APPENDIX J-3

Orcem Stormwater Management and Treatment Facilities Design Summary

Stormwater Management & Treatment Facilities
Design Summary

INTRODUCTION

KPFF Consulting Engineers has compiled this report to recommend the proposed stormwater design for the planned Orcem California Inc. (Orcem) project. The scope of this report is the compilation of the analysis associated with the site's comprehensive environmental review examining drainage patterns, stormwater runoff, and the impacts to stormwater water quality. This analysis effectively serves as a preliminary Stormwater Control Plan (SWCP) with the purpose of meeting the requirements of the authorities having jurisdiction for permitting of the project.

The Orcem project consists of the redevelopment of an existing site adjacent to Mare Island Strait. This stormwater report is based on design standards from the County of Solano and the City of Vallejo.

EXISTING CONDITIONS

The existing Orcem project site consists of abandoned buildings related to a deep-water terminal and flour milling plant previously owned by General Mills, and surrounding asphalt pavement, encompassing approximately 4.83-acres. The site is located at the southern tip of the Mare Island Strait, southwest of the City of Vallejo.

The project site generally slopes west at less than 5% towards Mare Island Strait, with elevations ranging from 16 feet to 10 feet AMSL. Existing run-on from the hillside immediately east of the project provides stormwater from an approximate 6-acre area. The project site is covered in drainage inlets that capture stormwater and convey it in pipes to the Strait. Any stormwater that is not captured in the drainage inlets flow overland to Mare Island Strait.

See "Table 1: Existing Watersheds" and "Existing Drainage Exhibit" for additional information regarding the existing stormwater conditions.

PROPOSED IMPROVEMENTS

The proposed Orcem Project would involve construction and operation of an industrial facility with a primary focus to recycle beneficiated byproducts and natural materials as high performance, less polluting replacements for the traditional Portland cement material used in most California construction projects. The Orcem Project would involve construction of approximately 78,000 square feet of buildings and equipment, together with outdoor storage areas, on a 4.83-acre portion of the former General Mills plant site leased from VMT. Several of the buildings and equipment previously used by General Mills within the Orcem Site would be demolished in order to accommodate construction and operation of the proposed cement products production facility. The project would be constructed in phases to coincide with the growth in demand for Orcem's products. Orcem would import most of the raw

materials used in the proposed plant via the proposed wharf on the adjoining Vallejo Marine Terminal site.

Drainage Plan

Stormwater impacting the site will come from three sources: run-on from the adjacent hillside, roof runoff, and pavement runoff. These sources of runoff will be split into two different drainage networks. Roof runoff and hillside run-on will be collected at downspouts and at the project boundary, respectively, and routed to the discharge point. Pavement runoff, which will potentially contain sediment from industrial operations, will be directed by concrete gutters to a primary treatment unit. After primary treatment has occurred, the runoff will be conveyed through a separate storm drain system towards a stormwater storage tank and secondary treatment unit. Following these measures, the treated stormwater will be conveyed to the discharge point, a connection to an existing 24" reinforced concrete pipe that will outfall into the Mare Island Strait. Additional analysis of the drainage and treatment facilities are detailed below.

STORMWATER ANALYSIS SUMMARY

The stormwater design for the Orcem project was evaluate in two phases: management and treatment. Guidelines established by governing agencies including the City of Vallejo, County of Solano, and the Regional Water Quality Control Board (RWQCB) were used to analyze and design the stormwater measures for this project.

Drainage and Flood Control Facilities

For flood control facilities, the NPDES permit specifies the Rational Method be used to develop the peak stormwater runoff rate. With this sizing approach, the stormwater runoff produced for the site conditions is based on a rainfall intensity using an "event based" or "design storm" methodology. The rainfall intensity, I, is a function of both frequency and duration of the storm event and the time of concentration. For rainfall intensity, the NPDES permit allows some municipalities and local agencies in Alameda, Contra Costa, Marin, and others not covered under the Phase I NPDES permit to regulate stormwater design standards. These municipalities and local agencies throughout California fall under the NPDES Phase II permit as Municipal Separate Storm Sewer System (MS4s). The Vallejo drainage design guidelines are outlined in the *Vallejo Sanitation and Flood Control District Guide to Existing Policies and Engineering Design Standards* and the *County of Solano Hydrology Manual*. The District's criteria are area- and performance-based, and include the following:

- Storm drain conveyance facilities draining areas of less than 200 acres shall be sized using the Rational Method.
- The protection level shall be a function of drainage area, with areas less than 640 acres requiring a 15-year level of protection.
- Intensity-duration-frequency curves, storm distributions, and runoff coefficients for use in Vallejo are provided in figures and tables in the Design Standards.

The storm duration for determining the peak runoff rate is considered to be the time required for the stormwater to flow from the furthest point of the system until it reaches the discharge

point. The time of concentration, T_c, used for the onsite conditions is five minutes which corresponds to an urban, directly connected surface drainage system. For project run-on from the adjacent hills, the T_c was determined using a maximum overland flow distance of 450 feet at 20% slope, across a landscape with a runoff coefficient of 0.40. This analysis resulted in a T_c of fifteen (15) minutes (See *County of Solano Hydrology Manual*, Figure 3-2). Figure 2-2 and Table 3-4A of the *County of Solano Hydrology Manual* were then used to determine the design rainfall intensity for a 15-year storm event.

Based on our analysis, the proposed peak rate of stormwater runoff is 23.40 cubic feet per second. The runoff coefficient for the proposed site conditions used a C-factor of 0.95 for all impervious surfaces and 0.40 for wooded/brush open area, as recommended by the *County of Solano Hydrology Manual*. A breakdown of the peak runoff rates for the individual drainage basins throughout the site is included in "Table 2: Proposed Drainage Management Areas" and accompanied by Drawing No. 5387-PP-104, "Drainage Plan."

Each individual drainage basin was evaluated to ensure the proposed drainage network has adequate capacity to convey the design storm. A breakdown of each pipe size and slope is available in "Table 3: Drainage Network" and on Drawing No. 5387-PP-104, "Drainage Plan."

Stormwater Treatment Facilities

For volume-based treatment facilities, the following equation is used to determine the required treatment volume of stormwater treatment facilities:

$$V=C*A*d$$

Where: C= volumetric runoff coefficient
A= drainage area in square feet
d= rainfall depth, in inches
V= peak runoff volume in cubic feet

Per the Bay Area Regional Water Quality Control Board (RWQCB), the treatment volume shall be sized to capture the 85th Percentile storm event, reported as 0.83" by the Martinez Area Rain Gauge.

Each individual drainage basin was evaluated to determine the required amount of treatment volume necessary and is available in "Table 4: Proposed Stormwater Treatment Volume."

This volume of stormwater is intended to be treated within two-chambered underground, traffic-rated, concrete sand filter vaults (four locations throughout site). The stormwater enters the retention chambers by gravity via a network of concrete valley gutters directing runoff to these low points throughout the site. Collected untreated stormwater level in dual-retention chamber is equalized by means of openings between the two compartments. This acts as the primary treatment method.

After stormwater runoff has been treated, it will be conveyed to a underground stormwater retention tank. The retained runoff will provide a source for the facility's stockpile dust suppression through pumping from retention compartment via floating suction device (filtered as required). The runoff will then be routed through one main pump station, distributing the water throughout the site. The size of this retention tank will be determined at a later date based on a water balance review of water required for dust suppression.

During large rain events, stormwater will overflow to the secondary treatment facility, proposed to be a sand filter treatment chamber. Stormwater overflowing into the sand filter chamber will filtrate by gravity through the sand, be collected in a drain pipe, and conveyed to the discharge point.

CONCLUSIONS

The proposed stormwater management and treatment facilities for the Ecocem project satisfy local and state requirements for sizing of stormwater conveyance and stormwater quality treatment facilities.

Table 1: Existing Watersheds

DMA I.D.	TOTAL AREA (sf)	TOTAL AREA (ac)	RUNOFF COEFFICIENT[1]	RAINFALL INTENSITY (IN/HR)[2]	PEAK FLOW RATE (cfs)
E-1	23,910	0.55	0.40	2.2	0.48
E-2	180,640	4.15	0.40	2.2	3.65
E-3	32,510	0.75	0.40	2.2	0.66
E-4	5,960	0.14	0.40	2.2	0.12
E-5	14,340	0.33	0.40	4.1	0.54
E-6	9,240	0.21	0.95	4.1	0.83
E-7	28,250	0.65	0.95	4.1	2.53
E-8	8,310	0.19	0.95	4.1	0.74
E-9	38,630	0.89	0.95	4.1	3.45
E-10	32,130	0.74	0.80	4.1	2.42
E-11	26,590	0.61	0.95	4.1	2.38
E-12	12,260	0.28	0.95	4.1	1.10
E-13	12,900	0.30	0.95	4.1	1.15
E-14	9,080	0.21	0.95	4.1	0.81
E-15	25,510	0.59	0.95	4.1	2.28
				TOTAL	**23.14**

Notes / assumptions:

1. Runoff coefficients determined using Solano County Hydrology Manual.
2. Rainfall intensity for the 15-year storm determined per the City of Vallejo Engineering Design Standards and Solano County Hydrology Manual.

Table 2: Proposed Drainage Management Areas

DMA I.D.	TOTAL AREA (sf)	TOTAL AREA (ac)	RUNOFF COEFFICIENT[1]	RAINFALL INTENSITY (IN/HR)[2]	PEAK FLOW RATE (cfs)
X-1	48,200	1.11	0.40	2.2	0.97
X-2	150,220	3.45	0.40	2.2	3.03
X-3	30,230	0.69	0.40	2.2	0.61
X-4	27,890	0.64	0.40	2.2	0.56
R-1	9,060	0.21	0.95	4.1	0.81
R-2	2,720	0.06	0.95	4.1	0.24
R-3	1,300	0.03	0.95	4.1	0.12
R-4	18,000	0.41	0.95	4.1	1.61
R-5	18,000	0.41	0.95	4.1	1.61
S-1	57,010	1.31	0.95	4.1	5.10
S-2	9,760	0.22	0.95	4.1	0.87
S-3	49,450	1.14	0.95	4.1	4.42
S-4	38,420	0.88	0.95	4.1	3.44
				TOTAL	**23.40**

Notes / assumptions:

1. Runoff coefficients determined using Solano County Hydrology Manual.
2. Rainfall intensity for the 15-year storm determined per the City of Vallejo Engineering Design Standards and Solano County Hydrology Manual.

Table 3: Proposed Drainage Network

PIPE I.D.[1]	DRAINAGE AREAS CONVEYED BY PIPE[2]													PEAK FLOW RATE (cfs)[2]	PIPE SLOPE (%)[1]	PIPE SIZE (IN)[1]	PEAK FLOW LESS THAN CAPACITY[3]
	X-1	X-2	X-3	X-4	R-1	R-2	R-3	R-4	R-5	S-1	S-2	S-3	S-4				
P1	X													0.97	1.3%	8	YES
P2	X				X			X						3.39	1.5%	12	YES
P3	X				X	X	X	X						3.75	1.5%	12	YES
P4		X												3.03	1.0%	12	YES
P5		X	X	X					X					5.82	1.0%	15	YES
P6		X	X	X					X					5.82	2.4%	15	YES
P7		X	X	X					X	X	X	X	X	19.65	1.0%	24	YES
P8			X											0.61	1.0%	8	YES
P9				X										0.56	1.0%	8	YES
P10										X				5.10	0.5%	18	YES
P11										X	X			5.97	0.5%	18	YES
P12										X	X			5.97	0.5%	18	YES
P13										X	X	X	X	13.83	0.5%	24	YES
P14											X			0.87	0.7%	8	YES
P15												X		4.42	0.5%	15	YES
P16													X	3.44	0.5%	15	YES
OUTFALL	X	X	X	X	X	X	X	X	X	X	X	X	X	23.40	0.8%	24	YES

Notes / assumptions:

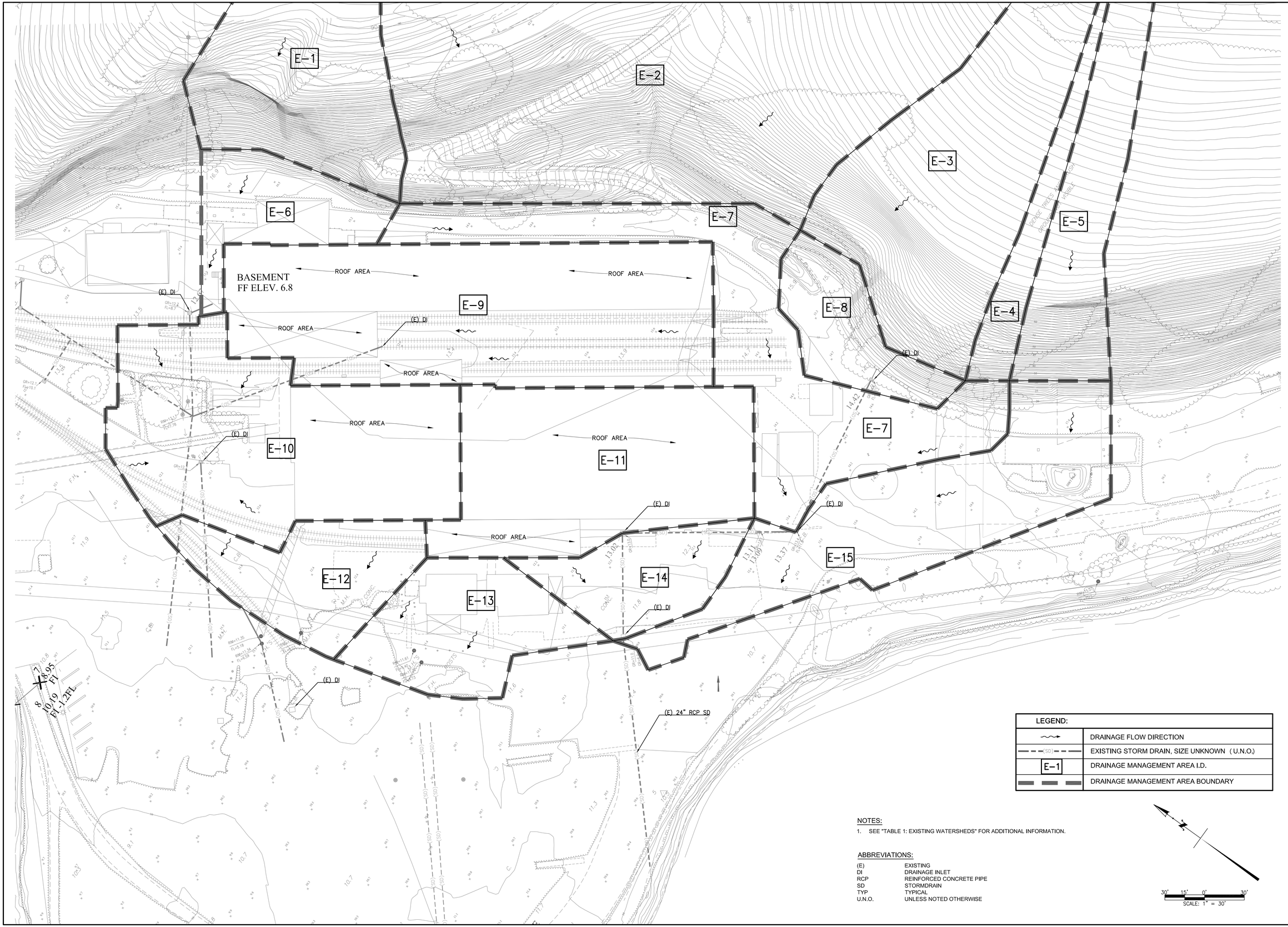
1. Pipe I.D., size, and slope per Drawing No. 5387-PP-104.
2. Drainage areas and peak flow rates per "Table 2: Proposed Drainage Management Areas."
3. Capacity evaluated using Manning's Equation and PVC pipe material (n = 0.012)

Table 4: Proposed Stormwater Treatment Volume

DMA I.D.	TOTAL AREA (sf)	TOTAL AREA (ac)	RUNOFF COEFFICIENT[1]	RAINFALL DEPTH (IN)[2]	TREATMENT VOLUME (CF)
S-1	57,010	1.31	0.95	0.83	3,747
S-2	9,760	0.22	0.95	0.83	642
S-3	49,450	1.14	0.95	0.83	3,250
S-4	38,420	0.88	0.95	0.83	2,525
				TOTAL	**10,164**

Notes / assumptions:

1. Runoff coefficients determined using Solano County Hydrology Manual.
2. Rainfall depth for 85th Percentile Average Annual Runoff (Martinez Area Gauge).



LEGEND:	
~~	DRAINAGE FLOW DIRECTION
(SD)	EXISTING STORM DRAIN, SIZE UNKNOWN (U.N.O.)
E-1	DRAINAGE MANAGEMENT AREA I.D.
	DRAINAGE MANAGEMENT AREA BOUNDARY

NOTES:

1. SEE "TABLE 1: EXISTING WATERSHEDS" FOR ADDITIONAL INFORMATION.

ABBREVIATIONS:

(E)	EXISTING
DI	DRAINAGE INLET
RCP	REINFORCED CONCRETE PIPE
SD	STORMDRAIN
TYP	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE

SCALE: 1" = 30'

Notes

Rev.	Date	By	Details Of Revision	Chk.	App.

Client

Project

PROPOSED PRODUCTION PLANT FACILITY

EXISTING DRAINAGE EXHIBIT

PROPERTY ADDRESS:
VALLEJO MARINE TERMINAL
760 AND 790 DERR STREET
VALLEJO
CALIFORNIA
Tel:

PROPERTY OWNER:
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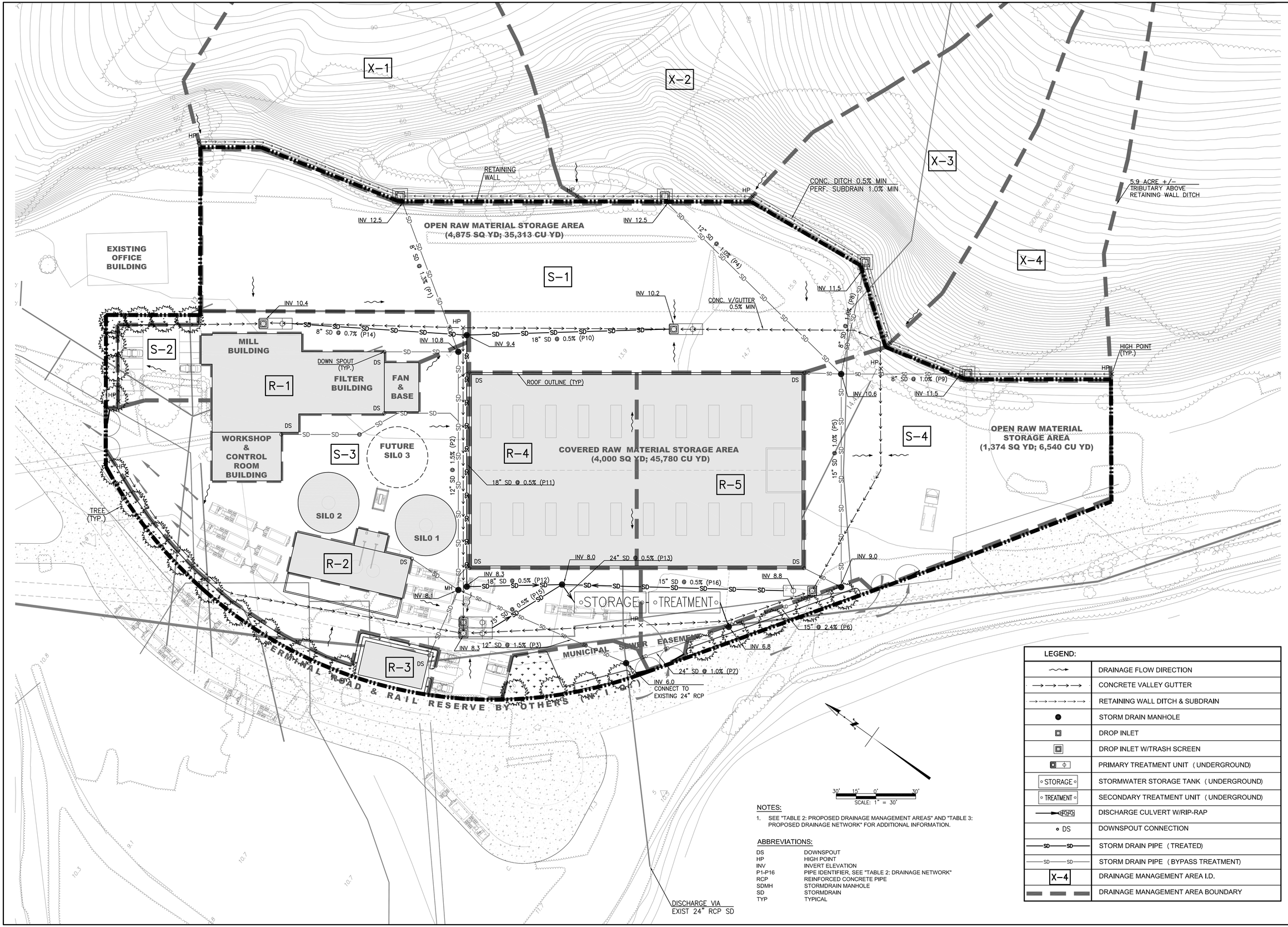
Status

Drawn		Scales	
Date		Eng.	Chk.	App'd.

30' 15' 0' 30'
SCALE: 1" = 30'

Drawing No. | Rev.



LEGEND:

~~→	DRAINAGE FLOW DIRECTION
→→→→	CONCRETE VALLEY GUTTER
→→→→→→	RETAINING WALL DITCH & SUBDRAIN
●	STORM DRAIN MANHOLE
▣	DROP INLET
▣	DROP INLET W/TRASH SCREEN
▣	PRIMARY TREATMENT UNIT (UNDERGROUND)
◦ STORAGE ◦	STORMWATER STORAGE TANK (UNDERGROUND)
◦ TREATMENT ◦	SECONDARY TREATMENT UNIT (UNDERGROUND)
⟨RIP-RAP⟩	DISCHARGE CULVERT W/RIP-RAP
◦ DS	DOWNSPOUT CONNECTION
SD SD	STORM DRAIN PIPE (TREATED)
SD SD	STORM DRAIN PIPE (BYPASS TREATMENT)
X-4	DRAINAGE MANAGEMENT AREA I.D.
	DRAINAGE MANAGEMENT AREA BOUNDARY

NOTES:

1. SEE "TABLE 2: PROPOSED DRAINAGE MANAGEMENT AREAS" AND "TABLE 3: PROPOSED DRAINAGE NETWORK" FOR ADDITIONAL INFORMATION.

ABBREVIATIONS:

DS	DOWNSPOUT
HP	HIGH POINT
INV	INVERT ELEVATION
P1-P16	PIPE IDENTIFIER, SEE "TABLE 2: DRAINAGE NETWORK"
RCP	REINFORCED CONCRETE PIPE
SDMH	STORMDRAIN MANHOLE
SD	STORMDRAIN
TYP	TYPICAL

Notes

Rev.	Date	By	Details Of Revision	Chk.	App.

Client

Project
PROPOSED PRODUCTION PLANT FACILITY

DRAINAGE PLAN

PROPERTY ADDRESS:
VALLEJO MARINE TERMINAL
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Walsh Group

Status
PERMIT APPLICATION

Drawn | Scales
Date | Eng. | Chk. | App'd.

30' 15' 0' 30'
SCALE: 1" = 30'

Drawing No. 5387-PP-104
Rev.