall have a minimum amount of soil covering the top of the bulb equal to three times the diameter of the bulb.

E Set all plants and bulbs at an equal distance apart as shown.

F. Place mulch in the bed such that the entire bed is covered in mulch. Lift leaves and stems of plants out of the mulch when covered.

the tree. Check the base of each tree below the mulch line to assure that no twine or tape is left in place.

3.12 STRAIGHTENING TREES AND SHRUBS

A. Maintain all trees and shrubs in a plumb position throughout the warranty period. Straighten all trees including those not staked. Plants to be straightened shall be excavated and the root ball moved to a plumb position, and then re-backfilled.

B. Do not straighten plants by pulling the trunk with guys.

3.13 INSTALLATION OF FERTILIZER

A. Fertilizer: Fertilizers shall be applied according to the manufacturer's instructions. Apply M-Roots as per label rates and application methods. Do not apply any fertilizer to large-caliper tree plantings during the first year after transplanting.

3.14 PRUNING OF TREES AND SHRUBS

A. Prune plants as directed by Landscape Architect at the time of planting and according preserve the natural character of the plant. Pruning shall follow recommendations in "An Illustrated Guide to Pruning, Second Edition." **Pruning of Alee trees shall be coordinated with Landscape Architect at the time of planting and shall include all necessary equipment and materials as noted in this section. Provide at least 7 days notice for Landscape Architect to appear in person to direct pruning.**

B. An arborist certified by the International Society of Arboriculture shall perform all pruning.

C. Wherever possible and appropriate to the species preserve or create a central leader.

D. Pruning of large trees shall be done from a hydraulic man lift if required to gain access to the top of the tree.

E. Remove and replace excessively pruned or malformed stock resulting from improper pruning.

F. Pruning shall be done with clean, sharp, rust-free tools. Cuts shall be made flush, leaving no stubs as per ANSI A 300 - 1995. No tree paint or sealants shall be used.

G. Dead wood, suckers, and broken and badly bruised branches shall be removed. Do not prune plant material that has been severely damaged due to transit or handling until viewed by Landscape Architect.

D. Maintain a log of all irrigation controller settings and adjustments.

3.17 CLEAN-UP

A. During installation, keep pavements clean and work area in an orderly condition.

B. Keep the site free of garbage at all times. Immediately dispose of wrappings or waste materials associated with products necessary for the completion of the work.

C. All garbage shall be kept in a central collection container. Do not bury garbage in back-fill.

D. Once installation is complete, remove any excess soil from pavements or embedded fixtures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site. Landscape Architect seals are to remain, as per Article, Installation of B&B Trees and Shrubs.

3.18 PROTECTION DURING CONSTRUCTION

A. The Contractor shall protect landscape work and materials from damage due to landscape operations, operations by other Contractors or trespassers. Maintain protection during installation until acceptance. Treat, repair or replace damaged landscape work immediately.

B. Damage done to plant materials, or any of the work, by the Contractor, or any of their sub-consultants, shall be replaced by the Contractor at no expense to the Owner.

3.19 PLANT MAINTENANCE (see also 1.8 A)

A. During the project and prior to Final Acceptance, the Contractor shall maintain the site, including completed work and existing conditions. Once the project is complete, the Contractor shall make periodic site visits to inspect the site. A written record of each visit shall be submitted to Landscape Architect.

B. Maintenance during the period prior to Acceptance shall consist of annual changeout, pruning, watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, repairing and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings free of insects and disease, and in healthy growing condition. Planting areas shall be kept free of weeds, grass, and other undesirable vegetative growth.

apply to plants intentionally removed as part of seasonal rotations.

2. Alternate Tree Warranty Period:

   a. As determined between Owner, Landscape Architect, and Contractor.

3. Inspection During Warranty Period: Conduct routine inspections with Owner and Landscape Architect of installed plant material during the specified warranty period. Provide a written report for each inspection to Owner or Landscape Architect. Include details on how the maintenance is being carried out, and make recommendations to the Owner to protect the warranty. Conduct a minimum of 4 site inspections per year occurring in May, June, July, and August.
4. When the work is accepted in parts, the warranty periods shall extend from each of the partial acceptances to the terminal date of the last warranty period. Thus, all warranty periods for each class of warranty, terminate at one time.
5. Plants that are dead, diseased, insect infested, or not in a vigorous, thriving condition, as determined by Landscape Architect during or at the end of the warranty period, shall be deemed defective. Plants that have had more than 25% of their branches die or removed shall be replaced. Plants that have had a major branch or side of the plant removed such that current or future aesthetic appeal or structural integrity of the plant, as determined by Landscape Architect, is diminished shall be considered defective. Plant material determined to be defective shall be replaced without cost to the Owner, as soon as weather conditions permit and within the specified planting period.
6. The Contractor is exempt from replacing plants, after Substantial Completion and during the warranty period, that are removed by others, lost or damaged due to occupancy of project in any part, lost or damaged by a third party, vandalism, or any natural disaster.
7. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
8. The warranty of all replacement plants shall extend for an additional one-year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended warranty period, the Owner may elect one more replacement items or credit for each item. These replacement items are not protected under a warranty period.
9. At the end of the warranty period, and no less than five days prior to final inspection, tree wrap, ties, and other temporary planting aids shall be removed from the site. Tree wraps should not be on trunks during active growing seasons. All trees that have leaned shall be straightened.

END OF SECTION

B. Shop Drawings: Submit Shop Drawings for fabrication and installation. Include the following:

1. Plans, elevations, and detail sections showing sizes, critical dimensions, panel layout constraints using a 2 x 2 inch modular grid, and details and locations of accessories.

2. Indicate materials, methods, finishes, fittings, fasteners, anchorages, and accessory items.

C. Verification Samples: Two samples representing actual products and finishes as follows:

1. Welded wire grid panel, 6 in. x 6 in., with one edge of channel trim and one edge of angle trim, all as one unit.

2. Color Submittals: Submit metal chips, 2 in. x 3-1/2 in. minimum, showing color and texture to be provided.

D. LEED Submittals:

1. A completed LEED Reporting Form (LRF) with a separate line item completed for each LEED Focus Materials (LFM).

2. Product cut sheets for each LFM confirming that the submitted products are the products installed as part of the Work.

3. Validation: Provide validation for the LFMs according to the Action Submittals requirements of [Section 01 8113 "Sustainable Design Requirements"]

a. Recycled Content

b. Regional Materials.

4. Materials Resources Certificates:
a. Certify source and origin for salvaged and recycled products.
b. Certify source for regional materials and distance from Project site.

5. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products. Provide cost data for the following products:

1.5 LEED FOCUS MATERIALS

A. LEED Focus Materials (LFMs) for this Section:

1. Steel products

D. Handle and store products according to manufacturer's recommendations. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.

E. Exercise care not to scratch, mark, dent, or bend metal components during delivery, storage, and installation.

1.9 PROJECT CONDITIONS

A. Verify actual openings by field measurements before fabrication; show recorded measurements on shop drawings.

B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. The welded wire panel plant support system and accessories shall have completed an ISO Compliant 14040/44, third party verified Life Cycle Assessment (LCA).

2.2 ACCEPTABLE MANUFACTURER

A. greenscreen®, 1743 La Cienega Blvd., Los Angeles, CA 90035; Tel: 1-800-450-3494; Fax: 310-837-0523, www.greenscreen.com.

2.3 PANELS

A. Panels shall be rigid, three dimensional welded wire grid fabricated of 14 gage galvanized steel wire.

1. Metallic-Coated Steel Wire: Welded-wire, galvanized in accordance with ASTM A641.

B. Face Grid: Wires shall be welded at each intersection to form a 2 x 2 inch face grid on the front and back of panels,

C. Trusses: Face grids shall be separated by bent wire trusses spaced at 2-inch centers and welded to front and back face grids at each truss apex.

D. Thickness: [3 inches.] [As shown on Drawings.]

E. Length and Width: As indicated on the Drawings.

F. Tolerance: 1/8 inch in width and 1/8 inch in length.

of "Cut-to-Curve" or "Crimped-to-Curve" fabrication technique is dependent on the specific radius and the direction of the curve relative to the flat panel layout.

2.6 FINISH

A. Metal components (except fasteners) shall receive commercial grade finish system after fabrication.

B. Finish System:

1. Pretreat with general purpose, alkaline, water based cleaner / degreaser applied at 240 degrees F.

2. Prime with fusion bond epoxy powder coat.

3. Topcoat with [TGIC] polyester or polyester-urethane powder coat with a minimum total dry film thickness of not less than [6 mils (0.15 mm)].

C. Salt Spray Resistance: Finish shall remain rust free when tested 1680 hours in accordance with ASTM B117.

D. Finish and Color: [Textured] Black.]

E. Touch-Up Paint: Provide high quality, exterior-grade spray paint suitable for conditions of use.

2.7 MISCELLANEOUS MATERIALS

A. Concrete: Refer to Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. Concrete: Normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size [or dry, packaged, normal-weight concrete mix complying with ASTM C 387 mixed with potable water according to manufacturer's written instructions].

PART 3 - EXECUTION

3.1 EXAMINATION

Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Do not use abrasive cleaners.

C. Remove from project site and legally dispose of construction debris associated with this work.

3.6 PROTECTION

A. Protect installed products until completion of Project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Protect installed products and finished surfaces from damage during construction.

D. Replace defective or damaged components as directed by Architect.

3.7 PLANT INSTALLATION

A. Refer to Section 32 93 00, PLANTS.

END OF SECTION

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, tube, fitting, and joining materials.

2.3 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints. Contech A-2000 or equivalent.

2.4 SOLID-WALL PIPES AND FITTINGS

A. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.

1. Gaskets: ASTM F 477, elastomeric seal.

2.5 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

1. Sleeve Materials:

a. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
b. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2. Unshielded Flexible Couplings: Elastomeric sleeve with corrosion-resistant metal tension band and tightening mechanism on each end.
3. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

2.6 CLEANOUTS

A. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.

2.7 DRAINAGE CONDUITS

A. Multipipe Drainage Conduits: Prefabricated geocomposite with interconnected, corrugated, perforated-pipe core molded from HDPE complying with ASTM D 1248 and wrapped in geotextile filter fabric.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.3 PIPING APPLICATIONS

A. Underground Subdrainage Piping:

1. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.

3.4 CLEANOUT APPLICATIONS

A. In Underground Subdrainage Piping:

1. At Grade in Earth: PVC cleanouts.

3.5 LANDSCAPING DRAINAGE INSTALLATION

A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Install drainage conduits as indicated in Part 3 "Piping Installation" Article for landscaping subdrainage with horizontal distance of at least 6 inches between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with tape.

E. Add drainage course to top of drainage conduits.

F. After satisfactory testing, cover drainage conduit to within 12 inches of finish grade.

G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric, overlapping edges at least 4 inches.

H. Fill to Grade: Place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.6 DRAINAGE SUMP STRUCTURE INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
   1. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.
   2. Lay perforated pipe with perforations down.
   3. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PVC piping according to ASTM D 2321.

3.9 PIPE JOINT CONSTRUCTION

A. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.

B. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.10 CLEANOUT INSTALLATION

A. Cleanouts for Landscaping Subdrainage:

   1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
   2. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches in depth. Set top of cleanout plug 1 inch above grade.

3.11 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.

3.12 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tapes directly over piping

33 47 13
POND LINER SYSTEM

PART 1 GENERAL

1.1 Description

A. This section includes the following:

1. Nonwoven geotextile
2. Polyvinyl chloride (PVC) geomembranes.

B. All work shall be done in strict accordance with the drawings and these specifications and are subject to the terms and conditions of the contract. It is the intent of these specifications to ensure a first quality finished product is provided. It shall be the responsibility of the Contractor to ensure that this requirement is met.

1.2 References

A. ASTM D4437, "Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes", American Society for Testing and Materials, West Conshohocken, Pennsylvania, USA.

B. ASTM D6214, "Standard test method for determining the integrity of field seams used in joining geomembranes by chemical fusion methods", American Society for Testing and Materials, West Conshohocken, Pennsylvania, USA

C. ASTM D6392, "Standard test method for determining the integrity of nonreinforced geomembrane seams produced using thermo-fusion methods", American Society for Testing and Materials, West Conshohocken, Pennsylvania, USA

D. ASTM D7177, "Standard test method for air-channel testing of field PVC Geomembrane Seams", American Society for Testing and Materials, West Conshohocken, Pennsylvania, USA

E. PVC Geomembrane Institute (PGI), 2004, "PVC Geomembrane Material Specification 1104", University of Illinois, Urbana, IL, www.pvcgeomembrane.com, January 1, 2004.

1.3 Submittals

A. Submit the following to the Engineer or Owner, for review and approval, within a reasonable time so as to expedite shipment, fabrication, and installation of the

8. Field seam destructive test results (if applicable)
9. Field repair/patching of defects
10. Daily field installation reports
11. As-built drawings

1.4 Qualifications

A. Manufacturer Qualifications:

1. Required minimum qualifications for approval: The manufacturer of the PVC geomembrane of the type specified shall have at least five years of experience in the manufacture of PVC geomembranes. In addition, the geomembrane manufacturer shall have manufactured at least one million square feet of the specified type of geomembrane in the last five years and be a member of the Fabricated Geomembrane Institute (FGI).

B. Fabricator:

1. The fabricator shall be Lange Containment Systems, Inc. of Denver, Colorado (1-800-446-4898), or approved equal.

2. Required minimum qualifications for approval: The Fabricator of the proposed PVC geomembrane shall have a minimum five million square feet of fabrication experience over the last 5 years and be a member of the FGI.

C. Installer Qualifications:

a. The Geomembrane Installer shall have at least three years of experience in the installation of the specified geomembrane and shall have installed a minimum of five million square feet of the specified geomembrane on a minimum of ten projects. The installer shall be approved/certified by the fabricator to install fabricated products.

b. Installation shall be performed under the direction of a Field Installation Supervisor who shall be responsible throughout the geomembrane installation. Responsibilities include: geomembrane panel deployment, anchorage, seaming, patching, testing, repairs, and all other daily activities of the Geomembrane Installer.

c. Seaming shall be performed under the direction of a Master Seamer (who may also be the Field Installation Supervisor or Crew Foreman) who has seamed a minimum of three million square feet of the type specified, using the same type of seaming apparatus to be used in the current project. The Field Installation Supervisor or Master Seamer shall be present whenever field seaming is being performed.

d. All seaming, patching, other welding operations, and testing shall be

1. Responsibilities of each party.
2. Lines of authority and communication for the project. Procedures for resolution of any project document ambiguity.
3. Methods for documenting, reporting, and distributing documents and reports.
4. Procedures for packaging and storing archive samples.
5. Review of the time schedule for all installation and testing. Schedule of workdays and/or starting times if third party testing verification is required.
6. Review of panel layout, access, numbering systems for panels, deployment, and seams including details for marking on the PVC geomembrane.
7. Procedures and responsibilities for preparation and submission of as-built drawings.
8. Temperature and weather limitations. Installation procedures for adverse weather conditions. Defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.
9. Subgrade conditions, dewatering responsibilities, and subgrade maintenance plan.
10. *Deployment techniques including allowable subgrade condition for* geomembrane placement.
11. Anchor trench construction, material placement, and backfilling.
12. Plan for minimizing and addressing wrinkles, if any, in the placed geomembrane.
13. Measurement and payment schedules.
14. Covering of the Geomembrane and cover soil placement.
15. Health and safety.

PVC Geomembrane Specifications PGI 1104 Specifications[1]

Certified Properties[2]	ASTM	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Thickness	D-5199	20 □1 mil	30 □ □1.5	40 □ □2	50 □ □2.	60 □ □3
Tensile Properties[3] Strength at Break	D-8824 Min	48 lbs/in 8.4 kN/m 360%	73 lbs/in 12.8 kN/m	97 lbs/In 17.0 kN/m	116 lbs/in 20.3	137 lbs/in 24.0
Tear Strength	D-1004	6 lbs	8 lbs 35 N	10 lbs	13 lbs	15 lbs
Dimensional Stability	D-1204[4]	4%	3%	3%	3%	3%
Low Temperature	D-1790	-15o F -26o C	-20o F	-20o F -29o C	-20o F -29o C	-20o F -29o C
Index Properties[5]	**ASTM**	**PVC 20**	**PVC 30**	**PVC 40**	**PVC 50**	**PVC 60**
Specific Gravity	D-792 Typical	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc
Water Extraction	D-1239[4]	0.15%	0.15	0.20%	0.20%	0.20%
Average Plasticizer	D-	400	400	400	400	400
Volatile Loss Percent Loss	D-12034	0.9	0.7	0.5	0.5	0.5
Soil Burial Break Strength Elongation Modulus at	G1604 Max Chg	20 20	20 20%	20 20	20 20	20 20
Hydrostatic Resistance	D-7514	68 psi 470 kPa	100 psi 690 kPa	120 psi 830 kPa	150 psi 1030 kPa	180 psi 1240 kPa
Seam	**ASTM**	**PVC 20**	**PVC 30**	**PVC 40**	**PVC 50**	**PVC 60**
Shear Strength[3]	D-882[4]	38.4 lbs/in	58.4 lbs/in	77.6 lbs/in	96 lbs/in 17 kN/m	116 lbs/in
Peel Strength[3]	D-882[4]	12.5 lbs/in	15 lbs/in 2.6 kN/m	15 lbs/in 2.6	15 lbs/in 2.6	15 lbs/in 2.6

Notes: 1. PGI 1104 replaces PGI 1103 Specification effective 1/1/04.
2. Certified properties are tested by lot as specified in PGI 1104 Appendix A.
3. Metric values are converted from US values and are rounded to the available significant digits.
4. Modifications or further details of test are described in PGI 1104 Appendix B.
5. Index properties are tested once per formulation as specified in PGI 1104 Appendix A.

PART 3 EXECUTION

3.1 Subgrade Preparation

A. The subgrade shall be prepared in accordance with the project specifications. Surfaces to be lined will be smooth and free of all rocks and stones greater than 1/2" diameter, sticks, sharp objects, or debris of any kind. The surface should provide a smooth, flat, firm, unyielding foundation for the geomembrane with no sudden, sharp, or abrupt changes or break in grade.

B. The stability of PVC geomembrane slopes should be carefully evaluated because the maximum allowable slope depends on the characteristics of the materials underlying and overlying the PVC geomembrane as well as other factors such as rainfall and gas pressure. However, maximum slopes less than 3 horizontal to 1 vertical have been observed to be stable in some applications.

C. If the liner is to be installed at an elevation below the current or possible future ground water elevation, the OWNER will be responsible for providing an adequate under-drain system to prevent ground water pressure from developing beneath the geomembrane. Excessive ground water can force the geomembrane upwards through the cover soil and any liquid contained in the impoundment.

D. The geomembrane installer and the owner's representative shall inspect the subgrade surface to be covered with geomembrane on each day's operation prior to placing the geomembrane to verify suitability.

E. The Geomembrane installer and Owner's Representative shall provide daily written acceptance for the subgrade surface to be covered in that day's operation. The surface shall be maintained in a manner to ensure subgrade suitability.

F. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to placement of the geomembrane. All repairs shall be approved by the owner's representative. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting.

3.2 Geomembrane Placement

A. PVC geomembrane shall not be deployed until all applicable submittals, certifications, and quality control certificates listed in Section 1.3 of this specification are submitted and approved by the owner's representative. Should the PVC geomembrane be deployed prior to approval of the Owner's Representative, it will be at the sole risk of the geomembrane installer and/or contractor. If the material does not meet the specification it shall be removed

1. Storage of fabricated product in a heated space prior to deployment.
2. Applying preheat immediately in front of area to be welded.
3. QA/QC testing should Include additional test welds to determine if field seams can be created to meet the PGI 1104 requirements.
4. The Owners representative shall approve the cold weather procedures and be available to verify that seam quality parameters can be achieved.

B. High temperature seaming procedures may include the following:

1. Suspension of work if temperatures create a dangerous work environment for the installation crew and inspectors.
2. Preparation of additional qualification strips to determine If welding can be completed and made to meet PGI 1104 seam strength requirements.

C. Fishmouths shall be kept to a minimum and when necessary be cut out and repaired so as to create a flat overlap.

D. All repairs shall extend a minimum of 6" past any cut in all directions. Thus, a circular patch will have a diameter of at twelve inches, i.e., a radius of six inches, for a small hole.

3.4 Seaming Specifications

A. Chemical Seaming

1. Prior to starting any field welds each seam crew shall prepare a test seam to verify quality and temperature requirements can be met.
2. Panels to be welded using chemicals shall be overlapped a minimum of 6".
3. Care should be taken to clean all areas with a rag prior to applying chemicals.
4. A sufficient amount of chemical shall be placed on both sheets of the PVC geomembrane to be joined with either a squeeze bottle or paintbrush and form a continuous wide weld path of at least 1.5 inches in width.
5. After application of chemical, the seam area should be rolled with a seam roller releasing any air bubbles and forming a continuous seam path. The seaming crew shall take care to always tie-in or weld to the prior chemical seam area as they continue along down the seam.
6. Upon completion of each seam, the seam shall be inspected and any loose areas re- rolled and/or chemical added as required to complete the seam.

B. Thermal Welding Specifications

1. Test seams shall be prepared and tested by the Geomembrane Installer to verify that the seaming parameters are adequate.
2. Test seams shall be made in accordance with ASTM D 4437 by each welding technician at the beginning of each seaming period. Test seaming shall be conducted under the same conditions and with the same equipment and operator as production seaming. The test seams shall be approximately 5' long for all types of field welds.
3. Samples shall be tested and evaluated in accordance with the PGI 1104. It should be noted that conditioning of samples and appropriate temperature and humidity requirements must be met to allow for proper testing of the PVC geomembrane.
4. If there is no area on site to provide for these requirements, seam strength can be verified for production using trial welds sent to an independent lab to verify quality.
5. For peel and shear testing see Destructive Field Seam Testing Section 3.6 of this document. Field peel and shear strength values should meet the requirements of PGI- 1104.
6. If a test seam fails, an additional test seam shall be immediately completed. If the additional test seam fails, the seaming apparatus shall be rejected and not used until the deficiencies are corrected and a successful full test seam can be produced.
7. Each test seam shall be labeled with date, geomembrane temperature, number of seaming unit, panel identification, seam number or test location, technician performing the test seam and a pass or fail description.

C. Non-Destructive Field Seam Testing

1. All field seams shall be non-destructively tested by the Geomembrane Installer over the full length of the seams before the seams are covered. Each seam shall be numbered or otherwise designated. The location, date, test unit, name of QC person, and outcome of all non-destructive shall be recorded and submitted to the Owner's Representative.

2. Testing should be performed as the seaming progresses, not at the completion of all fieldseaming, unless agreed to in advance by the Owner's Representative. All defects found should be repaired, re-tested and remarked to indicate acceptable completion of repair.

3. Non-destructive testing shall be performed using either the air lance test method (ASTM D4437) or air-channel pressure test method (ASTM D7177).

D. Air Lance Testing

1. Chemical and solid thermal, i.e., single track, welds can be tested utilizing

10 identical 25mm (1 inch) wide replicate specimens from his sample. The geomembrane installer shall test five replicate specimens for seam shear strength and five for peel strength. Peel strength tests will be performed on both the inside and outside of dual track welds. To be acceptable an average of five specimens must pass PGI 1104 specification field seam testing requirements.

5. If independent seam testing is required by the specifications, it shall be conducted in accordance with ASTM D 6214 for chemical seams and ASTM D 6392 for thermal seams by an accredited laboratory who is a member of the FGI.

6. Reports of the results of examinations and testing shall be prepared and submitted to the owner's representative.

7. For field seams, if laboratory tests fail, that shall be considered an indicator of possible inadequacy of the entire seam length corresponding to the test sample. Additional destructive samples of the subject seam shall be taken by the geomembrane installer at locations indicated by the owner's representative; typically 10 feet (3 meters) on either side of the failed sample and laboratory seam tests shall be performed. Passing tests shall be an indicator of adequate seams. Failing tests shall be an indicator of inadequate seams. All destructive sample locations shall be repaired with a cap strip either thermally or chemically welded into place. All cap stripped seams shall be non-destructively tested with an air lance test.

F. Identification of Defects

1. Panels and seams shall be inspected by the geomembrane installer and the owner's representative during and after panel deployment to identify all defects, including holes, blisters, and undispersed raw materials.

G. Evaluation of defects: Each suspect location (both in geomembrane seam and non-seam areas) shall be non-destructively tested using the air lance test method in ASTM D4437. Each location which fails non-destructive testing shall be marked, numbered, measured, and posted on the daily installation drawings and subsequently repaired.

1. If a destructive sample fails the field or laboratory tests, the geomembrane installer shall repair the seam between the two nearest passed locations on both sides of the failed destructive sample location.

2. Defective seams, tears, or holes shall be repaired by re-seaming or applying a cap strip.

3. Re-seaming may consist of either:

a. Removing the defective area and rewelding the parent material using the original welding equipment, or

B. The anchor trench should be backfilled and compacted by the contractor as approved by the INSPECTOR. Trench backfill material should be placed in loose lifts and compacted.

C. Care should be taken when backfilling the anchor trench to prevent any damage to the geomembrane or other geosynthetics. At no time will construction equipment come into direct contact with the geomembrane. If damage occurs, it will be repaired, at the backfilling contractor's expense, prior to the completion and backfilling of the anchor trench.

3.9 Disposal of scrap materials

A. On completion of installation, the geomembrane installer shall dispose of all waste and scrap material in a location provided and approved by the owner. The installer should also remove all equipment used in connection with the work herein, and shall leave the premises in a neat acceptable manner. No scrap material shall be left on the completed surface of the PVC geomembrane.

END OF SPECIFICATION

PAMPHLET

BACK OF PAMPHLET

AN ORDINANCE PROVIDING FOR THE INSTALLATION OF RIVERWALK, CHILDREN'S PLAYGROUND, DOG PARK, PLAZA, AMPHITHEATER, TRAIL SYSTEM, LANDSCAPING, OUTDOOR ELEVATOR, STORMWATER DETENTION, WATER MAIN, SANITARY SEWER, AND RIGHT-OF-WAY IMPROVEMENTS IN REGARD TO THE RIVERLINE DEVELOPMENT
[SPECIAL ASSESSMENT DOCKET NO. 58837/WARRANT NO. 62530]

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