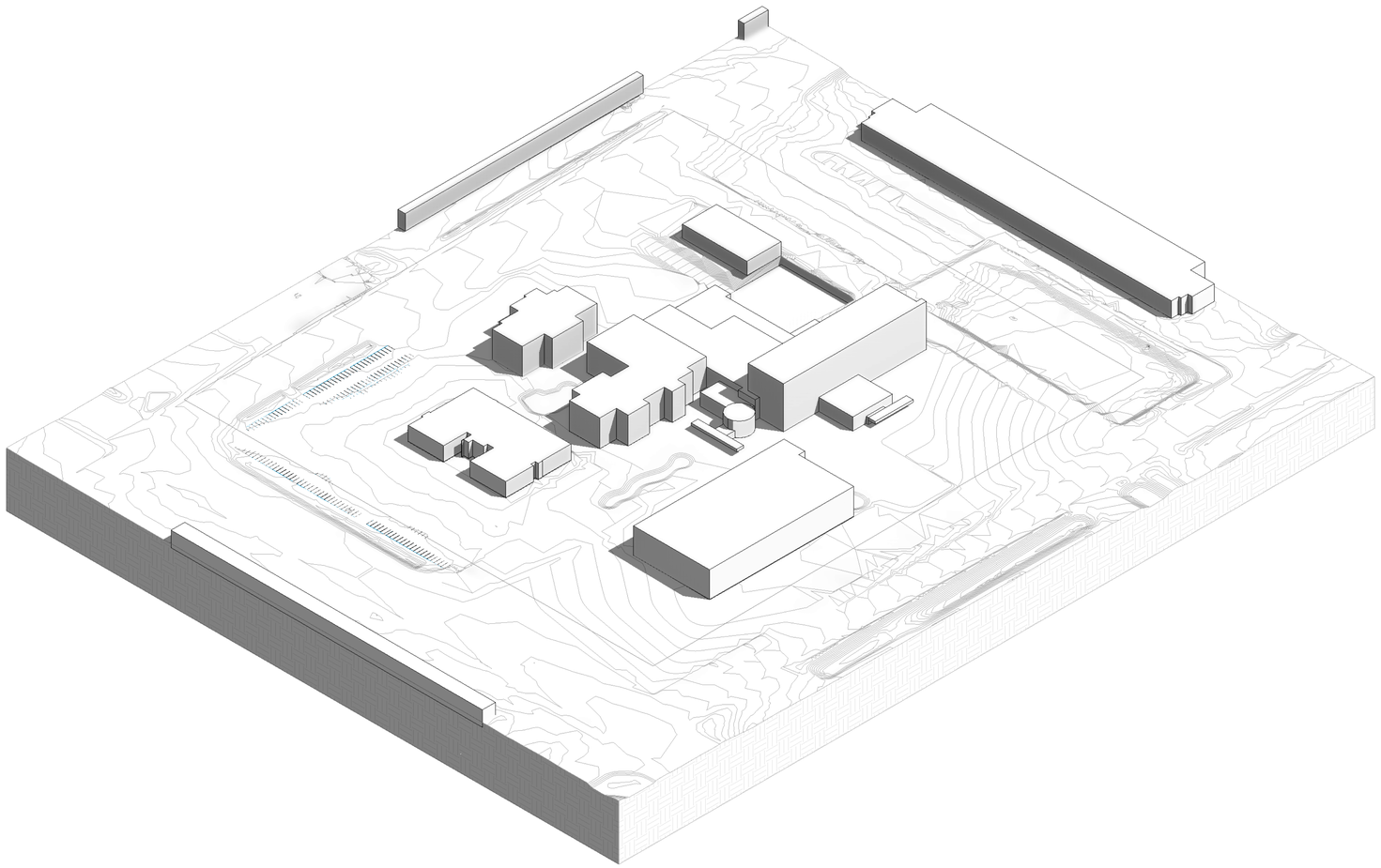
APPENDICES

APPENDIX A

PROJECT PLANS AND DRAWINGS

KAISER PERMANENTE
REDLANDS MEDICAL CENTER

1301 California Street, Redlands, CA 92374
Assessor's Parcel Number: 0167-441-07



DEVELOPMENT PLAN SUBMITTAL

July 24, 2024

KP Project No: CAP026569

KAISER PERMANENTE
REDLANDS MEDICAL CENTER
1301 California Street, Redlands, CA 92374
Assessor's Parcel Number: 0167-441-07

APPLICANT:
Kaiser Permanente
393 E. Walnut Street, 4th Floor
Pasadena, CA 91188
Deborah Han, Senior Land Use Manager - National Facilities...
626-344-4519
deborah.h.wong@kp.org

ARCHITECT:
CO Architects
5750 Wilshire Blvd., Suite 550
Los Angeles, CA 90036
Tom Chessum, FAIA, Principal
213-379-5583
tchessum@coarchitects.com

CIVIL ENGINEER:
Michael Baker International
9755 Clairemont Mesa Blvd., Suite 100
San Diego, CA 92124
Scott Davis P.E., Assoc. Vice President / Project Manager
858-805-5784
scottdavis@mbakerintl.com

LANDSCAPE ARCHITECT:
Ridge Landscape Architects
8841 Research Dr., Suite 200
Irvine, CA 92618
Andrew Neubauer, Senior Project Manager / Designer
949-387-1323 ext. 23
andrew@ridgela.com

ARCHITECTUAL

CIVIL

LANDSCAPE

PROJECT INFORMATION

LOCATION:	1301 California Street Redlands, CA 92374
APN:	0167-441-07
ZONING:	Concept Plan 1 District
SPECIFIC PLAN:	East Valley Corridor

PROJECT DESCRIPTION:	PURPOSE:	BUILDING AREA:	FOOTPRINT AREA:	BUILDING HEIGHT:	NUMBER OF LEVELS:	ROOF EQUIP. SCREEN:	BUILDING TYPE:	BUILDING OCCUPANCY:
Existing MOB 1	Medical Office	120,000 SF	40,000 SF	Existing		6'-6"	Existing	Existing
ASC/MOB 2	Ambulatory Surgery / Medical Office	165,000 SF	36,000 SF	62'-0" to Roof Level	4 Levels	8'-1"	Type IA / Full Sprinkler	Group I-2.1, B
Hospital	213 Bed Acute Care Hospital	400,000 SF	122,000 SF	107'-0" to Roof Level	7 Levels and Basement	15'-0"	Type IA / Full Sprinkler	Group I-2, B, A-2, A-3, F-1, S-2
Central Utility Plant	Mechanical and Electrical Utilities	35,000 SF	15,000 SF	18'-0" to Roof Level	2 Levels and Basement	To Be Determined	Type IIB / Full Sprinkler	Group B, F-1, S-1, S-2
MOB 3	Medical Office	83,000 SF	20,000 SF	62'-0" to Roof level	4 Levels	7'-6"	Type IIB / Full Sprinkler	Group B
Hospital Addition	108 Bed Hospital Addition	180,000 SF	30,000 SF	77'-0" to Roof Level	5 Levels and Basement	15'-0"	Type IA / Full Sprinkler	Group I-2, B, A-2, A-3, F-1, S-2
Total Building Area		983,000 SF	263,000 SF					
	(Excluding Central Utility Plant)	948,000 SF						
Site Area		1,590,580 SF						
Existing Developed Site Area		420,000 SF						
FAR:	.596 (Excludes Central Utility Plant)							

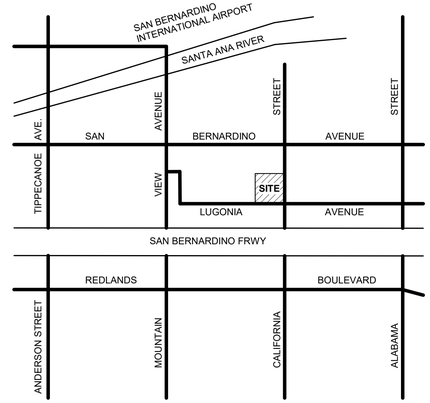
PARKING PROVISION:	PARKING REQUIREMENT:	PARKING DEMAND:	PARKING REQUIRED:	PARKING PROVIDED:
Existing MOB 1	5 PER 1,000 sf	120,000 SF	600	600
ASC/MOB 2	5 PER 1,000 sf	165,000 SF	825	825
Hospital	1 PER BED / 1 PER PEAK STAFF	213 BEDS / 501 STAFF	714	714
Central Utility Plant	NA	NA	0	0
MOB 3	5 PER 1,000 sf	83,000 SF	415	415
Hospital Addition	1 PER BED / 1 PER PEAK STAFF	108 BEDS / 49 STAFF	157	157
Excess				92
			2,711	2,803

LIGHTING REQUIREMENTS:

A. Parking and driveway lighting shall provide 0.5 foot-candle minimum uniform lighting.
B. Pedestrian walkways and plazas, building entries, driveway entries, drop-offs and stairways and grade changes shall be lighted.
C. Parking lot fixtures / poles shall be 30-foot high maximum.
D. Pedestrian walkway fixtures / poles shall be 12-foot high maximum.
E. All light fixtures shall be concealed source fixtures.
F. Security lighting shall be shielded and exterior wall-mounted flood lights are prohibited.

GENERAL NOTES:

A. Roof top radio, TV microwave antenna or other antenna are prohibited above roof parapet or screen.
B. Loading Area for Hospital is depressed 20-feet to Basement Level including a minimum of 5 loading docks, vehicle turning and ramping.
C. Parking stalls shall be 9-foot wide by 19-foot deep stalls with 26-foot wide asiles for 90-degree parking.
D. Parallel spaces shall be 8-foot wide by 24-foot deep.
E. Parking bumpers are prohibited.
F. Refuse Areas outside of the Hospital's depressed loading area shall be enclosed with a 6-foot high masonry wall on all sides with solid metal doors.
G. All utility appurtenances shall be placed behind the building setback line and screened.
H. All electrical power, low voltage and information technology distribution shall be installed underground.
I. Bicycle racks shall be provided at a rate of 1 per 30 parking spaces provided at each phase of development.
J. Employee vanpool and rideshare parking spaces shall be designated near employee building entrances at a rate of 1 per 100 spaces or at a rate of 10 per 100 employees, whichever is greater.



VICINITY MAP

NOT TO SCALE

PROJECT INFORMATION

1" = 200'-0"

July 24, 2024

CO ARCHITECTS

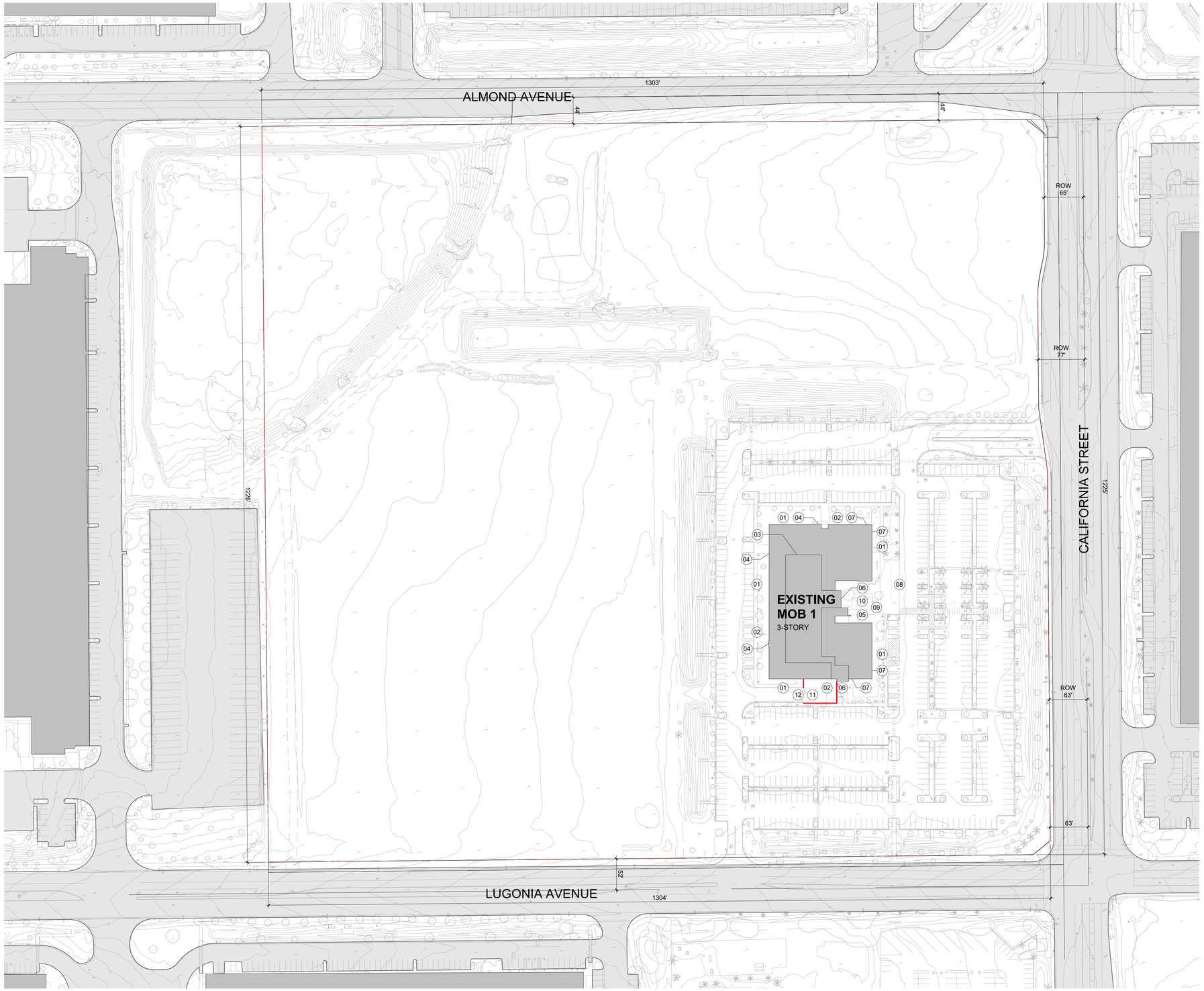
KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 0.10**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



EXISTING MOB 1 MATERIAL NOTES:

01 PAINTED PLASTER (45'-0")

02 PAINTED PLASTER (47'-0")

03 SCREEN WALL WITH METAL SIDING (7'-0")

04 SLATE TILE WALL SYSTEM (12'-5.5")

05 STOREFRONT / CURTAINWALL SYSTEM (44'-4")

06 METAL PANEL (54'-0")

07 METAL PANEL (8'-0")

08 CONCRETE BOLLARDS (24")

09 FREESTANDING COURT WALL (12'-6")

10 CAST IN PLACE CONCRETE SEATWALL (18")

11 CMU BLOCK WALL (10'-0")

12 IRON GATE (8'-0")

2 EXISTING SITE - OVERALL
1" = 80'-0"

EXISTING SITE PLAN
1" = 80'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 1.10**

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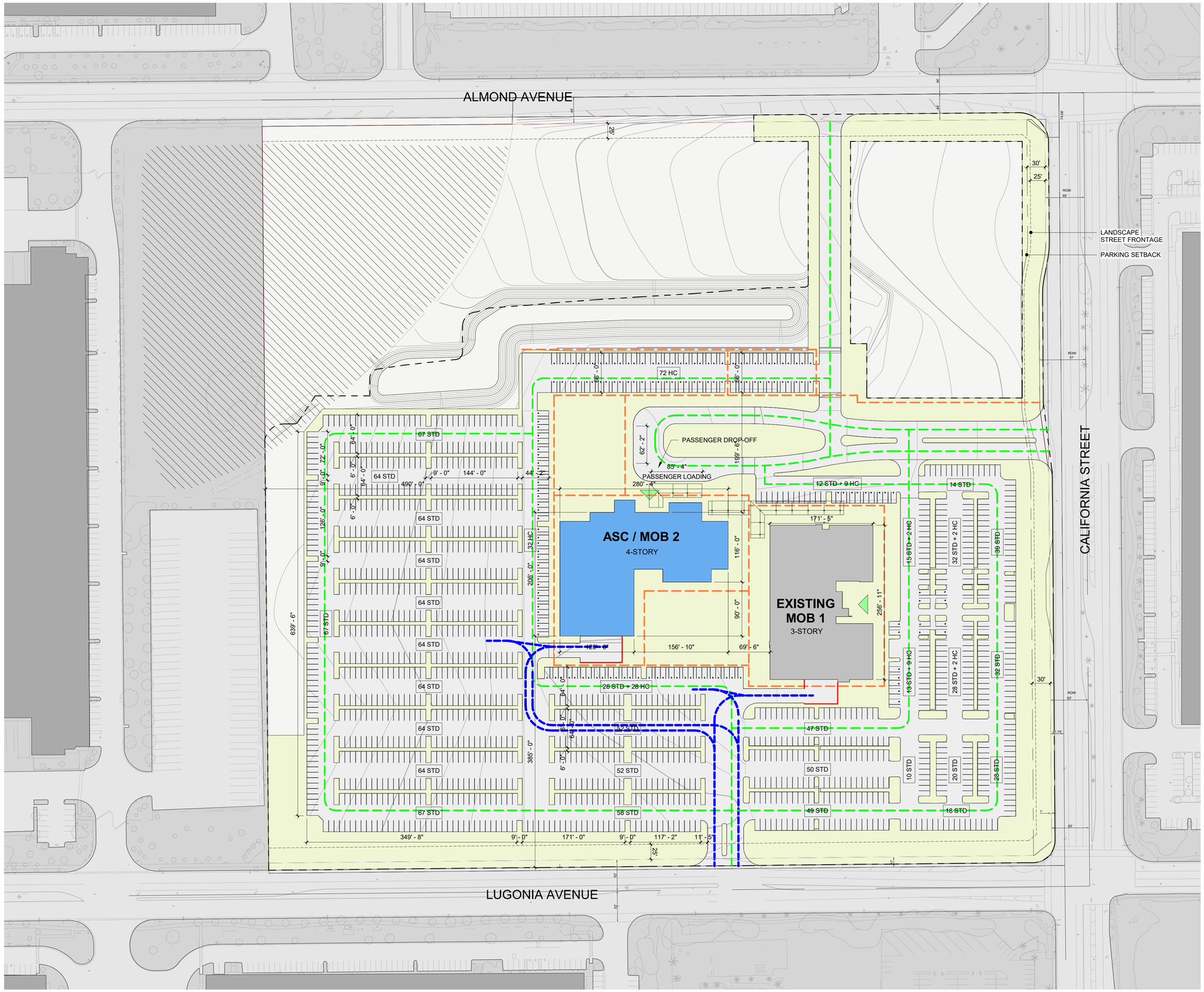
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 SITE - PHASE 1
1" = 80'-0"

CIRCULATION LEGEND

- AMBULANCE ROUTE
- VEHICLE ACCESS
- SERVICE ROUTE
- PEDESTRIAN PATH

PHASING LEGEND

- COMPLETE/PROPOSED
- EXISTING

SITE PLAN LEGEND

- DEVELOPED SITE AREA
- LANDSCAPED AREA
- SURFACE PARKING
- PERIMETER WALL

PHASE 1

BUILDING DESCRIPTION:	AREA:
Existing MOB 1	120,000 SF
ASC/MOB 2	165,000 SF
Total Building Area	285,000 SF

SITE COVERAGE:	AREA:	% COVERAGE
Total Developed Site Area	1,194,000 SF	
Total Building Coverage	76,000 SF	
Total Landscaped Area	411,000 SF	34%
Total Surface Parking Area	601,000 SF	
Total Parking Area Landscape	85,000 SF	14%

PARKING DESCRIPTION:	PARKING TOTAL PROVIDED:				ADA PORTION OF TOTAL:		
BUILDING:	REQUIREMENT:	DEMAND:	REQ:	PROV:	ADA %:	ADA #:	ADA PROV:
Existing MOB 1	5 per 1,000 sf	120,000 SF	600	600	10%	60	60
ASC/MOB 2	5 per 1,000 sf	165,000...	825	825	10%	83	83
Excess				39		13	13
			1,425	1,464		156	156

PHASE 1 SITE PLAN

As indicated

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 1.11**

CITY OF REDLANDS

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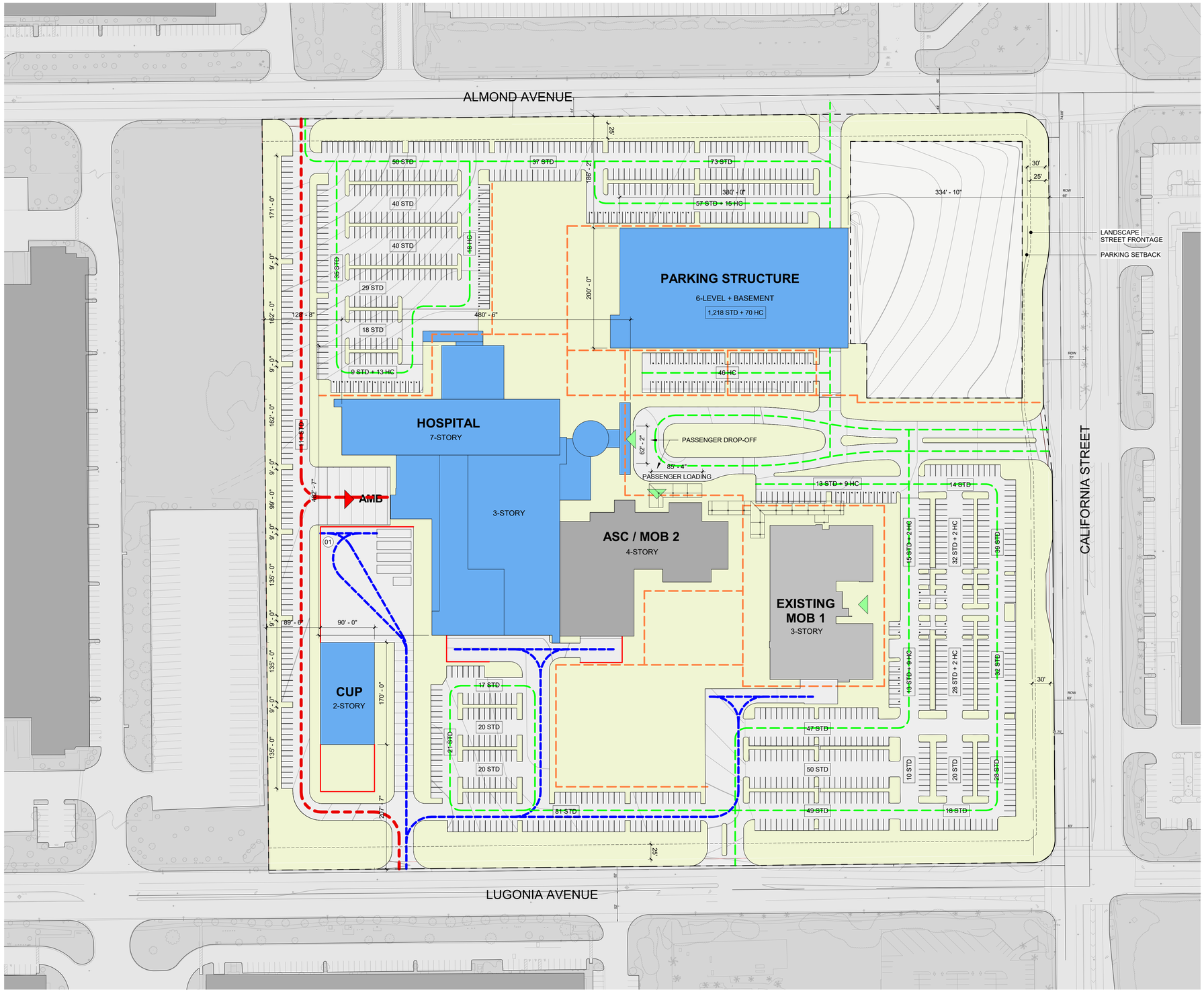
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 SITE - PHASE 2
1" = 80'-0"

MATERIAL NOTES:

01 CMU (6'-0")

CIRCULATION LEGEND

- AMBULANCE ROUTE
- VEHICLE ACCESS
- SERVICE ROUTE
- PEDESTRIAN PATH

PHASING LEGEND

- COMPLETE/PROPOSED
- EXISTING

SITE PLAN LEGEND

- DEVELOPED SITE AREA
- LANDSCAPED AREA
- SURFACE PARKING
- PERIMETER WALL

PHASE 2

BUILDING DESCRIPTION:	AREA:
Existing MOB 1	120,000 SF
ASC/MOB 2	165,000 SF
Hospital	400,000 SF
Central Utility Plant	35,000 SF
Total Building Area	720,000 SF

SITE COVERAGE:	AREA:	% COVERAGE
Total Developed Site Area	1,513,000 SF	
Total Building Coverage	213,000 SF	
Total Landscaped Area	602,000 SF	40%
Total Surface Parking Area	557,000 SF	
Total Parking Area Landscape	85,000 SF	15%

PARKING DESCRIPTION:	PARKING TOTAL PROVIDED:				ADA PORTION OF TOTAL:		
BUILDING:	REQUIREMENT:	DEMAND:	REQ:	PROV:	ADA %:	ADA #:	ADA PROV:
Existing MOB 1	5 per 1,000 sf	120,000 SF	600	600	10%	60	60
ASC/MOB 2	5 per 1,000 sf	165,000...	825	825	10%	83	83
Hospital - 213 Beds	1 per Bed	213 Beds	213	213	2%	5	5
	1 per peak Staff	501 Staff	501	501	2%	11	11
Central Utility Plant	NA	NA	0	0	NA	0	0
Excess				331		27	27
			2,139	2,470		186	186

PHASE 2 SITE PLAN

As indicated

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 1.12**

CITY OF REDLANDS

Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333

ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188

ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)

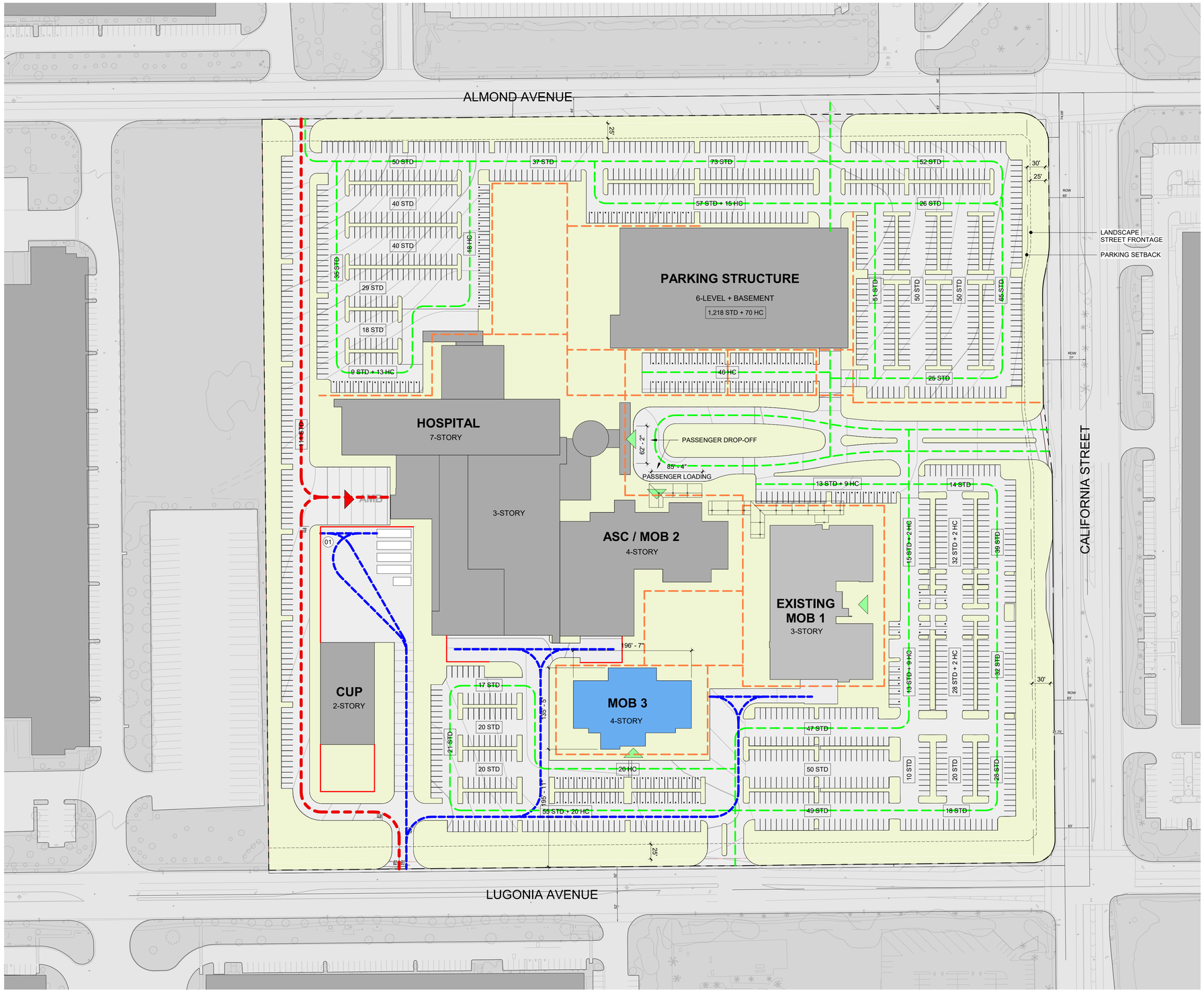
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)

LOCATION: 1301 California Street, Redlands, CA 92374

TYPE OF DEVELOPMENT: XXXXX

ZONE: CR ZONE

ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 SITE - PHASE 3
1" = 80'-0"

MATERIAL NOTES:

01 CMU (6'-0")

CIRCULATION LEGEND

- AMBULANCE ROUTE
- VEHICLE ACCESS
- SERVICE ROUTE
- PEDESTRIAN PATH

PHASING LEGEND

- COMPLETE/PROPOSED
- EXISTING

SITE PLAN LEGEND

- DEVELOPED SITE AREA
- LANDSCAPED AREA
- SURFACE PARKING
- PERIMETER WALL

PHASE 3

BUILDING DESCRIPTION:	AREA:
Existing MOB 1	120,000 SF
ASC/MOB 2	165,000 SF
Hospital	400,000 SF
Central Utility Plant	35,000 SF
MOB 3	83,000 SF
Total Building Area	803,000 SF

SITE COVERAGE:	AREA:	% COVERAGE
Total Developed Site Area	1,632,000 SF	
Total Building Coverage	233,000 SF	
Total Landscaped Area	593,000 SF	36%
Total Surface Parking Area	685,000 SF	
Total Parking Area Landscape	102,000 SF	15%

PARKING DESCRIPTION:	PARKING TOTAL PROVIDED:				ADA PORTION OF TOTAL:		
BUILDING:	REQUIREMENT:	DEMAND:	REQ:	PROV:	ADA %:	ADA #:	ADA PROV:
Existing MOB 1	5 per 1,000 sf	120,000 SF	600	600	10%	60	60
ASC/MOB 2	5 per 1,000 sf	165,000...	825	825	10%	83	83
Hospital - 213 Beds	1 per Bed	213 Beds	213	213	2%	5	5
	1 per peak Staff	501 Staff	501	501	2%	11	11
Central Utility Plant	NA	NA	0	0	NA	0	0
MOB 3	5 per 1,000 sf	83,000 SF	415	415	10%	42	42
Excess				249		25	25
			2,554	2,803		226	226

PHASE 3 SITE PLAN

As indicated

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: A 1.13

CITY OF REDLANDS

Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333

ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188

ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)

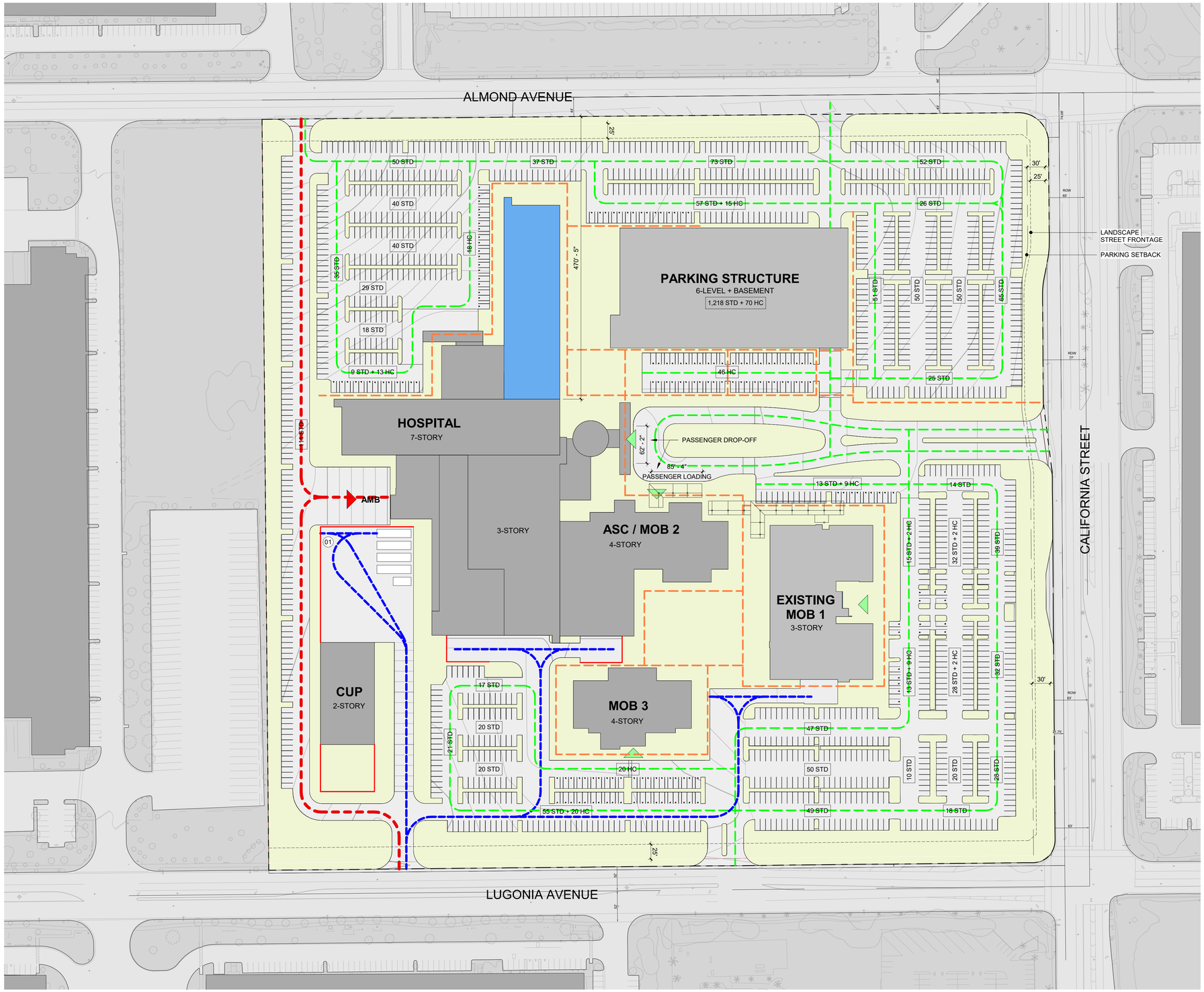
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)

TYPE OF DEVELOPMENT: XXXXX

ZONE: CR ZONE

LOCATION: 1301 California Street, Redlands, CA 92374

ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 SITE - PHASE 4
1" = 80'-0"

MATERIAL NOTES:

01 CMU (6'-0")

CIRCULATION LEGEND

- AMBULANCE ROUTE
- VEHICLE ACCESS
- SERVICE ROUTE
- PEDESTRIAN PATH

PHASING LEGEND

- COMPLETE/PROPOSED
- EXISTING

SITE PLAN LEGEND

- DEVELOPED SITE AREA
- LANDSCAPED AREA
- SURFACE PARKING
- PERIMETER WALL

PHASE 4

BUILDING DESCRIPTION:	AREA:
Existing MOB 1	120,000 SF
ASC/MOB 2	165,000 SF
Hospital	400,000 SF
Central Utility Plant	35,000 SF
MOB 3	83,000 SF
Hospital Addition	180,000 SF
Total Building Area	983,000 SF

SITE COVERAGE:	AREA:	% COVERAGE
Total Developed Site Area	1,632,000 SF	
Total Building Coverage	263,000 SF	
Total Landscaped Area	563,000 SF	34%
Total Surface Parking Area	685,000 SF	
Total Parking Area Landscape	102,000 SF	15%

PARKING DESCRIPTION:	PARKING TOTAL PROVIDED:				ADA PORTION OF TOTAL:		
BUILDING:	REQUIREMENT:	DEMAND:	REQ:	PROV:	ADA %:	ADA #:	ADA PROV:
Existing MOB 1	5 per 1,000 sf	120,000 SF	600	600	10%	60	60
ASC/MOB 2	5 per 1,000 sf	165,000...	825	825	10%	83	83
Hospital - 213 Beds	1 per Bed	213 Beds	213	213	2%	5	5
	1 per peak Staff	501 Staff	501	501	2%	11	11
Central Utility Plant	NA	NA	0	0	NA	0	0
MOB 3	5 per 1,000 sf	83,000 SF	415	415	10%	42	42
Hospital Addition - 108 Beds	1 per Bed	108 Beds	108	108	2%	3	3
	1 per peak Staff	49 Staff	49	49	2%	1	1
Excess				92		21	21
			2,711	2,803		226	226

PHASE 4 SITE PLAN

As indicated

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 1.14**

CITY OF REDLANDS

Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333

ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188

ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)

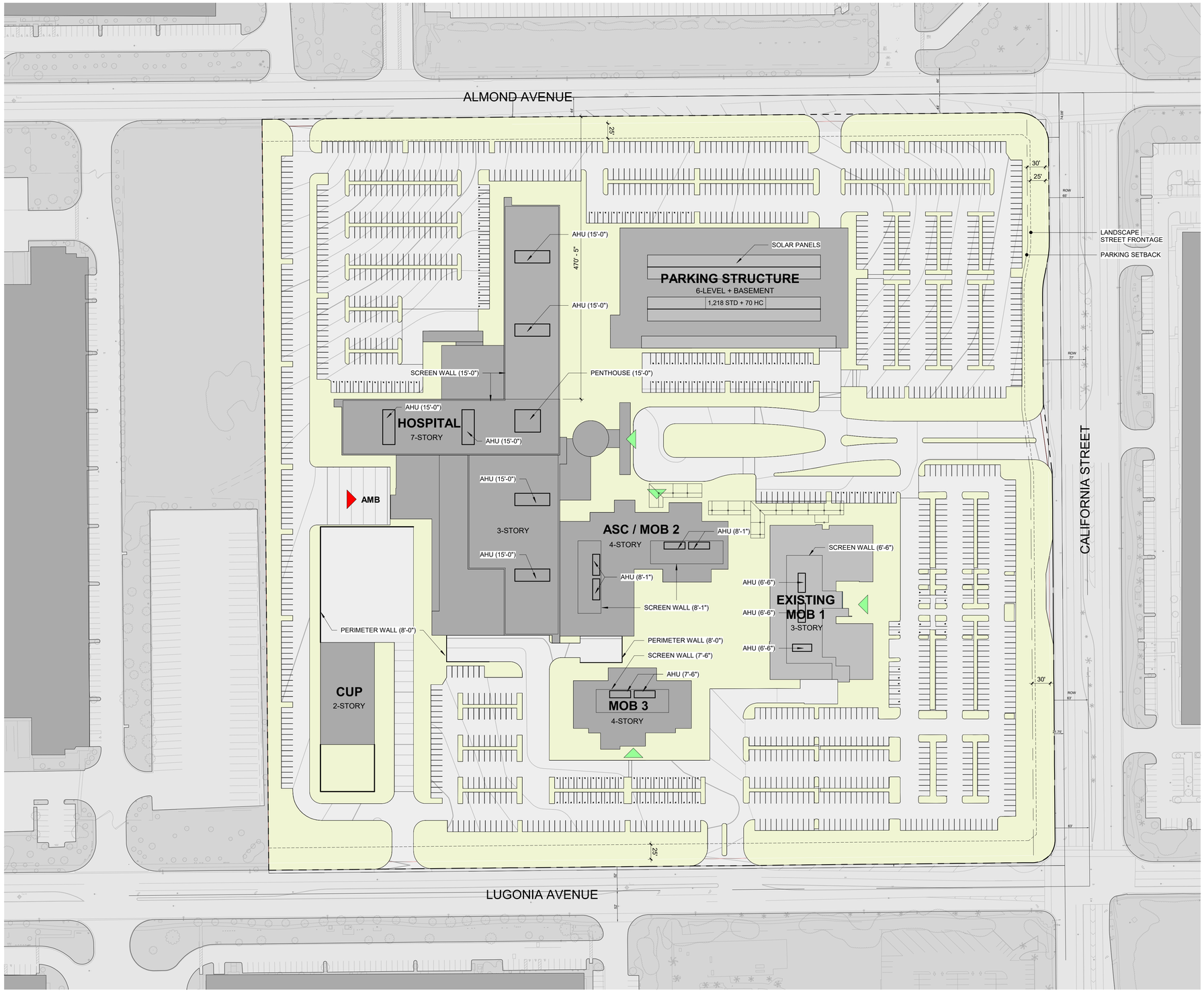
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)

LOCATION: 1301 California Street, Redlands, CA 92374

TYPE OF DEVELOPMENT: XXXXX

ZONE: CR ZONE

ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 SITE - ROOF
1" = 80'-0"

PHASE 4 ROOF PLAN
1" = 80'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 1.15**

CITY OF REDLANDS

Site Development Plan Number:	
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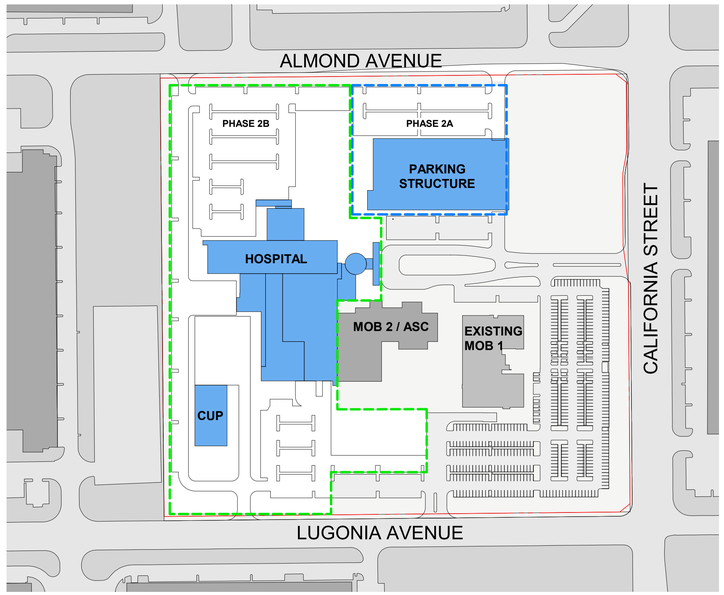
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07

1 CONSTRUCTION PHASING - PHASE 1

1" = 200'-0"

Construction Phasing: **Phase 1A** is developed first to provide replacement of parking removed during **Phase 1B** construction. Construction Laydown area is used as necessary for construction activity.



2 CONSTRUCTION PHASING - PHASE 2

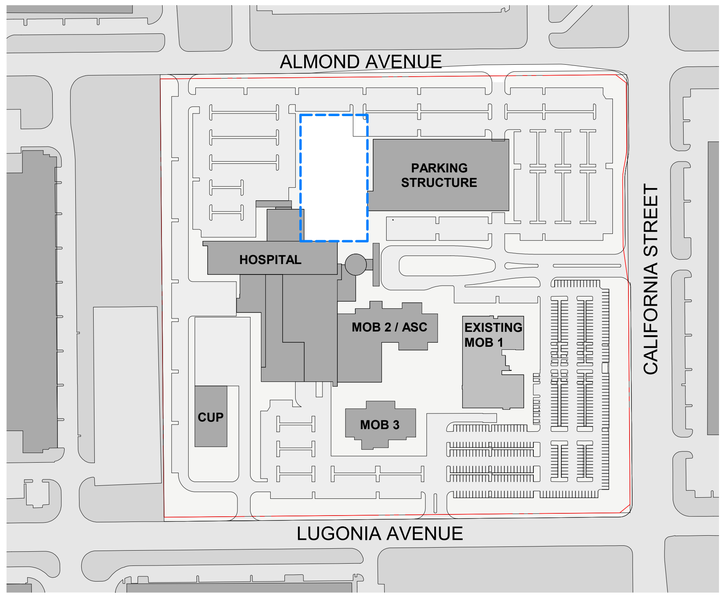
1" = 200'-0"

Construction Phasing: Phase 2A with Parking Structure developed first to provide excess parking for MOB 1, MOB 2 and contractor parking during construction. Construction Laydown area is used as necessary for construction activity.

3 CONSTRUCTION PHASING - PHASE 3

1" = 200'-0"

Construction Phasing: Excess parking from Phase 2 provides for construction parking.



4 CONSTRUCTION PHASING - PHASE 4

1" = 200'-0"

Construction Phasing: Excess parking from Phase 2 provides for construction parking.

CONSTRUCTION PHASING DIAGRAMS

1" = 200'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 1.20**

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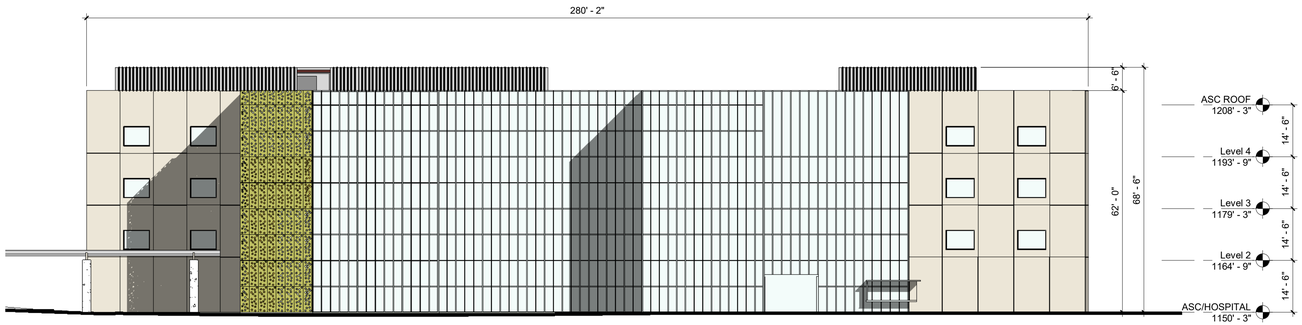
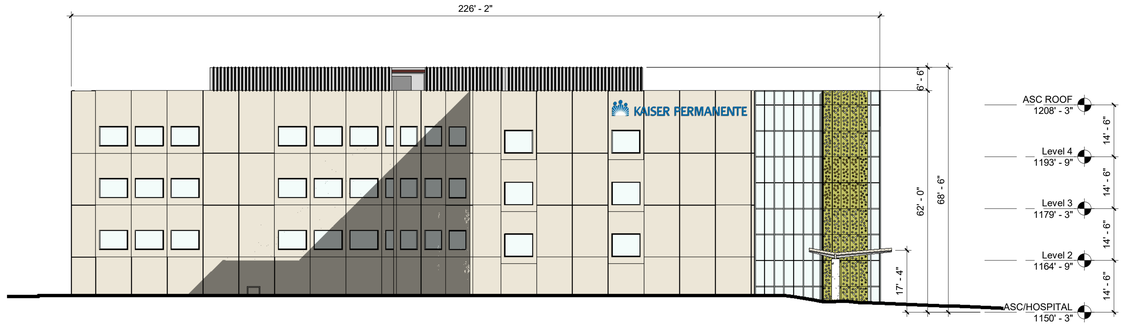
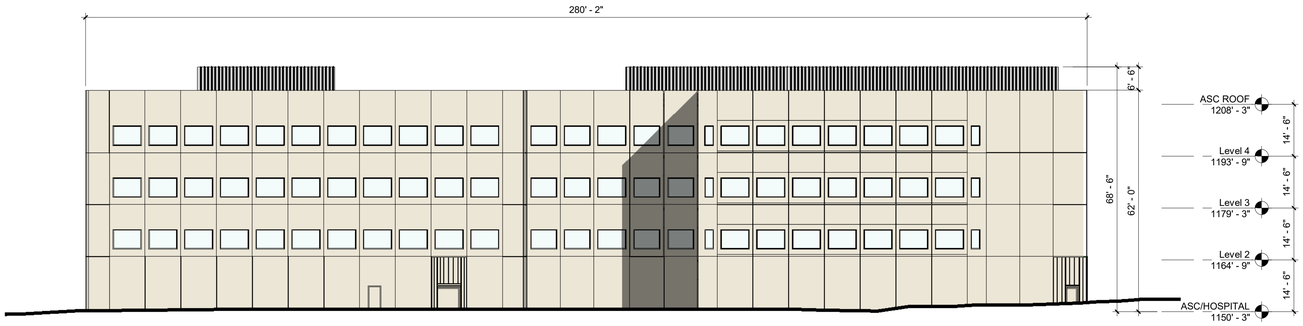
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 NORTH ELEVATION
1" = 20'-0"



3 EAST ELEVATION
1" = 20'-0"



2 SOUTH ELEVATION
1" = 20'-0"

EXTERIOR MATERIAL TYPES

- METAL PANEL - PATTERNED
- METAL PANEL - SMOOTH WITH INTEGRAL GLAZING
- CURTAIN WALL
- METAL PANEL - VERTICAL

ASC / MOB 2 ELEVATIONS

1" = 20'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 3.10**

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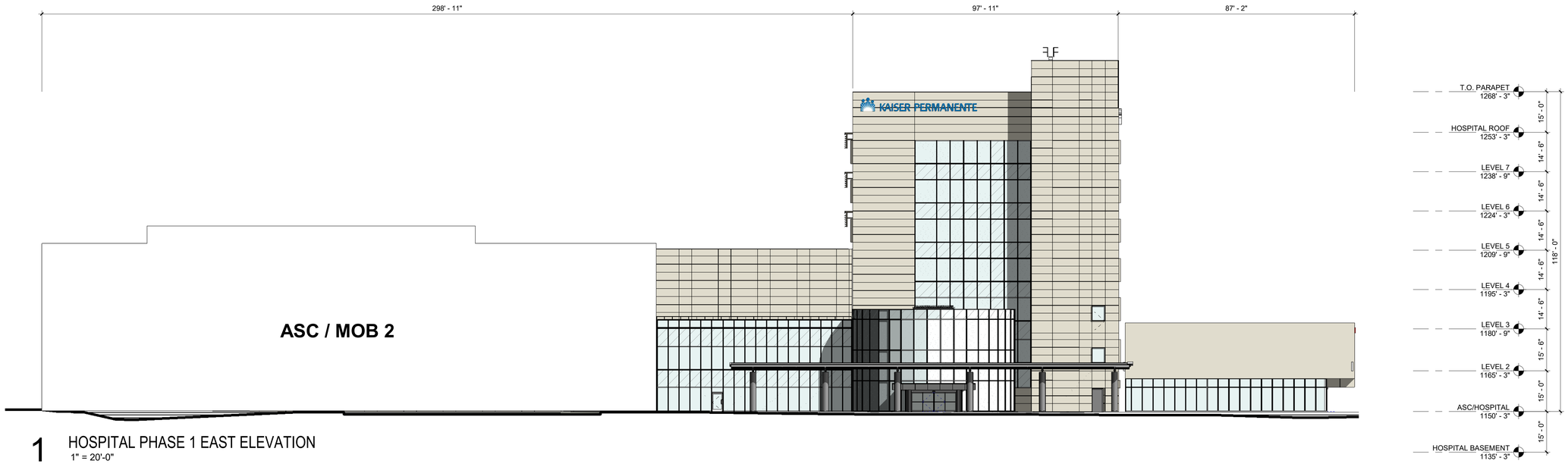
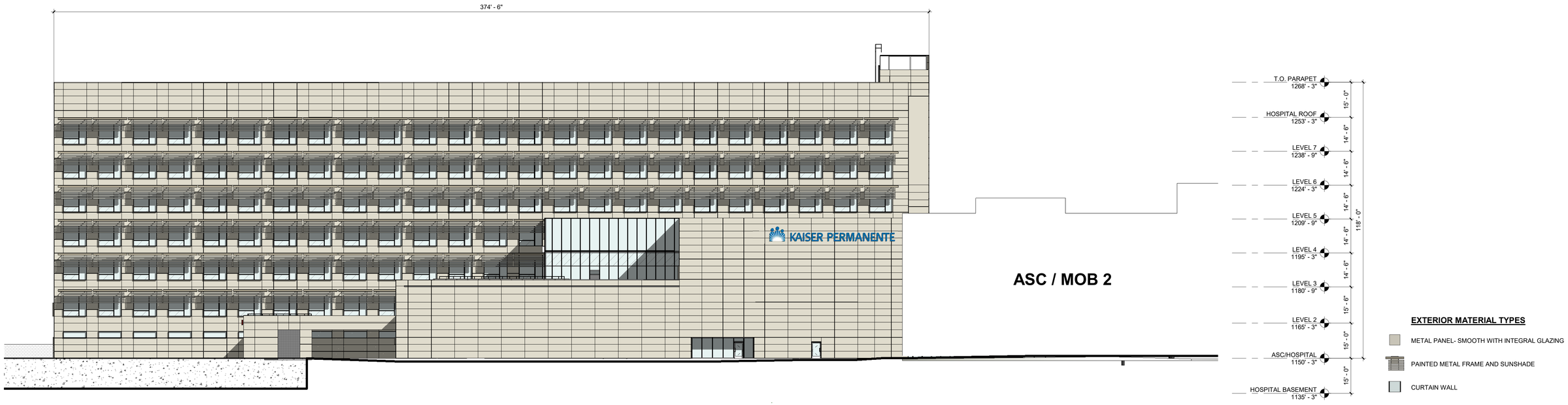
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 HOSPITAL PHASE 1 EAST ELEVATION
1" = 20'-0"



2 HOSPITAL PHASE 1 SOUTH ELEVATION
1" = 20'-0"

HOSPITAL PHASE 2 ELEVATIONS

As indicated

July 24, 2024

CO ARCHITECTS

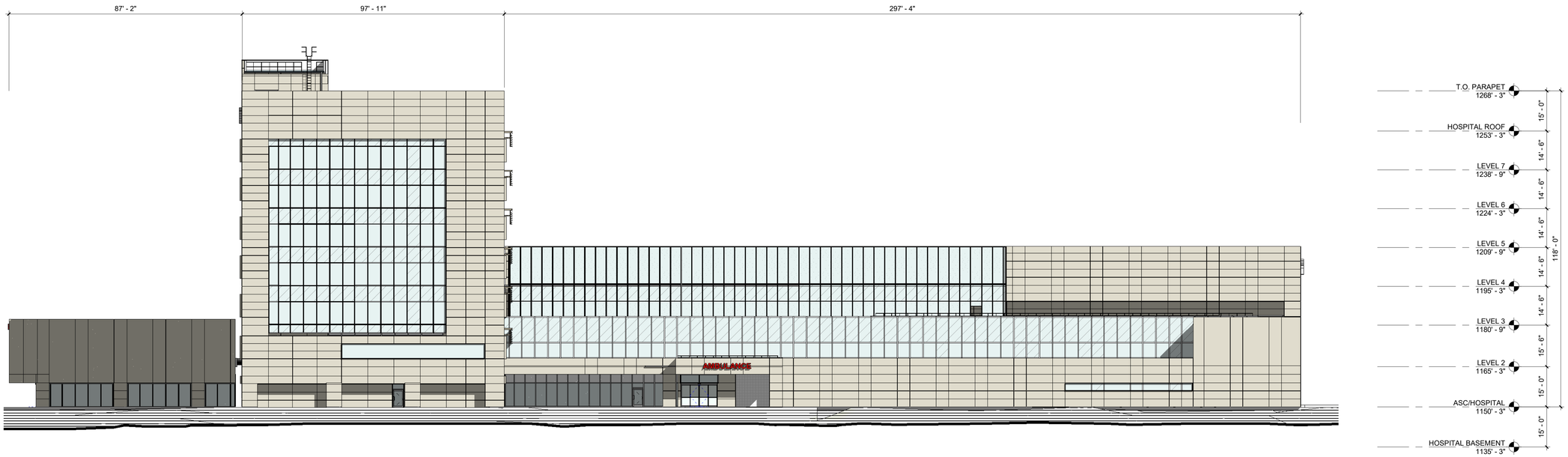
KAISER PERMANENTE

REDLANDS MEDICAL CENTER

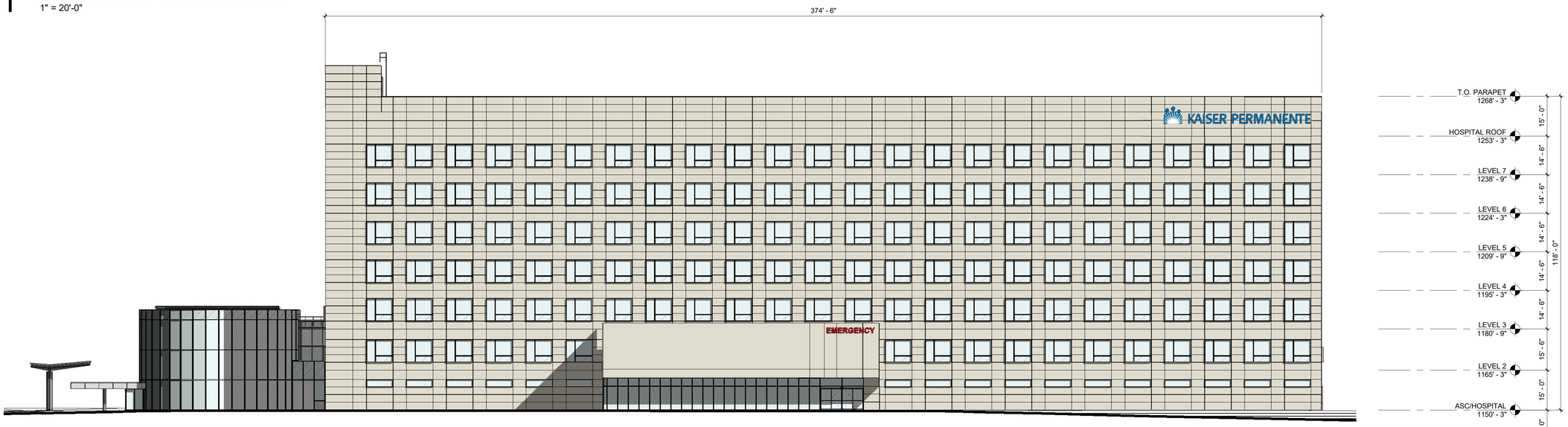
Sheet: **A 3.11A**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals	PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



1 HOSPITAL PHASE 1 WEST ELEVATION
1" = 20'-0"



2 HOSPITAL PHASE 1 NORTH ELEVATION
1" = 20'-0"

HOSPITAL PHASE 2 ELEVATIONS

1" = 20'-0"

July 24, 2024

CO ARCHITECTS

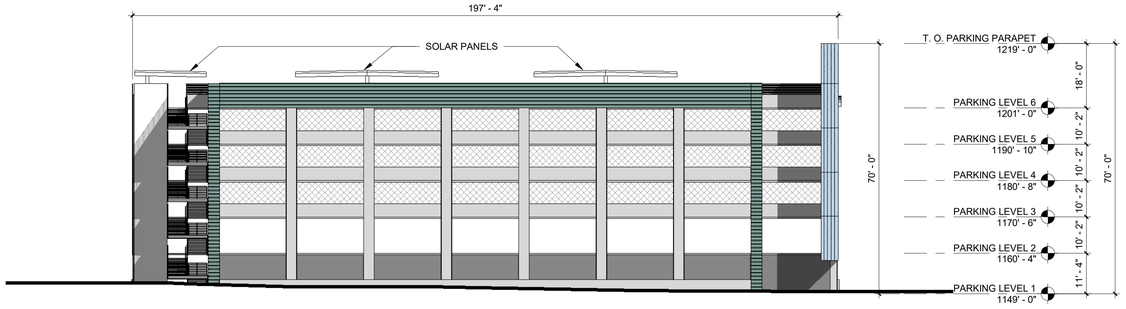
KAISER PERMANENTE

REDLANDS MEDICAL CENTER

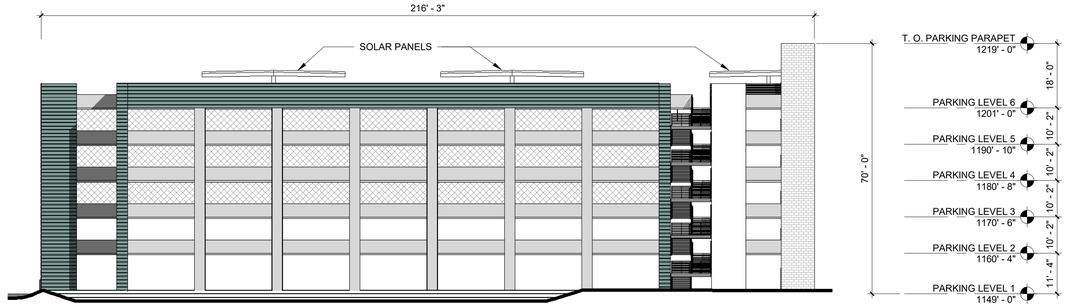
Sheet: **A 3.11B**

CITY OF REDLANDS

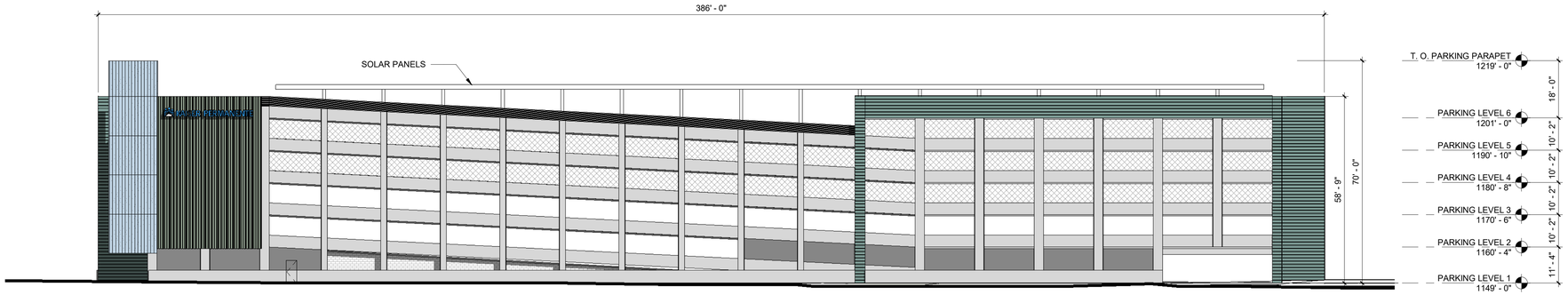
Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



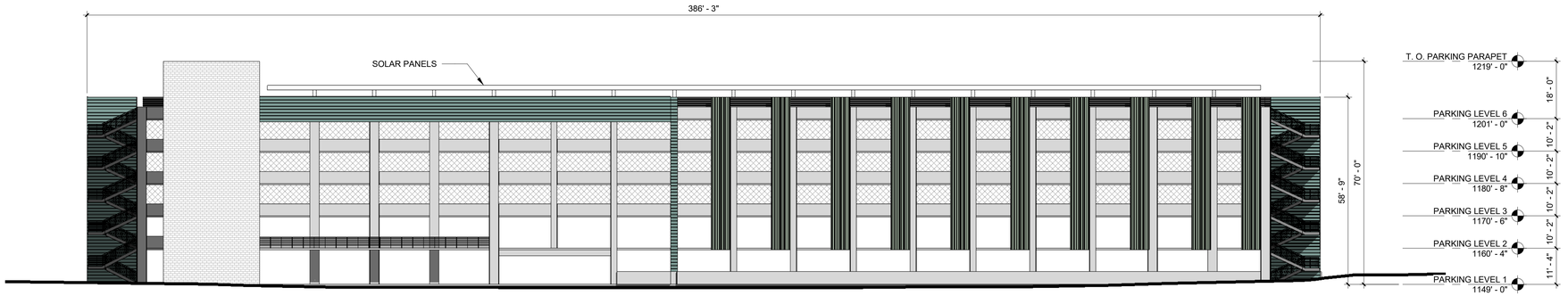
1 EAST ELEVATION
1" = 20'-0"



2 WEST ELEVATION
1" = 20'-0"



3 NORTH ELEVATION
1" = 20'-0"



4 SOUTH ELEVATION
1" = 20'-0"

EXTERIOR MATERIAL TYPES

- METAL PANEL
- CHANNEL GLASS
- PAINTED CONCRETE
- CMU ELEVATOR TOWER
- MESH SCREEN FOR FALL PROTECTION

PARKING STRUCTURE ELEVATIONS

1" = 20'-0"

July 24, 2024

CO ARCHITECTS

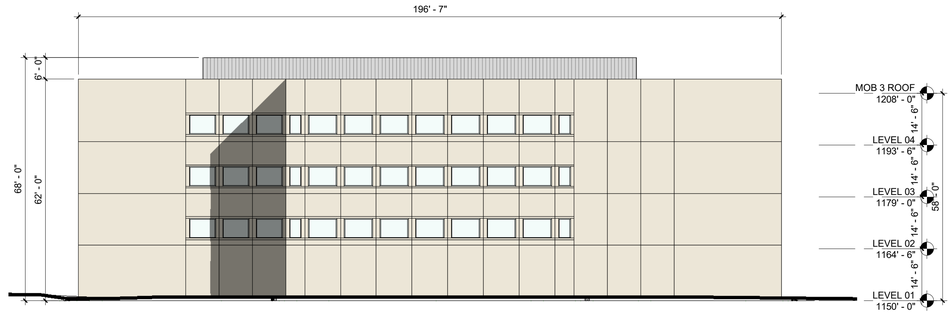
KAISER PERMANENTE

REDLANDS MEDICAL CENTER

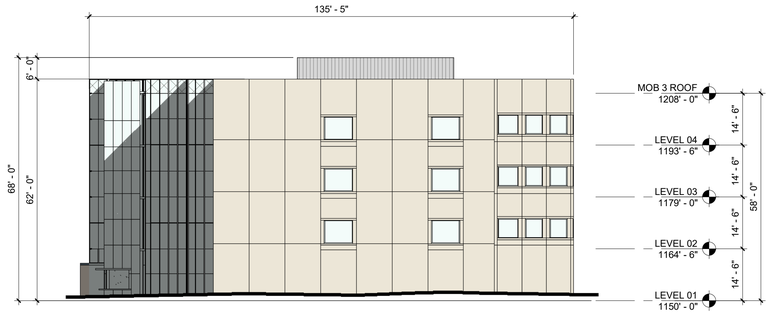
Sheet: **A 3.12**

CITY OF REDLANDS

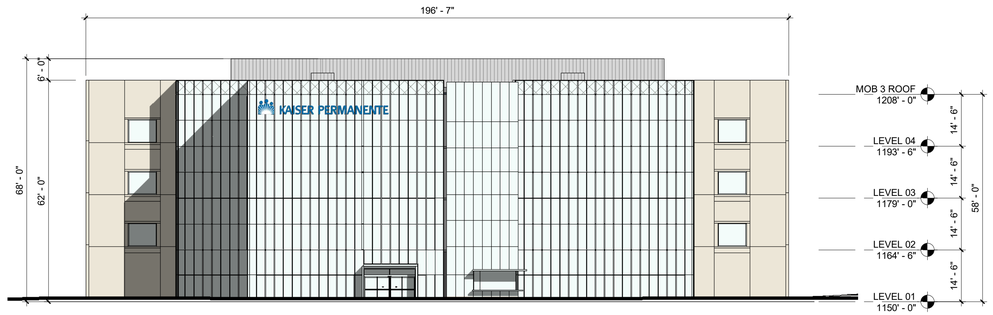
Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals	PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



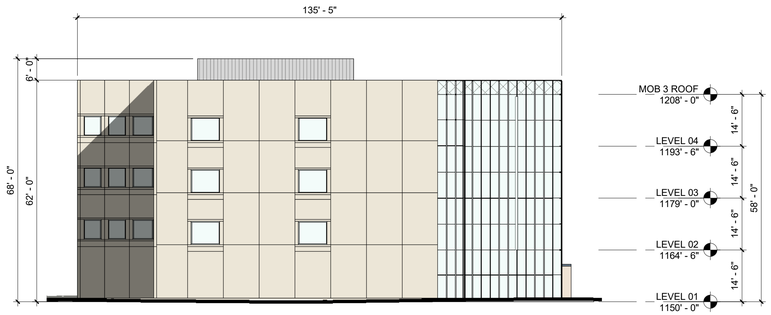
1 NORTH ELEVATION
1" = 20'-0"



2 EAST ELEVATION
1" = 20'-0"



3 SOUTH ELEVATION
1" = 20'-0"



4 WEST ELEVATION
1" = 20'-0"

EXTERIOR MATERIAL TYPES

- METAL PANEL - SMOOTH WITH INTEGRAL GLAZING
- METAL PANEL - VERTICAL
- CURTAIN WALL

MOB 3 ELEVATIONS
1" = 20'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 3.13**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
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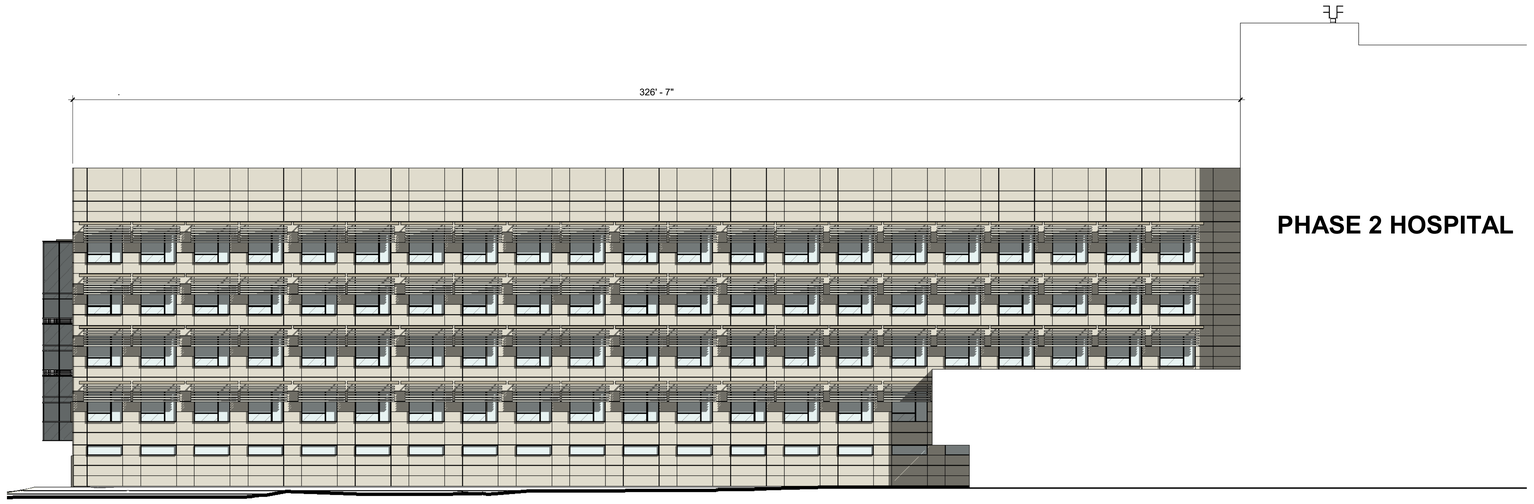
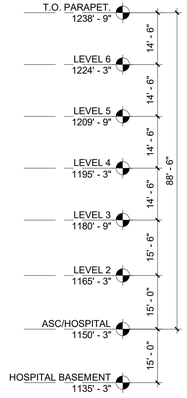
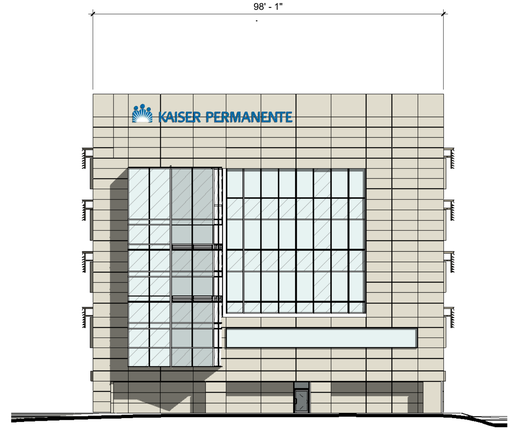
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07

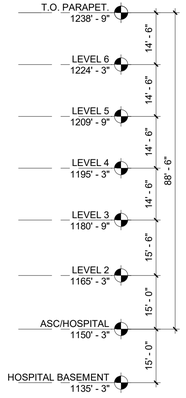


PHASE 2 HOSPITAL



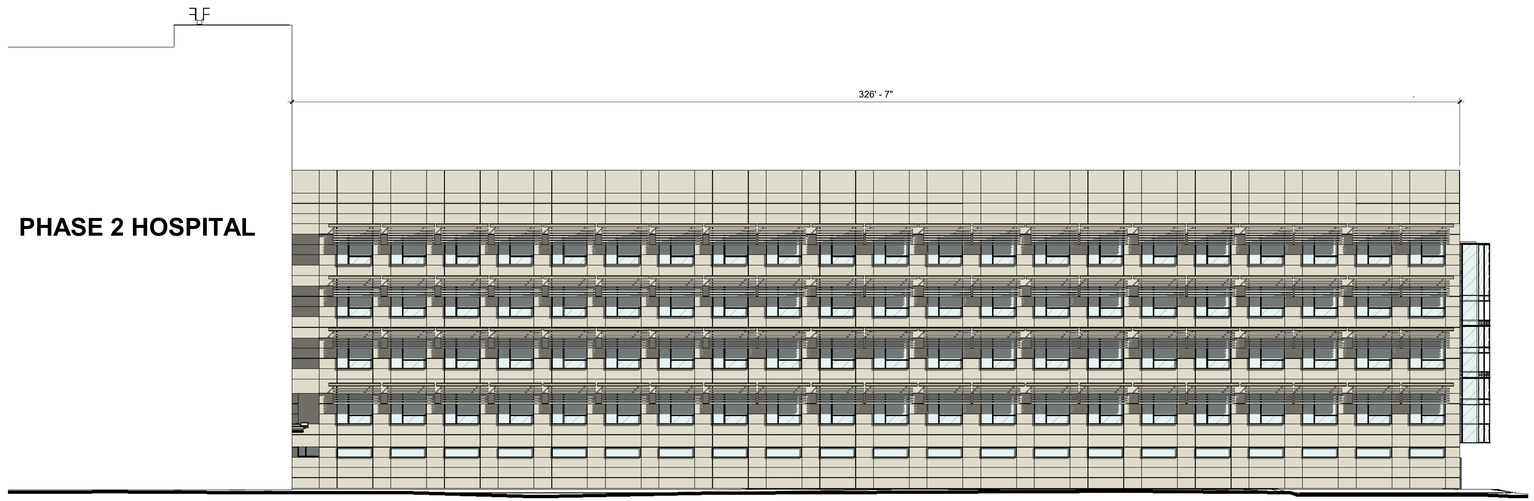
1 HOSPITAL PHASE 4 WEST ELEVATION
1" = 20'-0"



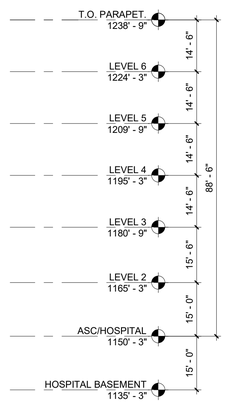


Original Level
19' - 0"

2 HOSPITAL PHASE 4 NORTH ELEVATION
1" = 20'-0"



PHASE 2 HOSPITAL



3 HOSPITAL PHASE 4 EAST ELEVATION
1" = 20'-0"

EXTERIOR MATERIAL TYPES

- METAL PANEL- SMOOTH WITH INTEGRAL GLAZING
- PAINTED METAL FRAME AND SUNSHADE
- CURTAIN WALL

HOSPITAL PHASE 4 ELEVATIONS
1" = 20'-0"
July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 3.14**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
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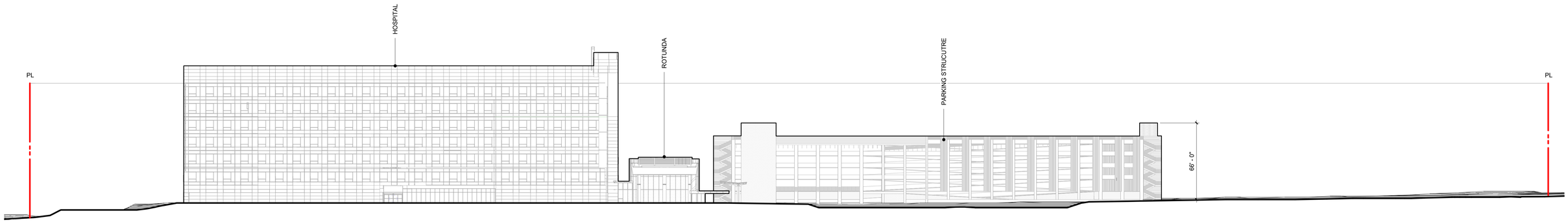
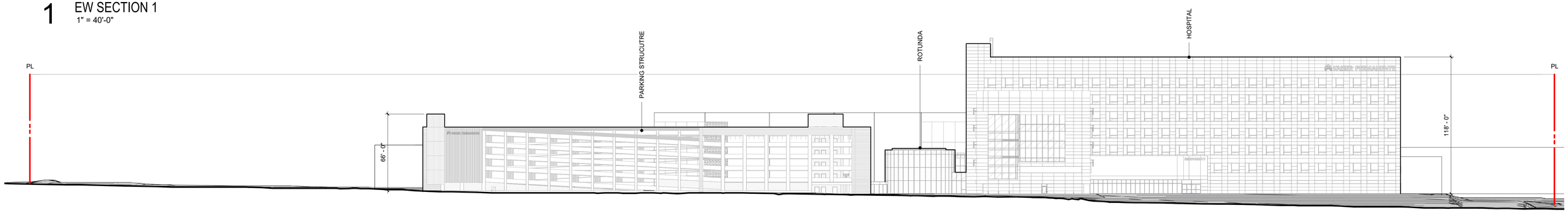
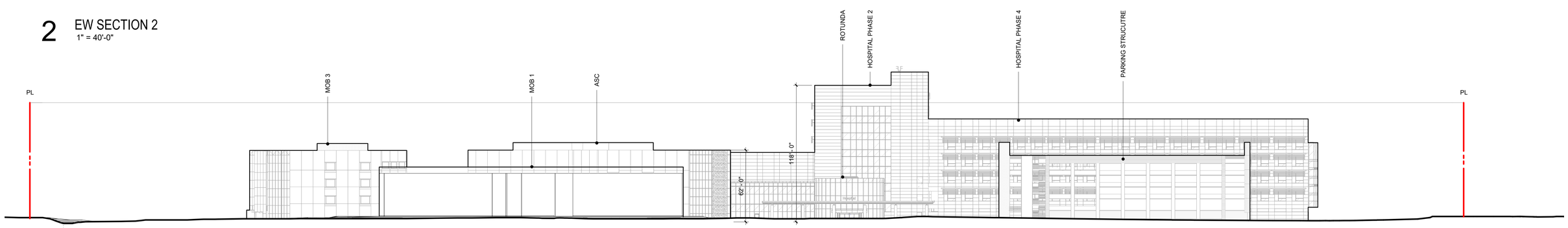
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



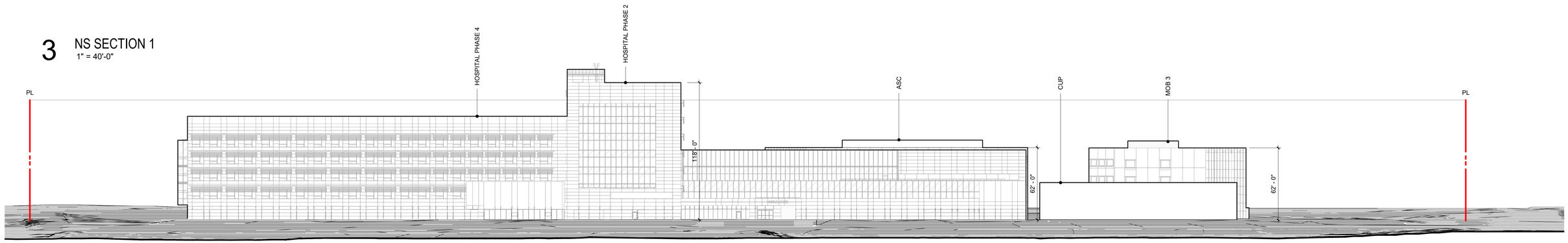
1 EW SECTION 1
1" = 40'-0"



2 EW SECTION 2
1" = 40'-0"



3 NS SECTION 1
1" = 40'-0"



4 NS SECTION 2
1" = 40'-0"

SITE SECTIONS
1" = 40'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 3.20**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals	PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
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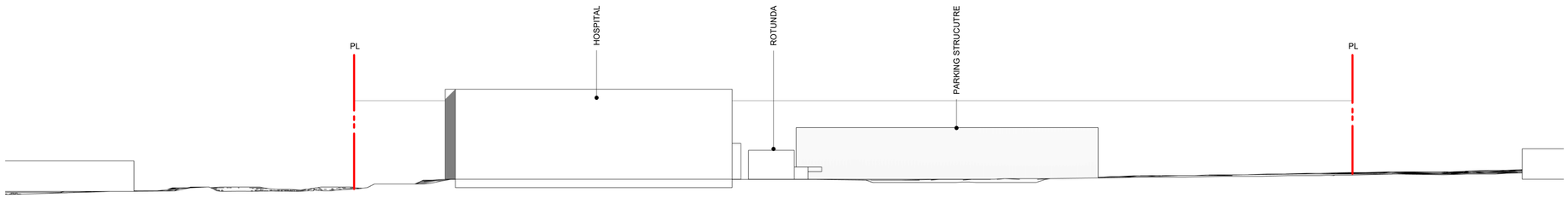
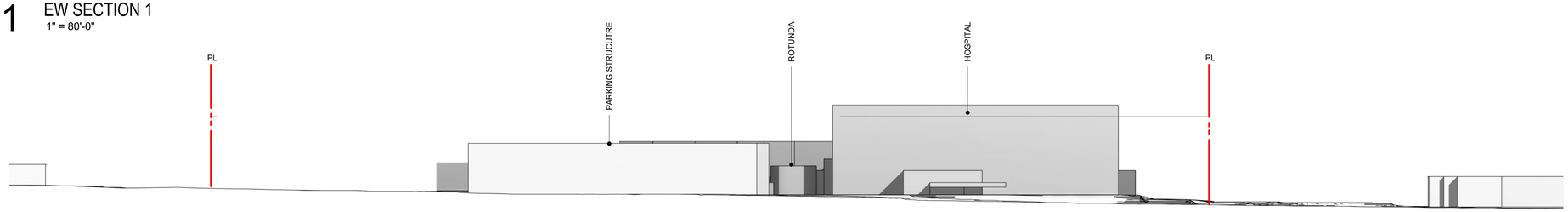
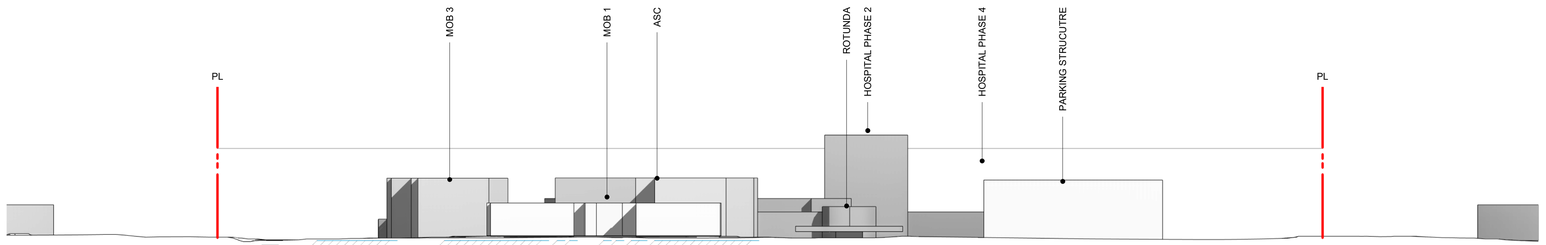
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



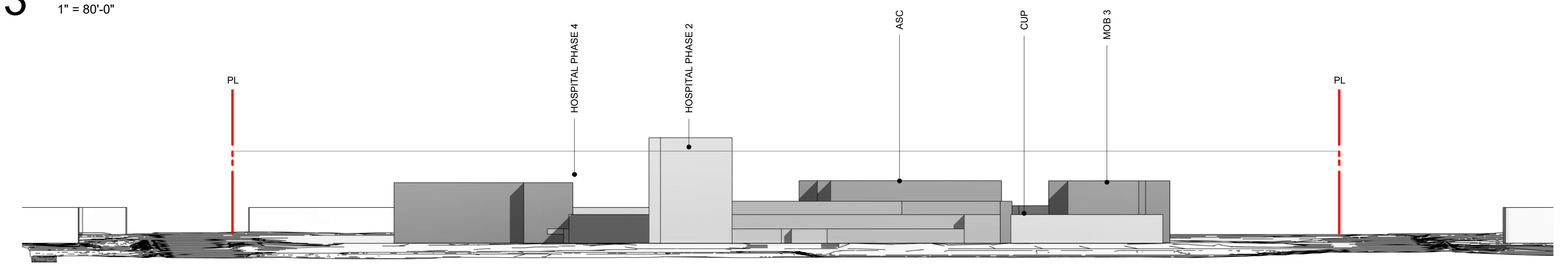
1 EW SECTION 1
1" = 80'-0"



2 EW SECTION 2
1" = 80'-0"



3 NS SECTION 1
1" = 80'-0"



4 NS SECTION 2
1" = 80'-0"

SITE & VICINITY SECTIONS

1" = 80'-0"

July 24, 2024

CO ARCHITECTS

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **A 3.21**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street, 4th Floor, Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
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TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07

PROPOSED PLANT PALETTE

TREES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE / FORM	INSTALL SIZE	WATER USE	DESCRIPTION	MATURE SIZE (AT 15 YEARS)
	CINNAMONUM CAMPHORA	CAMPHOR	24" BOX STD.	8'H X 4'W X 1-1/4"CAL.	M	CALIFORNIA STREET TREE	22'H X 20'W X 4"CAL.
	CUPANIOPSIS ANACARDIODES	CARROTWOOD	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	M	LUGONIA STREET TREE	24'H X 20'W X 4"CAL.
	ULMUS PARVIFOLIA 'TRUE GREEN' - OR - TIPUANA TIPU	TRUE GREEN CHINESE ELM - OR - TIPU TREE	36" BOX STD.	10'H X 5'W X 2"CAL.	M	CANOPY SHADE TREE	25'H X 25'W X 4"CAL.
	LAGERSTROEMIA INDICA 'PURPLE TOWER'	PURPLE TOWER CREPE MYRTLE	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	SMALL DECIDUOUS ACCENT	14'H X 12'W X 3"CAL.
	LOPHOSTEMON CONFERTUS	BRISBANE BOX	24" BOX STD.	8'H X 3'W X 1-1/4"CAL.	M	PERIMETER EDGE	25'H X 10'W X 4"CAL.
	OLEA EUROPEA 'WILSONII'	WILSON FRUITLESS OLIVE	36" BOX MULTI	8'H X 5'W X (3) 1.5"CAL.	L	EVERGREEN MULTI TRUNK FOCAL TREE	20'H X 24'W X (3) 3"CAL.
	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	24" BOX LOW BRCH	8'H X 3'W X 1-1/4"CAL.	M	CONIFEROUS SCREEN	25'H X 18'W X 4"CAL.
	QUERCUS AGRIFOLIA	COAST LIVE OAK	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	EVERGREEN CANOPY	24'H X 20'W X 4"CAL.
	RHUS LANCEA	AFRICAN SUMAC	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	PARKING AREA SHADE CANOPY	20'H X 24'W X 4"CAL.
	WASHINGTONIA ROBUSTA	CALIFORNIA FAN PALM	24' BTH	24'H X 8'W X 18" CAL.	L	CALIFORNIA STREET SKYLINE PALM	35'H X 8'W X 30"CAL.

***REFER TO SHEET L2.01 FOR FULL PLANT SCHEDULE**

TREE CALCULATIONS

EXISTING PARKING LOT
- TOTAL TREES - 148 TREES
- EVERGREEN TREES - 24 TREES (16.22%)
- DECIDUOUS TREES - 124 TREES (83.78%)

PROPOSED PARKING LOT (PHASE 1)
- TOTAL TREES - 285 TREES
- EVERGREEN TREES - 285 TREES (100%)
- DECIDUOUS TREES - 0 TREES (0%)

TOTAL PARKING AREA (PHASE 1)
- TOTAL TREES - 433 TREES
- EVERGREEN TREES - 309 TREES (71.36%)
- DECIDUOUS TREES - 124 TREES (28.64%)

TOTAL LANDSCAPE AREA (PHASE 1)
- TOTAL TREES - 797 TREES
- EVERGREEN TREES - 539 TREES (67.63%)
- DECIDUOUS TREES - 258 TREES (32.37%)

LEGEND

1. EXISTING PARKING LOT AND PARKING LOT LANDSCAPE
2. EXISTING BUILDING HARDSCAPE / LANDSCAPE
3. PROPOSED PARKING LOT AND PARKING LOT LANDSCAPE
4. EXISTING FALLOW LOT
5. TEMPORARY DETENTION BASIN
6. UPDATED ENTRY AND ENTRY LANDSCAPE
7. DECORATIVE DRY STREAM BED WITH BOULDERS AND PLANTING FOR FUTURE DETENTION BASIN
8. DROP OFF AREA WITH DECORATIVE VEHICULAR AND PEDESTRIAN PAVING
9. DEPRESSED PRAIRIE GRASS AREA FOR FUTURE DETENTION BASIN
10. PEDESTRIAN PROMENADE WITH SEATING / DINING OPPORTUNITIES
11. FOCAL BRIDGE ELEMENT OVER BASIN
12. DECORATIVE SEATING / DINING AREA
13. DECOMPOSED GRANITE TRAILS WITH SEATING / DINING OPPORTUNITIES AND PRAIRIE GRASS FIELDS
14. BUILDING ENTRY
15. STREET / PERIMETER LANDSCAPE
16. SERVICE AREA

0 80 160 240

PRELIMINARY LANDSCAPE PLAN (PHASE 1)

1" = 80'-0"

July 24, 2024

CO ARCHITECTS

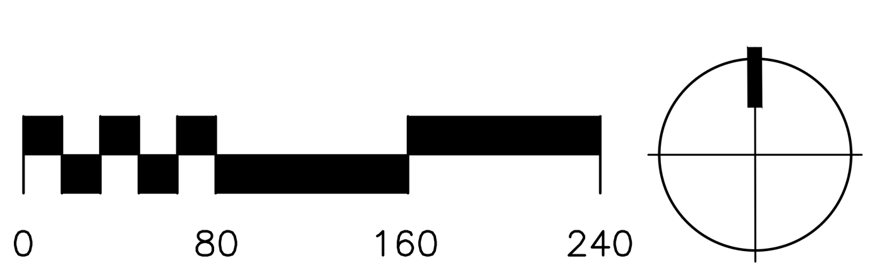
KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **L1.01**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: -	
ADDRESS: -	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, -	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: -
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07



PROPOSED PLANT PALETTE

TREES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE / FORM	INSTALL SIZE	WATER USE	DESCRIPTION	MATURE SIZE (AT 15 YEARS)
	CINNAMONUM CAMPHORA	CAMPHOR	24" BOX STD.	8'H X 4'W X 1-1/4"CAL.	M	CALIFORNIA STREET TREE	22'H X 20'W X 4"CAL.
	CUPANIOPSIS ANACARDIODES	CARROTWOOD	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	M	LUGONIA STREET TREE	24'H X 20'W X 4"CAL.
	ULMUS PARVIFOLIA 'TRUE GREEN' - OR - TIPUANA TIPU	TRUE GREEN CHINESE ELM - OR - TIPU TREE	36" BOX STD.	10'H X 5'W X 2"CAL.	M	CANOPY SHADE TREE	25'H X 25'W X 4"CAL.
	LAGERSTROEMIA INDICA 'PURPLE TOWER'	PURPLE TOWER CREPE MYRTLE	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	SMALL DECIDUOUS ACCENT	14'H X 12'W X 3"CAL.
	LOPHOSTEMON CONFERTUS	BRISBANE BOX	24" BOX STD.	8'H X 3'W X 1-1/4"CAL.	M	PERIMETER EDGE	25'H X 10'W X 4"CAL.
	OLEA EUROPEA 'WILSONII'	WILSON FRUITLESS OLIVE	36" BOX MULTI	8'H X 5'W X (3) 1.5"CAL.	L	EVERGREEN MULTI TRUNK FOCAL TREE	20'H X 24'W X (3) 3"CAL.
	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	24" BOX LOW BRCH	8'H X 3'W X 1-1/4"CAL.	M	CONIFEROUS SCREEN	25'H X 18'W X 4"CAL.
	QUERCUS AGRIFOLIA	COAST LIVE OAK	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	EVERGREEN CANOPY	24'H X 20'W X 4"CAL.
	RHUS LANCEA	AFRICAN SUMAC	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	PARKING AREA SHADE CANOPY	20'H X 24'W X 4"CAL.
	WASHINGTONIA ROBUSTA	CALIFORNIA FAN PALM	24' BTH	24'H X 8'W X 18" CAL.	L	CALIFORNIA STREET SKYLINE PALM	35'H X 8'W X 30"CAL.

***REFER TO SHEET L2.01 FOR FULL PLANT SCHEDULE**

TREE CALCULATIONS

EXISTING PARKING LOT
- TOTAL TREES - 148 TREES
- EVERGREEN TREES - 24 TREES (16.22%)
- DECIDUOUS TREES - 124 TREES (83.78%)

PROPOSED PARKING LOT (PHASE 2)
- TOTAL TREES - 258 TREES
- EVERGREEN TREES - 258 TREES (100%)
- DECIDUOUS TREES - 0 TREES (0%)

TOTAL PARKING AREA (PHASE 2)
- TOTAL TREES - 406 TREES
- EVERGREEN TREES - 282 TREES (69.46%)
- DECIDUOUS TREES - 124 TREES (30.54%)

TOTAL LANDSCAPE AREA (PHASE 2)
- TOTAL TREES - 962 TREES
- EVERGREEN TREES - 663 TREES (68.92%)
- DECIDUOUS TREES - 299 TREES (31.08%)

LEGEND

1. EXISTING PARKING LOT AND PARKING LOT LANDSCAPE
2. EXISTING BUILDING HARDSCAPE / LANDSCAPE
3. PROPOSED PARKING LOT AND PARKING LOT LANDSCAPE
4. EXISTING FALLOW LOT
5. AMBULANCE DROP OFF
6. UPDATED ENTRY AND ENTRY LANDSCAPE
7. DETENTION BASIN - DECORATIVE DRY STREAM BED WITH BOULDERS AND PLANTING
8. DROP OFF AREA WITH DECORATIVE VEHICULAR AND PEDESTRIAN PAVING
9. DEPRESSED PRAIRIE GRASS AREA FOR FUTURE DETENTION BASIN
10. PEDESTRIAN PROMENADE WITH SEATING / DINING OPPORTUNITIES
11. FOCAL BRIDGE ELEMENT OVER BASIN
12. DECORATIVE SEATING / DINING AREA
13. DECOMPOSED GRANITE TRAILS WITH SEATING / DINING OPPORTUNITIES AND PRAIRIE GRASS FIELDS
14. BUILDING ENTRY
15. STREET / PERIMETER LANDSCAPE
16. LOADING DOCK / SERVICE AREA

PRELIMINARY LANDSCAPE PLAN (PHASE 2)

1" = 80'-0"

July 24, 2024

CO ARCHITECTS

RLA

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **L1.02**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals	PHONE: -
ADDRESS: -	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, -	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: -
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07

PROPOSED PLANT PALETTE

TREES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE / FORM	INSTALL SIZE	WATER USE	DESCRIPTION	MATURE SIZE (AT 15 YEARS)
	CINNAMONUM CAMPHORA	CAMPHOR	24" BOX STD.	8'H X 4'W X 1-1/4"CAL.	M	CALIFORNIA STREET TREE	22'H X 20'W X 4"CAL.
	CUPANIOPSIS ANACARDIODES	CARROTWOOD	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	M	LUGONIA STREET TREE	24'H X 20'W X 4"CAL.
	ULMUS PARVIFOLIA 'TRUE GREEN' - OR - TIPUANA TIPU	TRUE GREEN CHINESE ELM - OR - TIPU TREE	36" BOX STD.	10'H X 5'W X 2"CAL.	M	CANOPY SHADE TREE	25'H X 25'W X 4"CAL.
	LAGERSTROEMIA INDICA 'PURPLE TOWER'	PURPLE TOWER CREPE MYRTLE	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	SMALL DECIDUOUS ACCENT	14'H X 12'W X 3"CAL.
	LOPHOSTEMON CONFERTUS	BRISBANE BOX	24" BOX STD.	8'H X 3'W X 1-1/4"CAL.	M	PERIMETER EDGE	25'H X 10'W X 4"CAL.
	OLEA EUROPEA 'WILSONII'	WILSON FRUITLESS OLIVE	36" BOX MULTI	8'H X 5'W X (3) 1.5"CAL.	L	EVERGREEN MULTI TRUNK FOCAL TREE	20'H X 24'W X (3) 3"CAL.
	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	24" BOX LOW BRCH	8'H X 3'W X 1-1/4"CAL.	M	CONIFEROUS SCREEN	25'H X 18'W X 4"CAL.
	QUERCUS AGRIFOLIA	COAST LIVE OAK	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	EVERGREEN CANOPY	24'H X 20'W X 4"CAL.
	RHUS LANCEA	AFRICAN SUMAC	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	PARKING AREA SHADE CANOPY	20'H X 24'W X 4"CAL.
	WASHINGTONIA ROBUSTA	CALIFORNIA FAN PALM	24' BTH	24'H X 8'W X 18" CAL.	L	CALIFORNIA STREET SKYLINE PALM	35'H X 8'W X 30"CAL.

***REFER TO SHEET L2.01 FOR FULL PLANT SCHEDULE**

TREE CALCULATIONS

EXISTING PARKING LOT
- TOTAL TREES - 148 TREES
- EVERGREEN TREES - 24 TREES (16.22%)
- DECIDUOUS TREES - 124 TREES (83.78%)

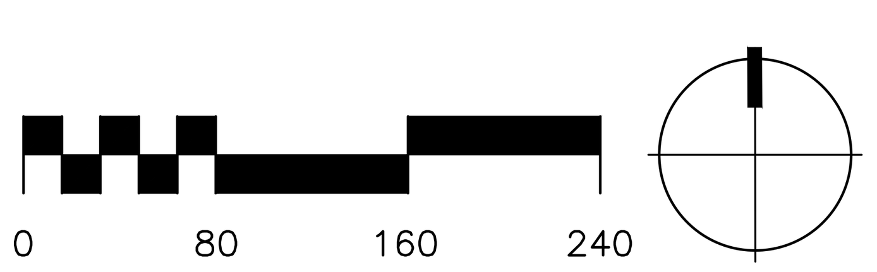
PROPOSED PARKING LOT (PHASE 3)
- TOTAL TREES - 369 TREES
- EVERGREEN TREES - 343 TREES (92.95%)
- DECIDUOUS TREES - 26 TREES (7.05%)

TOTAL PARKING AREA (PHASE 3)
- TOTAL TREES - 517 TREES
- EVERGREEN TREES - 367 TREES (70.99%)
- DECIDUOUS TREES - 150 TREES (29.01%)

TOTAL LANDSCAPE AREA (PHASE 3)
- TOTAL TREES - 1,065 TREES
- EVERGREEN TREES - 727 TREES (68.26%)
- DECIDUOUS TREES - 338 TREES (31.74%)

LEGEND

1. EXISTING PARKING LOT AND PARKING LOT LANDSCAPE
2. EXISTING BUILDING HARDSCAPE / LANDSCAPE
3. PROPOSED PARKING LOT AND PARKING LOT LANDSCAPE
4. EXISTING FALLOW LOT
5. AMBULANCE DROP OFF
6. UPDATED ENTRY AND ENTRY LANDSCAPE
7. DETENTION BASIN - DECORATIVE DRY STREAM BED WITH BOULDERS AND PLANTING
8. DROP OFF AREA WITH DECORATIVE VEHICULAR AND PEDESTRIAN PAVING
9. LOADING DOCK / SERVICE AREA
10. PEDESTRIAN PROMENADE WITH SEATING / DINING OPPORTUNITIES
11. FOCAL BRIDGE ELEMENT OVER BASIN
12. DECORATIVE SEATING / DINING AREA
13. DECOMPOSED GRANITE TRAILS WITH SEATING / DINING OPPORTUNITIES AND PRAIRIE GRASS FIELDS
14. BUILDING ENTRY
15. STREET / PERIMETER LANDSCAPE



PRELIMINARY LANDSCAPE PLAN (PHASE 3)

1" = 80'-0"

July 24, 2024

CO ARCHITECTS

RLA

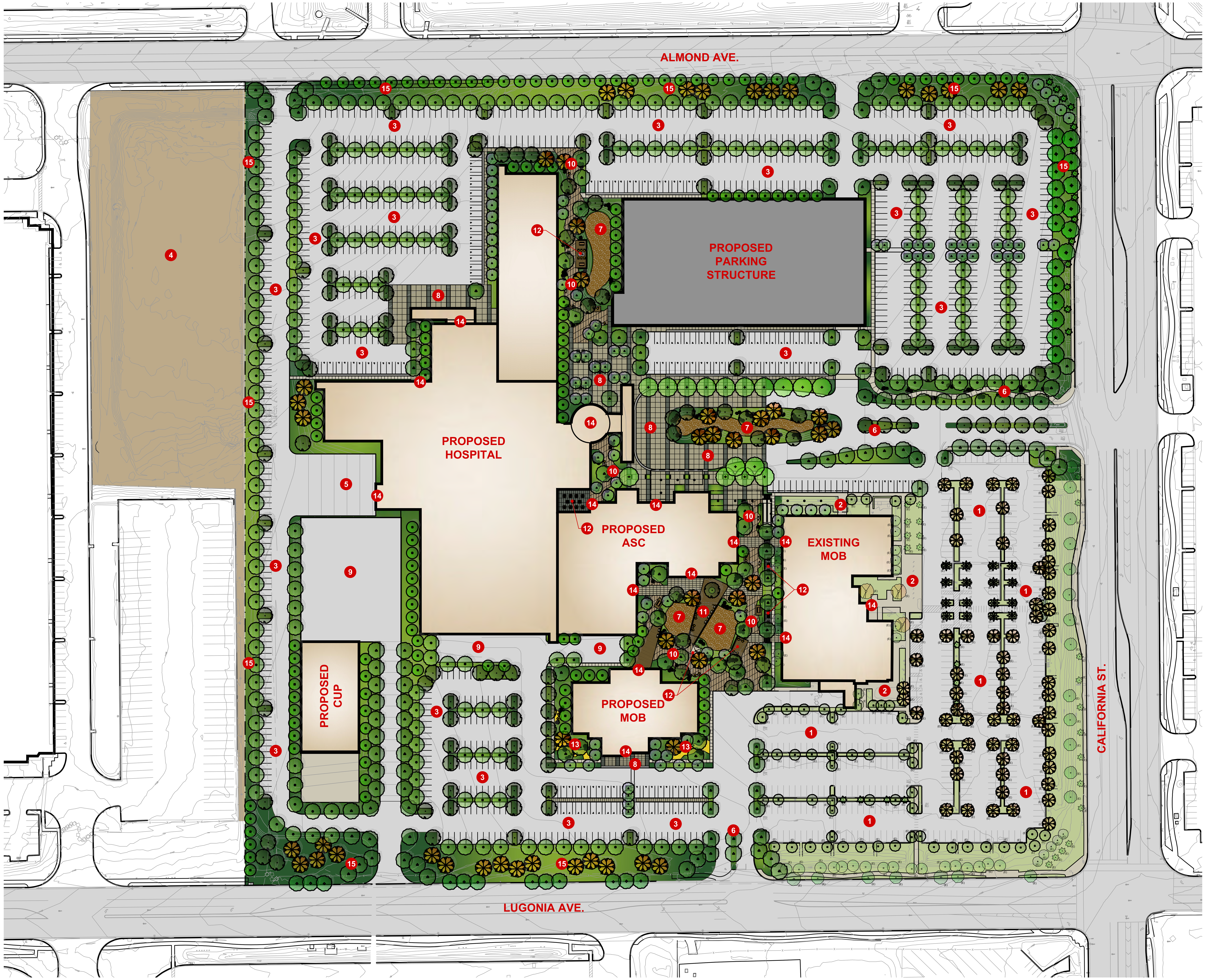
KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **L1.03**

CITY OF REDLANDS

Site Development Plan Number:
OWNER: Kaiser Foundation Hospitals PHONE: -
ADDRESS: -
ARCHITECT, ENGINEER, DESIGNER: CO Architects, - PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
TYPE OF DEVELOPMENT: XXXXX LOCATION: -
ZONE: CR ZONE ACCESSOR'S PARCEL NUMBER: 0167-441-07



PROPOSED PLANT PALETTE

TREES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE / FORM
	CINNAMONUM CAMPHORA	CAMPHOR	24" BOX STD.
	CUPANIOPSIS ANACARDIODES	CARROTWOOD	24" BOX STD.
	ULMUS PARVIFOLIA 'TRUE GREEN' - OR - TIPUANA TIPU	TRUE GREEN CHINESE ELM - OR - TIPU TREE	36" BOX STD.
	LAGERSTROEMIA INDICA 'PURPLE TOWER'	PURPLE TOWER CREPE MYRTLE	24" BOX STD.
	LOPHOSTEMON CONFERTUS	BRISBANE BOX	24" BOX STD.

PROPOSED PLANT PALETTE

TREES

	OLEA EUROPEA 'WILSONII'	WILSON FRUITLESS OLIVE	36" BOX MULTI
	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	24" BOX LOW BRCH
	QUERCUS AGRIFOLIA	COAST LIVE OAK	24" BOX STD.
	RHUS LANCEA	AFRICAN SUMAC	24" BOX STD.
	WASHINGTONIA ROBUSTA	CALIFORNIA FAN PALM	24' BTH

***REFER TO SHEET L2.01 FOR FULL PLANT SCHEDULE**

Appendix A Water Efficient Landscape Worksheet

Reference Evapotranspiration (ET_o)	55.6		Project Type		Non-Residential		0.45
Hydrozone # / Planting Description [a]	Plant Factor (PF)	Irrigation Method [b]	Irrigation Efficiency (IE) [c]	ETAF (PF/IE)	Landscape Area (Sq. Ft.)	ETAF x Area	Estimated Total Water Use (ETWU) [d]
Regular Landscape Areas							
1- Shrub Drip (LOW)	0.2	Drip	0.81	0.25	248666	61399	2116547
2 - Shrub Drip (MOD)	0.5	Drip	0.81	0.62	188005	116052	4000561
2 - Tree Bubbler (LOW)	0.3	Bubbler	0.73	0.41	0	0	0
3 - Tree Bubbler (MOD)	0.5	Bubbler	0.73	0.68	3360	2301	79333
				Totals	440031	179753	6196440
Special Landscape Areas							
SLA-1				1	0	0	0
				Totals	0	0	0
						ETWU Total [d]	6,196,440.3
						Maximum Allowed Water Allowance (MAWA) [e]	6,825,936.9
						MAWA - EAWA=	86,616.6

[a] **Hydrozone# / Planting Description** e.g.
1.) Front lawn
2.) Low water use planting
3.) Medium water use planting

[b] **Irrigation Method**
1.) Overhead Spray
2.) Drip

[c] **Irrigation Efficiency**
1.) 0.73 for Spray Head
2.) 0.81 for Drip

[d] **ETWU (Annual Gallons Required) =**
Eto x 0.62 x ETAF x Area
Where 0.62 is a conversion factor to change acre-inches per acre per year to gallons per square foot per year

[e] **MAWA (Annual Gallons Allowed)** = (Eto) (0.62) [(ETAF x LA) + ((1-ETAF) x SLA)]
Where 0.62 is a conversion factor to change acre-inches per acre per year to gallons per square foot per year, LA is the total regular landscape area in square feet, SLA is the total special landscape area in square feet, and ETAF is 0.55 for residential areas and 0.45 for non-residential areas.

ETAF Calculations

Regular Landscape Areas

Total ETAF x Area		179753
Total Area		440031
Average ETAF		0.41

Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for non-residential areas.

All Landscape Areas

Total ETAF x Area		179753	(B+D)
Total Area		440031	(A+C)
Average ETAF		0.41	(B+D) ÷ (A+C)

LEGEND

1. EXISTING PARKING LOT AND PARKING LOT LANDSCAPE
2. EXISTING BUILDING HARDSCAPE / LANDSCAPE
3. PROPOSED PARKING LOT AND PARKING LOT LANDSCAPE
4. EXISTING FALLOW LOT
5. AMBULANCE DROP OFF
6. UPDATED ENTRY AND ENTRY LANDSCAPE
7. DETENTION BASIN - DECORATIVE DRY STREAM BED WITH BOULDERS AND PLANTING
8. DROP OFF AREA WITH DECORATIVE VEHICULAR AND PEDESTRIAN PAVING
9. LOADING DOCK / SERVICE AREA
10. PEDESTRIAN PROMENADE WITH SEATING / DINING OPPORTUNITIES
11. FOCAL BRIDGE ELEMENT OVER BASIN
12. DECORATIVE SEATING / DINING AREA
13. DECOMPOSED GRANITE TRAILS WITH SEATING / DINING OPPORTUNITIES AND PRAIRIE GRASS FIELDS
14. BUILDING ENTRY
15. STREET / PERIMETER LANDSCAPE

TREE CALCULATIONS

EXISTING PARKING LOT
- TOTAL TREES - 148 TREES
- EVERGREEN TREES - 24 TREES (16.22%)
- DECIDUOUS TREES - 124 TREES (83.78%)

PROPOSED PARKING LOT (PHASE 4)
- TOTAL TREES - 369 TREES
- EVERGREEN TREES - 343 TREES (92.95%)
- DECIDUOUS TREES - 26 TREES (7.05%)

TOTAL PARKING AREA (PHASE 4)
- TOTAL TREES - 517 TREES
- EVERGREEN TREES - 367 TREES (70.99%)
- DECIDUOUS TREES - 150 TREES (29.01%)

TOTAL LANDSCAPE AREA (PHASE 4)
- TOTAL TREES - 1,037 TREES
- EVERGREEN TREES - 710 TREES (68.47%)
- DECIDUOUS TREES - 327 TREES (31.53%)

0 80 160 240

REGISTERED LANDSCAPE ARCHITECT
DAVIS EBBETS
(Signature)
06/09/23
(Date)
07/21/24
(Exp. Date)
STATE OF CALIFORNIA

PRELIMINARY LANDSCAPE PLAN (PHASE 4)

1" = 80'-0"

July 24, 2024

CO ARCHITECTS

RLA

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **L1.04**

CITY OF REDLANDS

Site Development Plan Number:
OWNER: Kaiser Foundation Hospitals PHONE: -
ADDRESS: -
ARCHITECT, ENGINEER, DESIGNER: CO Architects, - PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
TYPE OF DEVELOPMENT: XXXXX
LOCATION: -
ZONE: CR ZONE
ACCESSOR'S PARCEL NUMBER: 0167-441-07

TREES


CINNAMOMUM CAMPHORA /
CAMPHOR


CUPANIOPSIS ANACARDIOIDES /
CARROTWOOD

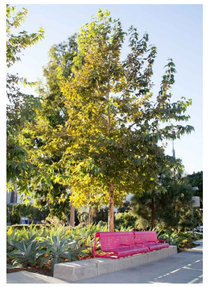

LAGERSTROEMIA I. 'PURPLE TOWER' /
PURPLE TOWER CREPE MYRTLE


ULMUS P. 'TRUE GREEN' /
TRUE GREEN CHINESE ELM


TIPUANA TIPU /
TIPU TREE


LOPHOSTEMON CONFERTUS /
BRISBANE BOX


OLEA EUROPEA 'WILSONII' /
WILSON FRUITLESS OLIVE


PLATANUS RACEMOSA /
CALIFORNIA SYCAMORE


QUERCUS AGRIFOLIA /
COAST LIVE OAK


RHUS LANCEA /
AFRICAN SUMAC


WASHINGTONIA ROBUSTA /
CALIFORNIA FAN PALM

BIOSWALE GRASSES


CAREX DIVULSA /
BERKELEY SEDGE


CAREX TUMICOLA /
FOOTHILL SEDGE


JUNCUS PATENS /
CALIFORNIA GRAY RUSH

VINES


DISTICTIS BUCCINATORIA /
BLOOD-RED TRUMPET VINE

BACKGROUND SHRUBS


FURCRAEA MACDOUGALLII /
MACDOUGALLS CENTURY PLANT


OLEA E. 'MONTRA' /
LITTLE OLLIE DWARF OLIVE


LEUCOPHYLLUM F. 'GREEN CLOUD' /
TEXAS RANGER


WESTRINGIA 'WYNYABBIE GEM' /
COAST ROSEMARY

MIDGROUND SHRUBS


AGAVE OVATIFOLIA /
WHALE'S TONGUE AGAVE


MUHLENBERGIA 'EL TORO' /
BULL GRASS


RHAPHIOLEPIS U. 'MINOR' /
DWARF YEDDO HAWTHORN


CALLISTEMON 'LITTLE JOHN' /
DWARF BOTTLE BRUSH


BACCHARIS P. 'TWIN PEAKS' /
TWIN PEAKS COYOTE BRUSH

FOREGROUND SHRUBS


DIANELLA 'LITTLE REV' /
LITTLE REV FLAX LILY


CAREX DIVULSA /
BERKELEY SEDGE


FESTUCA MAIREI /
ATLAS FESCUE


HESPERALOE PARVIFLORA /
RED YUCCA


LOMONDRA L. 'LOMLON' /
LOMLON MOOR GRASS

GROUNDCOVERS


ACACIA R. 'LOWBOY' /
PROSTRATE ACACIA


BACCHARIS P. 'PIGEON POINT' /
DWARF COYOTE BRUSH


LANTANA 'NEW GOLD' /
NEW GOLD LANTANA


SESLERIA A. 'GREENLEE' /
GREENLEE MOOR GRASS


ROSMARINUS O. 'PROSTRATUS' /
PROSTRATE ROSEMARY

PROPOSED PLANT PALETTE

TREES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE / FORM	INSTALL SIZE	WATER USE	DESCRIPTION	MATURE SIZE (AT 15 YEARS)
+	CINNAMONUM CAMPHORA	CAMPHOR	24" BOX STD.	8'H X 4'W X 1-1/4"CAL.	M	CALIFORNIA STREET TREE	22'H X 20'W X 4"CAL.
◆	CUPANIOPSIS ANACARDIODES	CARROTWOOD	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	M	LUGONIA STREET TREE	24'H X 20'W X 4"CAL.
+	ULMUS PARVIFOLIA 'TRUE GREEN' - OR - TIPUANA TIPU	TRUE GREEN CHINESE ELM - OR - TIPU TREE	36" BOX STD.	10'H X 5'W X 2"CAL.	M	CANOPY SHADE TREE	25'H X 25'W X 4"CAL.
▲	LAGERSTROEMIA INDICA 'PURPLE TOWER'	PURPLE TOWER CREPE MYRTLE	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	SMALL DECIDUOUS ACCENT	14'H X 12'W X 3"CAL.
⌗	LOPHOSTEMON CONFERTUS	BRISBANE BOX	24" BOX STD.	8'H X 3'W X 1-1/4"CAL.	M	PERIMETER EDGE	25'H X 10'W X 4"CAL.
♣	OLEA EUROPEA 'WILSONII'	WILSON FRUITLESS OLIVE	36" BOX MULTI	8'H X 5'W X (3) 1.5"CAL.	VL	EVERGREEN MULTI TRUNK FOCAL TREE	20'H X 24'W X (3) 3"CAL.
✳	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	24" BOX LOW BRCH	8'H X 3'W X 1-1/4"CAL.	M	CONIFEROUS SCREEN	25'H X 18'W X 4"CAL.
•	QUERCUS AGRIFOLIA	COAST LIVE OAK	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	EVERGREEN CANOPY	24'H X 20'W X 4"CAL.
●	RHUS LANCEA	AFRICAN SUMAC	24" BOX STD.	6'H X 3'W X 1-1/4"CAL.	L	PARKING AREA SHADE CANOPY	20'H X 24'W X 4"CAL.
★	WASHINGTONIA ROBUSTA	CALIFORNIA FAN PALM	24' BTH	24'H X 8'W X 18" CAL.	L	CALIFORNIA STREET SKYLINE PALM	35'H X 8'W 30"CAL.

BACKGROUND SHRUBS

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE	DESCRIPTION
	FURCRAEA MACDOUGALLII	MACDOUGALLS CENTURY PLANT	5 GAL.	60" O.C.	L	SUCCULENT ACCENT
	OLEA X MONTRA 'LITTLE OLLIE'	LITTLE OLLIE	5 GAL.	36" O.C.	L	HEDGE
	LEUCOPHYLLUM F. 'GREEN CLOUD'	TEXAS RANGER	5 GAL.	48" O.C.	L	LARGE FLOWERING
	WESTRINGIA FRUTICOSA 'WYNYABBIE GEM'	WYNYABBIE GEM COAST ROSEMARY	5 GAL.	42" O.C.	L	HEDGE

MIDGROUND SHRUBS

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE	DESCRIPTION
	AGAVE OVATIFOLIA	WHALE'S TONGUE AGAVE	5 GAL.	48" O.C.	L	SUCCULENT ACCENT
	MUHLENBERGIA EMERSLEYI 'EL TORO'	BULL GRASS	1 GAL.	36" O.C.	L	ORNAMENTAL GRASS
	RHAPHIOLEPIS UMBELLATA 'MINOR'	DWARF YEDDO HAWTHORN	5 GAL.	36" O.C.	M	FLOWERING ACCENT
	CALLISTEMON 'LITTLE JOHN'	LITTLE JOHN DWARF BOTTLE BRUSH	5 GAL.	36" O.C.	L	FLOWERING ACCENT
	BACCHARIS PILULARIS 'TWIN PEAKS'	TWIN PEAKS COYOTE BRUSH	5 GAL.	36" O.C.	L	CALIFORNIA NATIVE

FOREGROUND SHRUBS

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE	DESCRIPTION
	DIANELLA 'LITTLE REV'	LITTLE REV FLAX LILY	1 GAL.	24" O.C.	L	STRAPPY ACCENT
	CAREX DIVULSA	BERKELEY SEDGE	1 GAL.	30" O.C.	L	ORNAMENTAL GRASS
	FESTUCA MAIREI	ATLAS FESCUE	1 GAL.	30" O.C.	L	ORNAMENTAL GRASS
	HESPERALOE PARVIFLORA	RED YUCCA	1 GAL.	36" O.C.	L	FLOWERING ACCENT
	LOMANDRA LONGIFOLIA 'LOMLON'	LOMLON MOOR GRASS	1 GAL.	36" O.C.	M	ORNAMENTAL GRASS

GROUNDCOVERS

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE	DESCRIPTION
	ACACIA REDOLENS 'LOW BOY'	PROSTRATE ACACIA	1 GAL.	8' O.C.	VL	EVERGREEN GROUNDCOVER
	BACCHARIS P. 'PIGEON POINT'	DWARF COYOTE BRUSH	1 GAL.	48" O.C.	L	EVERGREEN GROUNDCOVER
	LANTANA 'NEW GOLD'	NEW GOLD LANTANA	1 GAL.	36" O.C.	L	FLOWERING GROUNDCOVER
	SESLERIA AUTUMNALIS 'GREENLEE'	GREENLEE MOOR GRASS	1 GAL.	18" O.C.	M	FLOWERING GROUNDCOVER
	ROSMARINUS O. 'PROSTRATUS'	PROSTRATE ROSEMARY	FLATS	12" O.C.	L	EVERGREEN GROUNDCOVER

BIOSWALE GRASSES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE	DESCRIPTION
	CAREX DIVULSA	BERKELEY SEDGE	1 GAL.	24" O.C.	L	BIOSWALE GRASS
	CHONDROPETALUM TECTORUM	CAPE RUSH	5 GAL.	36" O.C.	M	BIOSWALE GRASS
	JUNCUS PATENS	CALIFORNIA GRAY RUSH	1 GAL.	18" O.C.	L	BIOSWALE GRASS

VINES

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE	DESCRIPTION
	DISTICTUS BUCCINATORIA	BLOOD-RED TRUMPET VINE	1 GAL / STAKED	PER PLAN	M	FLOWERING VINE

WATER USE KEY:
VL = VERY LOW WATER USE, L = LOW WATER USE, M = MODERATE WATER USE, H = HIGH WATER USE. WATER USE STATED IS PER 'WATER USE CLASSIFICATION OF LANDSCAPE SPECIES' (ALSO REFERRED TO AS WUCOLS IV) FOR THE CITY OF REDLANDS

REGISTERED LANDSCAPE ARCHITECT
DAVIS EBBS
No. 4624
(Signature)
04/25/23
(Date)
07/21/24
(Exp. Date)
STATE OF CALIFORNIA

CONCEPTUAL LANDSCAPE IMAGERY

1" = 80'-0"

July 24, 2024

CO ARCHITECTS

RLA

KAISER PERMANENTE

REDLANDS MEDICAL CENTER

Sheet: **L2.01**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: -	
ADDRESS: -	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, -	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: -
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07

APPENDIX B

CULTURAL RESOURCES INVENTORY

PHASE I
CULTURAL RESOURCES INVENTORY
FOR THE

KAISER PERMANENTE MEDICAL CENTER PROJECT
CITY OF REDLANDS
SAN BERNARDINO, CALIFORNIA

Prepared for:

Kevin Beery, Senior Planner
Development Services Department
City of Redlands
35 Cajon Street, Suite 20
Redlands, CA 92373

Prepared by:

Stephen O'Neil, M.A., RPA
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PHASE I
CULTURAL RESOURCES INVENTORY

FOR THE

KAISER PERMANENTE MEDICAL CENTER PROJECT CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA

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October, 2024

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1.0 INTRODUCTION

1.1 Overview

This Phase I Cultural Resource Inventory report was prepared by UltraSystems Environmental (UEI) at the request of the City of Redlands to conduct a Cultural Resources Inventory in support of an Environmental Impact Report for the proposed Kaiser Permanente Medical Center Project in San Bernardino County, California. UltraSystems has prepared this study to evaluate the potential presence of prehistoric and historic resources within the project boundary.

The proposed project includes the expansion of the existing Kaiser Permanente Redlands Medical Offices site in multiple phases. The first phase includes a new four-story 165,000 square foot Medical Office Building/Ambulatory Services Center and parking lots. The second phase includes a seven-story 400,000 square foot hospital, a two-story 35,000 square foot Central Utility Plant building, parking structure and parking lots. The third phase includes a four-story 83,000 square foot Medical Office Building, and the fourth phase includes a 180,000 square foot addition to the future hospital. The project boundary covers an area of approximately 36.5 acres. Currently the only developed portion of the project site is 9.6 acres in the southeast quadrant with a three-story medical building and surface parking on the site. The remainder of the site is tilled vacant land.

The project area is specifically located at 1301 California Street at the northwest corner of California Street and Lugonia Avenue and 0.25 mile north of the I-10 Freeway in the city of Redlands (see **Attachment A, Map 1** and **Map 2)**. This may be seen on the *Redlands, Calif.*, USGS topographical quadrangle, Range 03 West, Township 01 South, in the SE ¼ of the NE ¼ of Section 19 (see **Attachment A, Map 3)** – the project area is depicted with a 0.5-mile buffer zone beyond the Area of Potential Effect (APE). The project area is surrounded by industrial uses in all directions, including a warehouse currently under construction to the south (see **Attachment A, Map 2)**.

Area of Potential Effect

The APE for the undertaking encompasses the maximum extent of potential ground disturbance required by the project design (see **Attachment A**, **Map 3**).

1.2 Methods

A cultural resources records search was completed at the South Central Coastal Information Center (SCCIC) at California University Fullerton, which is the local California Historic Resources Information System (CHRIS) facility. The project site is included in the search radius for archival studies. The records search was conducted to identify previously recorded cultural resources (prehistoric and historic archaeological sites/isolates, historic buildings, structures, objects, or districts) and to also identify previous cultural resource surveys within the project area. These records included a review of previously recorded prehistoric and historic archaeological resources and of listed cultural resource survey reports within that same geographical area. The cultural resources record search was conducted by UEI staff. The Native American Heritage Commission (NAHC) was contacted requesting a Sacred Lands File (SLF) search and a list of local tribes to contact. A field pedestrian survey was also conducted.

Stephen O'Neil, M.A., RPA, who qualifies as a Principal Prehistoric Archaeologist and Historic Archaeologist per United States Secretary of the Interior Standards (see **Attachment B**) is the Principal Investigator for this study. UEI Assistant Project Archaeologist Megan B. Doukakis, M.A.,

contacted the Native American Heritage Commission (NAHC) requesting a Sacred Lands File (SLF) search and assisted with the preparation of this report.

A search of the Built Environment Resources Directory (BERD) provided by the Office of Historic Preservation (2021) for potential historic properties listed in the National Register of Historic Places (NRHP) was conducted by Ms. Doukakis for this project on November 8, 2023 -- see **Section 4.4**.

Disposition of Data

This report will be filed with the SCCIC, California State University Fullerton; the City of Redlands Development Services Department; and UltraSystems Environmental, Inc., Irvine, California. All field notes and other documentation related to the study will remain on file at the Irvine office of UltraSystems.

2.0 SETTINGS

2.1 Natural Setting

The City of Redlands is located in the southwest portion of the San Bernardino Valley. This is a broad inland valley defined by the San Gabriel and San Bernardino Mountain Ranges to the north and is ringed by a series of low rocky hills to the south. The region's environment is characterized by a temperate Mediterranean climate, with the average maximum temperature in July reaching 89 degrees Fahrenheit (°F) and the average minimum temperature in January at around 42°F. Rainfall is typically less than 15 inches annually, most of which occurs between November and March.

The project site boundary is underlain by Surficial Sediments (Qa) (Dibblee, 2004), consisting of Alluvial and clay in valley areas covered with grey soil, including alluvia pebbly sand adjacent to mountain terrain. These soils date to the Holocene (11,650 years before present [ybp]) (Dibblee, 2004). The project site is at an elevation ranging from approximately 1,145 to 1,160 feet above mean sea level (AMSL) with a gentle slope to the west.

The city of Redlands encompasses 36.24 square miles. It is bordered by the cities of Highland to the north, San Bernardino to the northwest, Loma Linda to the southwest, Yucaipa to the east, and unincorporated San Bernardino County lands to the north and northeast, as well as by Riverside County to the south. At the 2020 census the population was 73,170; by mid-2022 the population had grown to an estimated 73,849 (U.S. Census 2023).

2.2 Cultural Setting

2.2.1 Prehistoric Context

The earliest evidence of human occupation in the Inland Empire region (consisting of the southwestern corner of San Bernardino and western Riverside counties) was discovered below the surface of an alluvial fan in the northern portion of the Lakeview Mountains, overlooking the San Jacinto Valley, dating to around 9,500 radiocarbon years (rcy) before present (B.P.) (before present = A.D. 1950) (Horne and McDougall, 2008). Another prehistoric archaeological site found near the shoreline of Lake Elsinore, close to the confluence of Temescal Wash and the San Jacinto River, dates between 8,000 and 9,000 B.P. (Grenda, 1997). Additional sites with isolated Archaic dart points, bifaces, and other associated flaked stone artifacts are considered to be from the same age range and have been found in the Cajon Pass area, typically atop knolls with good viewsheds (Basgall and True, 1985; Goodman, 2002; Goodman and McDonald, 2001).

The regional prehistory of Southern California has been characterized by various cultural chronologies, including those developed by Chartkoff and Chartkoff (1984), Warren (1984), and others. Specifically, the prehistory of the Inland Empire region has been addressed by O'Connell et al., (1974), Keller et al., (1989), Grenda (1993), and Horne and McDougall (2008). Although the beginning and ending dates of different cultural periods vary, the regional framework can be generally broken into four primary periods:

- Paleoindian and Lake Mojave (Terminal Pleistocene and Early Holocene) (ca. 11000 to 6000 calibrated years [cal] B.C.). This time period is characterized by highly mobile foraging strategies and a broad spectrum of subsistence pursuits. These earliest expressions of aboriginal occupation in America were marked by the use of large projectile points (Fluted

and Concave Base Points) that are an element of the Western Clovis expression. Following the earliest portions of this time span there was a change in climate coincident with the retreat of glaciers. Large bodies of water existed and lakeside aboriginal adaptations were common. Large stemmed points (Western Stemmed – Lake Mojave and Silver Lake) accompanied by a wide variety of formalized stone tools were employed with the aid of atlatls (dart throwers) and are representative of an adaptation that was in part focused on lacustrine environments.

- Millingstone Horizon (ca. 6000 cal B.C. to cal A.D. 1000), during which time mobile hunter-gatherers became more sedentary and plant foods and small game animals came into more use. This prehistoric cultural expression is often characterized by a large number of millingstones (especially well-made, deep basin metates) and formalized, portable handstones (manos). Additionally, the cultural assemblage is dominated by an abundance of scraping tools (including scraper planes and pounding/pulping implements), and only a slight representation of dart-tipped projectile points (Pinto, Elko and Gypsum types).

- Late Prehistoric Period (ca. cal A.D. 1000 to 1500), during which a more complex social organization, more diversified subsistence base and an extensive use of the bow and arrow is evidenced. Small, light arrow points, expedient millingstones and, later, pottery mark this period along with the full development of regional Native cultures and tribal territories.

- Protohistoric Period (ca. cal A.D. 1500 to 1700s) ushered in long-distance contacts with Europeans, and thereby led to the Historic Period (ca. cal A.D. 1700 to contemporary times). Small arrow points are recognized as a hallmark of this time period.

Geospatial analyses of known prehistoric sites in inland Southern California suggest that longer-term residential settlements of the Native population were more likely to occur in sheltered areas. Such locations were near the base of hills and/or on elevated terraces, hills, and finger ridges. Further, these favored locations were near permanent or reliable sources of water. These were areas that were largely level encampments situated on the unprotected valley floor. The residential sites were used for resource procurement and travel. The use of such geographical settings is supported by the ethnographic literature. These reports identify the foothills as preferred areas for settlement (Bean and Smith, 1978a; 1978b).

2.2.2 Ethnohistoric Context

Prior to European contact, the indigenous peoples who resided in modern-day San Bernardino County were the Tongva (Gabrielino), and Taaqtam (Serrano) peoples who lived in the San Bernardino Valley and the San Bernardino Mountains. Bean and Smith (1978a:538; 1978b:570) and Johnston (1962) indicate that "…the historic-era border between the Gabrielino and Serrano at San Bernardino [town]. It is likely that both groups used the territories within the project area during the sixteenth to nineteenth centuries…" (Foster et al. 1991:11).

2.2.2.1 Gabrielino/Tongva

The project lies within the territory of the Gabrielino (Tongva) ethnolinguistic group (Bean and Smith, 1978a:538), who speak a language classified as a member of the Uto-Aztecan language family. This language is further affiliated as an element of the Northern Takic Branch of that linguistic group (Golla, 2011).

The Gabrielino, with the Chumash, were considered the most populous, wealthiest, and therefore most powerful ethnic nationalities in aboriginal Southern California (Bean and Smith, 1978a:538). Unfortunately, most Gabrielino cultural practices had declined before systematic ethnographic studies were instituted. Today, the leading sources on Gabrielino culture are Bean and Smith (1978a), Johnston (1962), and McCawley (1996).

According to recent research, Takic groups were not the first inhabitants of the region. Archeologists suggest that a Takic in-migration may have occurred as early as 2,000 years ago, replacing or intermarrying with a more ancient indigenous people represented by speakers of a Hokan language (Howard and Raab, 1993; Porcasi, 1998). By the time of European contact, the Gabrielino territory included the southern Channel Islands and the entire Los Angeles Basin. Their territory reached to the west along the Pacific Coast to Malibu, north and east to the foothills of the San Gabriel Mountains, to the southeast into the present-day San Bernardino-Riverside area and south to the San Joaquin Hills in central Orange County.

Different groups of Gabrielino adopted several subsistence strategies, based on gathering, hunting, and fishing. Because of the similarities to other Southern California tribes in economic activities, inland Gabrielino groups' industrial arts, exemplified by basket weaving, exhibited an affinity with those of their neighbors (Kroeber, 1925). Coastal Gabrielino material culture, on the other hand, reflected an elaborately developed artisanship most recognized through the medium of steatite, which was rivaled by few other groups in Southern California.

The intricacies of Gabrielino social organization are not well known. There appeared to have been at least three hierarchically ordered social classes, topped with an elite consisting of the chiefs, their immediate families, and other ceremonial specialists (Bean and Smith, 1978a). Clans owned land, and property boundaries were marked by the clan's personalized symbol. Villages were politically autonomous, composed of non-localized lineages, each with its own leader. The dominant lineage's leader was usually the village chief, whose office was generally hereditary through the male line. Occasionally several villages were allied under the leadership of a single chief. The villages frequently engaged in warfare against one another, resulting in what some consider to be a state of constant enmity between coastal and inland groups.

The City of Redlands is situated within the eastern periphery of the Tongva culture area. The central Tongva land was the Los Angeles Basin; however, it extended east to include portions of the San Bernardino Valley. In the San Bernardino Valley, the Tongva's neighbors were the Serrano on the north and the Cahuilla farther east. Away from the Santa Ana River this area was not well watered. Therefore, this portion of the territory was not as densely populated as the coastal territory.

The San Bernardino Valley contains the northeastern region of Gabrielino territory, with upwards of eight major communities located throughout (McCawley 1996:48). The village of *Wa'aachnga*, also spelled *Kaawchama*, was somewhat west of Redlands (McCawley, 1996:50). It is also the site of the San Bernardino Asistencia of Mission San Gabriel built in 1820 (Engelhardt 1931) in what was later called Old San Bernardino. Somewhat to the southwest of Redlands, "southeast of Colton between the southerly bank of the Santa Ana River and the base of the foothills" (Shinn 1941, cited in McCawley 1996:50) was the native community of *Homhoa*. Both of these villages were located either along the Santa Ana River (*Wa'aachnga*) or a tributary to it (*Homhoa*). In the late Mission Period or just thereafter, much of the region was populated by the Serrano (Bean and Smith, 1978b), who migrated into the area following the removal of the Gabrielino to Mission San Gabriel.

The first Franciscan establishment in Gabrielino territory and the broader region was Mission San Gabriel, founded in A.D. 1772. Priests from the mission proselytized the Tongva throughout the Los Angeles Basin. As early as 1542, however, the Gabrielino were in peripheral contact with the Spanish even during the historic expedition of Juan Rodríguez Cabrillo. However, it was not until 1769 that the Spaniards took steps to colonize the territory of aboriginal Californians. Within a few decades, most of the Gabrielino were incorporated into Mission San Gabriel and other missions in Southern California (Engelhardt, 1931). Due to introduced diseases, dietary deficiencies, and forceful *reducción* (removal of non-agrarian Native populations to the mission compound), Gabrielino population dwindled rapidly from these impacts. By 1900, the Gabrielino community had almost ceased to exist as a culturally identifiable group. In the late 20th century, however, a renaissance of Native American activism and cultural revitalization of Gabrielino descendants took place. Among the results of this movement has been a return to a traditional name for the tribe, the Tongva, which is employed by several of the bands and organizations representing tribal members. Many of the Tongva bands focus on maintaining and teaching traditional knowledge, with special emphasis on language, place names and natural resources, and preservation of ancestral sites.

2.2.2.2 Serrano

The City of Redlands is situated within the southeastern periphery of the Serrano culture area. The Recent research by Earle (1990, 1997, 2004a, 2004b, 2005a, 2005b), King (2003), and Johnson and Lorenz (2006) have helped to clarify the ethnic identification of the San Gabriel / San Bernardino mountains and Mojave Desert Native American groups. Their work with the John Peabody Harrington notes, combined with analysis of the Franciscan sacramental registries, confirm ethnographic records (Benedict 1924, Kroeber 1925, Strong 1929) that the inhabitants of the project area were speakers of a dialect of Serrano. It has been determined that Native groups occupying villages in the San Bernardino Mountains and adjacent Moreno Valley region maintained marriage ties to surrounding region and the foothills extending into the San Bernardino and San Jacinto Valleys inhabited by Cahuilla and Luiseno were also Serrano in ethnic and linguistic affiliation.

Earle (1990, 1997) supports King's revisions of earlier territorial boundaries asserting that Serrano territory included the San Bernardino Mountains and the northern slopes of the San Gabriel Mountains, the Mojave River, and Antelope Valley. It also appears from their research that both the south and north slopes of the San Gabriel Mountains were "owned" and occupied by Serrano speakers.

Early 20th century ethnographic fieldwork among the Serrano was conducted by Kroeber (1925), Gifford (1918), Strong (1929), Benedict (1924), and Harrington (1986). More recent research by Bean (1972), Bean and Smith (1978b), and Bean, et al. (1981) has helped to focus attention on key research questions in an attempt to clarify the relationship of Serrano land use patterns, territorial attributions, subsistence-settlement patterns, and social, ceremonial, and political organization.

The economic resource base of the Serrano was determined in part by the seasonal availability of key animals and plants exploited for basic subsistence (Earle 1992). Hunting activities supplemented a diet mainly emphasizing plants. Hunting excursions were usually an individual affair but also sometimes incorporated communal drives, and trap lines to snare small animals (e.g., rabbits, squirrels and rodents). Some desert hunting areas to the north in the Mojave Desert and in the vicinity of the Mojave River may have been shared with adjacent groups (e.g., Chemehuevi and/or Mojave).

Mule deer were available in the San Gabriel Mountains. Deer would migrate to lower elevations during the winter and would be available in the lower foothill region at that time. Pronghorn frequented the valley floors year-round but were not consistently abundant and were hunted only occasionally using communal surrounds and group drives. The latter communal drive technique was also used to ensnare large numbers of jackrabbits during the fall when the rabbits were especially abundant. Mountain sheep were available in the higher mountains but would only have been rarely procured. Waterfowl could be captured using bows and arrows and special nets. Ducks, quail, geese, and grebes would have been available in considerable numbers during their breeding seasons and in association with riparian settings.

Abundant stands of acorns, juniper, mesquite, and piñon were available to extended gathering expeditions into the mountains. These might involve several lineages collaborating under one leader's authority and would have entailed accessing the resource base of surrounding groups (Bean and Smith 1978; Benedict 1924:391-392; Drucker 1937). Cattail / bulrush seeds (*Typha* spp. and *Scirpus* spp.), various roots, shoots, bulbs, and other hard seeds were all principal plant foods. The most likely plant resources that were of significant economic importance that have been identified paleobotantically or noted in the immediate vicinity of the Project were grasses (*Poa* ssp.), chia (*Salvia columbariae*), and goosefoot (*Chenopodium* spp.).

Various groundstone tools, including manos and metates, mortars and pestles used for grinding food were made by grinding granite, quartzite and other suitable rocks. Flaked tools including knives, spear and arrow points, and scarpers were made from crystalline lithics. Bone and antler were used as to fashion other tools. Baskets were woven for use in gathering, storing and preparing foods, as well as hats for women. Other plant material was woven into bags, storage pouches, mats, nets and sandals.

Serrano houses were circular domes made of brush that had a central fire pit. Ramadas and ceremonial enclosures were also built. Granaries were woven, often of willow. Houses of several families tended to be clustered in small communities and located near springs or creeks, and often were centrally located at the nexus of several environments.

Edward W. Gifford conducted a detailed study of the marriage practices and sociopolitical organization of native southern California Native Americans during from 1916 through 1917 (Gifford 1918). Based on these studies, he developed a model of Serrano social organization (Earle 2004a, 2004b). William Duncan Strong (1929: 5-35) conducted additional extensive social organization studies among the Serrano, Cahuilla, Luiseño, and Cupeño in 1925. Strong indicated that the Serrano were an unusual California group in that they possessed true patrilineal clans. Patrilineal clans are patterned such that all males, their descendants, and their wives were part of a single group. Clans may be segmented into subclans or lineages. A woman retained her own lineage name but upon marriage was incorporated into the clan of her husband. The transfer of women from one ceremonial affiliation with one clan to another, upon marriage, was characteristic of all southern California Takic (a linguistic subfamily of Northern Uto-Aztecan) groups. The Serrano maintained an active moiety system -- their society was divided into two parts identified with either Coyote or Wildcat. The Coyote moiety had the most important political leaders. Moiety out-marriage excluded partners from half the neighboring Serrano settlements. Hence, only settlements of opposing moieties were interrelated through marriage.

Serrano villages in the mountain settings were generally less dispersed than in the desert. This nearer pattern resulted in marriages linking together very large areas. Many of the settlements had marriage ties with villages 10 - 20 miles away and counter intuitive was the fact that the closest relationships

were not with the nearest villages – but rather with settlements affiliated with opposing moieties further distant.

King's study of the Franciscan mission registers indicates that there were numerous important hereditary positions among the Serrano. Each village contained a chief, a ceremonial manager, two messengers, as well as various shamans, diviners, and other ritual specialists. Each of these leaders oversaw different elements of Serrano life involving festivals, dances, and warfare.

Ethnographic data attests that a major native trade and travel corridor facilitated a long-distance exchange system. Recent research has supported the importance of long distance trade linking coastal southern Californian Tongva clans/villages with inland groups including the coastal Tongva and Luiseño/Acjachemen tribes in a route along the Santa Ana River (Earle 2005a, Strong 1929). Shell bead trade was one of the mediums of exchange and was used as a kind of currency or money. This system was significant since it involved trade, travel, and exchange covering hundreds of miles and was a system of exchange of native goods that linked various ethnic groups politically and economically.

Their primary trading partners were the Mojaves to the east and the Tongva to the west, but they also traded with their close neighbors, the Cahuilla and Chemehuevi. The Serrano were, in fact, a major nexus in a trade and exchange network that brought goods from the Southwest to the coast. This trade and travel route ran from the American Southwest (principally the Hopi territory in Arizona), along the Colorado River to the Mojave River thence through the central Mojave Desert into the Antelope Valley and west to the Pacific Coast (Davis 1961; Farmer 1935; Sample 1950). These circuits of exchange cut across political and cultural boundaries. A number of researchers have argued that such an exchange system may have been an influential factor in facilitating semi-sedentary settlement and complex sociopolitical organization for the Serrano (Earle 2005a; Robinson 1977; Sutton 1980).

The Maringa (Mariña) Serrano, who occupied the south-easternmost area of their tribe's territory, were the most visible of Serrano groups in the later historical period after many Serrano who lived in the valleys were removed to Mission San Gabriel in in1811.

Nearby Serrano habitations in the foothills above the San Jacinto Valley, are recorded by Strong at yūhavetam, above Highland and upwards from there into the San Bernardino Mountains' foothills, wa'atcem, in the mountains foothills between the Santa Ana River and Mill Creek, yucaipaīem, Yucaipa Valley, and the Marina clan at yumisēval, along upper Mission Creek above the San Gorgonio Pass (Strong 1929: Map1 page 7, and Table 1 page 11). These are all noted as occupied by members of Coyote moiety clans.

In 1770, the Gaspar de Portolá Expedition passed along the Southern California coast to the west through Luiseño territory, while the de Anza expeditions of 1774 and 1776 took a route through the San Jacinto Valley bordering Serrano territory. During the next two decades several missions were established in the region and made contact with the Serrano. Natives were recruited to these missions that included San Gabriel, San Luis Rey, and San Fernando. Kroeber (1925:617) estimated only 1,500 people for the total population; Bean and Smith (1978), however, did not speculate on the population. Upon contact, European interactions and introduced diseases led to dramatic population declines.

Eventually, a reservation system was developed, and members of the Serrano tribe are currently enrolled in the San Manuel Band of Mission Indians (now the Yahaaviatam of San Manuel) (located

adjacent to the town of Highland; 5.5 miles to the northwest of the project), and with members of the Cahuilla tribe at Morongo Band of Mission Indians (adjacent to and east of Banning28 miles to the east of the project). These two groups are federally recognized. There is also one non-federally recognized Serrano band, the Serrano Nation of Mission Indians.

2.2.3 Historic Context

2.2.3.1 Spanish/Mexican Era

Spanish Missionaries from Mission San Gabriel Arcángel established an asistencia and ranch near the village of *Guachama* in 1810 near Lytle Creek just west of the current city of San Bernardino, naming the new Gabrielino and Serrano neophyte Politana. Father Francisco Dumetz named the asistencia San Bernardino on May 20, 1810, after the feast day of St. Bernardino of Siena. In 1819, they established the San Bernardino de Siena Estancia, a mission farm in what is now Redlands. (Sparkman 1908).

By the early 1820s California came under Mexico's rule, and in 1834 the missions were secularized. Since the primary purpose of the Missions was Indian control, this secularization led to an increase in the number of natives participating in the reservation system. Many were kept forcefully and assimilated into Hispanic society if they had been converted to Catholicism.

Following Mexican independence from Spain in 1821, select Mexican citizens were awarded land grants to establish ranchos in the area of the county. Rancho Jurupa in 1838, Rancho Cucamonga and El Rincon in 1839, Rancho Santa Ana del Chino in 1841, Rancho San Bernardino in 1842 and Rancho Muscupiabe in 1844. Agua Mansa was the first town in what became San Bernardino County, settled by immigrants from New Mexico in the 1830s on land donated from the Rancho Jurupa in 1841 near what is now Colton. (Van De Grift Sanchez, 1914.) In 1842, several years after the secularization of the missions by Mexico, Governor Juan Bautista Alvarado, , made a large land grant to Don Antonio Maria Lugo and his three sons. The Lugo family's Rancho San Bernardino encompassed land in both the San Bernardino and Yucaipa valleys, extending from present-day Colton to Calimesa.

Wartime alliances developed among three groups, the Mexicans, Anglos, and Indians, and the turmoil, or war, had a profound effect on Native Americans resulting in the Cahuilla massacre of Luiseno near Temecula. The signing of the Treaty of Guadalupe Hidalgo on February 2, 1848, ended the Mexican-American War and marked the beginning of the American Period when California became a territory of the United States, and a state in 1850.

2.2.3.2 The American Period

The discovery of gold the same year as the treaty initiated the 1848 Gold Rush, bringing thousands of miners and settlers to California. Gold was discovered in San Bernardino County by William Francis "Bill" Holcomb in the Holcomb and Bear Valleys in 1860. The boom-town of Belleville briefly threatened to take the county seat away from San Bernardino. San Bernardino won by one vote. However, for those settlers who chose to come to Southern California, their fortunes were more closely tied to cattle and farming than gold. (Cleland 1941)

When severe drought and flooding came to southern California and the 1860's, many ranchos were put into bankruptcy. The Great Flood of 1862 largely destroyed the earlier settlement of Agua Mansa. The Catholic Church there was rebuilt in downtown San Bernardino in 1865. The flood caused severe

damage along the Santa Ana River's tributaries, particularly Lytle Creek. (Castillo 1978; Cleland 1941.)

While California remained in the Union during the Civil War, there were many Confederate sympathizers in the area. A brief skirmish between Unionists and Confederate sympathizers erupted in the local mountains (Kupfer 1979).

The stagecoaches of Phineas Banning had a stop in downtown San Bernardino during the 1860s. A young Wyatt Earp and his family traveled to San Bernardino by wagon train, arriving in 1864. Virgil Earp later settled in Colton, California, where he became town marshal. Late in life, in the 1920s, Wyatt became a ceremonial San Bernardino County Deputy Sheriff (Hinckley 1956).

San Bernardino County

At the beginning of California statehood in 1850, what is now San Bernardino was part of Los Angeles County. In the spring of 1851, 437 Mormon settlers, who had come in wagons from Salt Lake City, settled in the San Bernardino Valley. Amasa Lyman and Charles C. Rich, acting as representatives of the Latter Day Saints, bought a large portion of Rancho San Bernardino from the Lugos and established what would become the city of San Bernardino.

San Bernardino County was formed in 1853 from parts of Los Angeles County. Some of the southern portions of the county's territory were used in part to form Riverside County in 1893 (Van De Grift Sanchez 1914).

Agriculture and ranching played a prominent role in the socioeconomic development of San Bernardino County from the latter half of the nineteenth century. The earliest agricultural activity in the San Gorgonio Pass-San Timoteo Canyon area was cattle ranching, with Mission San Gabriel creating the Rancho San Bernardino as a cattle ranch to support the Mission. Following the increased population in the project area of Anglo-American settlement, grain production (including barley, oats, and wheat) emerged as a primary crop for many farmers.

The California Gold Rush and concomitant increase in population created a large market for dairy products. Due to the limits of early transportation systems, most dairy production was located close to cities. Construction of railroads in the 1870s allowed the dairies to function farther from population centers, which was desirable due to the lower cost of land in more remote locations. During the railroad boom of the 1880s and beyond, the dairy business in the San Bernardino Valley region was an important early industry that provided milk products to the growing cities of Redlands and San Bernardino.

Presence of the railroad also allowed for transport of hay, grain, and cattle. Fruit trees were first grown in the project vicinity in the late 1840s, ushering in the emphasis on citriculture in southern California. By the 1880s, grain farming was surpassed by citriculture as the dominant agricultural pursuit in western San Bernardino County. In the 1900s, citrus farming was promoted locally and resulted in a second “Gold [orange] Rush”. Agricultural enterprises, which had served the area well for over 100 years, were to change forever with the advent of World War II. The overwhelming need for housing engendered by the GI Bill and the postwar building boom initiated the transition into residential development that continues to this day.

City of Redlands

In 1881, the development firm of Judson and Brown, (E.C. Judson and Frank E. Brown), purchased 4,000 acres along the southern edge of the alluvial plains of the San Bernardino Valley. Their intent was to subdivide the land into 5- and 10-acre parcels which would then be sold to "working class" investors of moderate means. The Judson and Brown partnership was also instrumental in bringing water into the area. Water for domestic and agricultural purposes was brought in by construction of an irrigation canal which was dug to the Santa Ana River, some five miles distant. The introduction of a reliable water supply paved the way for successful farming as well as the continuing development of residential tracts. Soon it was discovered that the soil could support a variety of profitable crops. However, it was only a short time before citrus became the preferred crop.

> "Agriculture included grapes, peaches, apricot orchards and a number of fruit drying operations... Backers of early Redlands townsite were actively promoting citrus cultivation in the area. Planters were encouraged to border their groves with Mexican fan palm trees to make them more attractive to prospective citrus investors from the east. By the end of the 1880's people were uprooting their other fruit orchards in favor of oranges. The navel orange soon became Redlands main economic source (Moore 1983)." (URS Consultants, Inc. 1988).

The City of Redlands was incorporated on November 26, 1888 (Burgess 1981; Hinckley 1951). Establishing itself as the business center of the region with a thriving community at Orange and State Streets, the community grew to encompass several thousand acres. (Burgess 1981) By 1889 the boom decade had passed. That same year the brothers Alfred H. and Albert K Smiley move into the Redlands area. The Smiley brothers, who were land development investors, bought Canyon Crest Park and developed it into one of this region's botanical show spots--Smiley Heights (Robinson 1958:59).

In the 1890's, the Santa Fe Railroad constructed a loop rail service line through the entire citrus belt of the San Bernardino Valley. This loop was referred to as the "Redlands loop" and was a digression from the Old Kite Route which was in service from the 1890s-1930s (Donovan and Horton 1943:16). In 1891, the Atchison Topeka and Santa Fe Railway completed the loop line which connected Redlands, East Highlands, Highland, and West Highlands with San Bernardino - a major railroad shipping point. This loop facilitated the shipping and marketing of fruit, and also resulted in the construction of a number of stations and packing houses along the railway route. Most notable of these was the Drew Ranch packing house which was later sold to Vice President Fairbanks (Theodore Roosevelt administration). Other houses included the Allen Break, the Randolph house, the M.H. Whittier house, the A.P. Dallas house, and the Nevada Street Packing Company (Anderson 1979). At the height of its citrus industry, Redlands had 32 packing houses. Of that number, only two remain in operation.

In 1903, Henry Huntington, nephew of Collis Huntington (President of the Southern Pacific), formed a new traction company called the Los Angeles Inter-Urban Railway as a result of an attempted take-over of the Pacific Electric by the Southern Pacific (Crump 1965:74). Huntington expanded his Los Angeles Inter-Urban line into San Bernardino and Riverside counties where he acquired major interests in existing traction companies. One such company was the San Bernardino Valley Traction Company (SBVT). However, by 1910, Huntington seeking a more esoteric lifestyle, had turned control of both the Pacific Electric and Los Angeles Inter-Urban railways over to the Southern Pacific.

The onset of World War II brought about considerable change in the Redlands economy, particularly with the citrus industry. In the late 1940s, large grove properties became more valuable as subdivisions for housing developments than for the growing of citrus. As a result, most of the packing houses were forced to relocate or close (Moore 1983). Southern Pacific continued to serve the citrus packing houses in the Redlands/Lugonia area until sometime following the end of WW II. By the close of the war, trucks had become the choice in the transportation of fruit to market. They were more flexible in load hauling capability and also could be more directly routed (Moore 1987:185).

The nearby community of Gladysta was platted by businessman Henry L. Williams in 1887 when he attempted to predict the route of the San Bernardino-Redlands Railroad. Williams named it after his daughter Gladys (Redland Daily Facts 2011). See mention below of its presence approximately 0.5 mile to the southeast of the project site on the 1901 USGS topo map.

Since the 1950s, many thousands of acres of orange trees have given way to residential and commercial development. As its citrus agriculture gradually fades into history, Redlands continues to prosper while maintaining its downtown core and surrounding neighborhoods reminiscent of a small early twentieth century city.

2.2.3.3 Project Site Land Use History

Aerial Photographs:

Historic aerial photographs are available for this area of Redlands, the earliest dating to 1938 (NETROnline 2023). This photo shows that the project area was predominantly orchards and other crops. The project parcel itself is open land apparently used for hay fields, while to the north and east across California Street and to the south all is in orchards – likely citrus. There is a large farm complex on the northeast corner of the parcel and extending north of the California/Almond streets intersection consisting of five buildings to the north of the first rod extension west from Almond, possibly a barn and a residence, while to the south (on the project parcel) are five smaller out-buildings with a reservoir, all surrounded by trees. This can be associated with the Marigold Farms dairy.

The next available aerial phot comes from 1959 (NETROnline 2023), when the general land use remained the same throughout the area; the farm complex is reduced in size with only two structures north of the "Almond" dirt road; the south side remains the same. In 1966 (NETROnline 2023) there was now just one structure north of the first road while the buildings to the south are unchanged from 1959 as is the agricultural use of the surrounding land. The land use and number of buildings remain unchanged in the 1968 and 1980 aerial photos (NETROnline 2023) of this location.

The only apparent alterations in the 1984 aerial view are that by now Lugonia Avenue is paved, as is California Street from south of Lugonia northward to Almond Avenue. This then remains unchanged in the 1985 and 1994 (NETROnline 2023) aerial views. Three years later (NETROnline 2023) the basin in the northwest corner of the parcel is now present, and the parcel is still open field. At this time now, Almond Avenue has been pushed through past California Street and the remaining aspects of the farm complex are gone, though an orchard still remains east of California Street.

The Kaiser Medical Center occupies the southwest quarter of the project parcel by 2009, with the remaining space possibly agricultural fields; the surrounding parcels remain the same. There are no further changes visible in 2010 and 2012 (NETROnline 2023). In 2014 (NETROnline 2023) the open land around the medical center remains open and while the southern half appears fallow, the

northern portion may still be in active agricultural use; there is now a warehouse north of Almond and to the east of California the orchard is gone and the land is fallow. Within two years, however (NETROnline 2023) the land on all four sides of the project parcel has been built up with commercial and warehouse structures. The aerial photo from 2018 and 2020 (NETROnline 2023) are the same, though in 2020 it can be seen there is now a large ditch running east/west between the north and south field in the parcel (the situation found during the present field survey).

USGS Topo Maps:

The available U.S. Geological Survey (USGS) topographic maps for this area start with 1901. Maps from 1901 through 1951 (USGS, 1901, 1905, 1909, 1913, 1924, 1929, 1939, 1946 and 1951) are the same, showing the presence of the current main roads of California Street bordering the east edge of the project site, Lugonia Avenue along the south and Almond Avenue to the north, all dirt roads. There is a rail line approximately a half mile to the south (this is the Atchison Topeka and Santa Fe [AT&SF] rail line which is still present) with a small community at the siding; The is present to the south and roads are present in the surrounding area. A label on the map approximately a half mile to the east indicates that the area is called Gladysta, though no structures are present. The land is shown as open with no agriculture present, though orchards were likely already present but simply not yet shown on the map. There is a wash indicated flowing from the northwest of the project site 0.5 to 0.75 mile to the southwest; this parallels the rail line east/west for about a half mile directly south of the project site, and then turns south. The 1955 (USGS, 1955) map now shows Lugonia Avenue as a paved primary road and the other surrounding streets of California and Almons as smaller paved roads. There are orchards stretching out east of California and south of Lugonia from the project site, which is still open land; there is a water reservoir and four structures indicated in the north corner, across from the Almond intersection – this would be the Mayfair Dairy farm. These are all located immediately west of the intersection of California and Almond streets. The rail line 0.25 mile to the south is now identified as the AT&SF and there is now another rail line also going east/west 0.25 mile to the north identified as the San Bernardino Electric line.

The 1960 topo map shows the region as essentially the same as in 1955 but now only three structures are shown in the northeast corner (the Dairy), while the reservoir remains (USGS, 1960). The 1963 USGS map is the same as the 1955 version, while the 1964 map is the same as the 1960 version (USGS, 1963 and 1964). .

The I-10 Freeway is not present in the 1964 USGS topo map, but is shown in the 1969 version 0.25 mile to the south following the rail line, with an on/off ramp at California Street. At that time there is still agriculture (orchards) to the north of the freeway and to the south of the AT&SF Rail line with the land between, including the project site, "vacant" (though the site was occupied by the dairy farm which would have been growing hay). In 1969 the USGS topo (USGS, 1969) map still shows little change in the immediate project area from the 1955 version – orchards remain to the east across California Street and south across Lugonia Avenue with the project site as open space, though the orchard along the southwest edge has been reduced in size. The dairy complex also continues to be reduced in size and is now shown as one structure, and the reservoir is now gone. The 1973 map (USGS, 1973) shows the same configuration as in 1960. By the time of the 1979 topo map (USGS, 1979) , though while the general setting and structures remain the same as in 1969, in the 1980 version (USGS, 1980) the surrounding area is the same as seen in 1969, but the dairy farm presence has been expanded to now include a large long building situated on the west side of the intersection of California and Almond, at the extreme northeast corner of the project parcel. The 1986 USGS map shows much the same situation as in 1980 except the orchards to the south of Lugonia are now nearly

gone. The 1988 and 1999 USGS topo maps show the same configuration as in 1986 (USGS, 1986, 1988 and 1999). .

The 2012, 2015, 2018 and 2021 topo maps (USGS, 2012, 2015, 2018 and 2021) use the new standard of only showing roadways, with the except that on the 2015 map the waterway to the south is now named "The Mission Zanja." The 2018 map shows a "Nevada" label immediately southeast of the project area, in the same location as "Gladysta" appeared in 1901. Nevada is identified as a "populated place located within the City of Redlands" (HomeTownLocator.com, n.d.).

3.0 RESEARCH METHODS

The cultural resources inventory and related archival research included a background cultural resources records check (archival research) at the SCCIC, California State University Fullerton. Additionally, a SLF search was requested from the NAHC.

3.1 Records Search

A cultural resource records search was conducted on June 22, 2023 by Ms. Doukakis. The CHRIS facility for San Bernardino County records is maintained at the SCCIC. That research was reviewed to identify resources that have been previously evaluated for historic significance, as well as to identify any previous completed cultural resources survey reports on or near the project site.

Also searched and reviewed were the official records and maps for cultural resources and surveys in the City of Redlands, the NRHP, Listed Properties and Determined Eligible Properties (2012), and the California Register of Historical Resources (CRHR) (2012).

For the current study, the scope of the records search included the project's boundary (see **Attachment A, Figure 3**). The research effort was completed to assess the sensitivity of the project site for both surface and subsurface cultural resources and to assist in determining the potential to encounter such resources, especially prehistoric – i.e., Native American – cultural remains, during potential sub-surface activities associated with the proposed project.

3.2 Native American Outreach

On June 8, 2023, Mr. O'Neil contacted the NAHC via email notifying them of the project activities, requesting a search of their SLF and requesting a list of local tribal organizations and individuals to contact for project outreach. The Commission's SLF results were received by email on July 13, 2023. The 38 Tribes and Native American contacts recommended by the NAHC were contacted via mail and email on October 3, 2023.

3.3 Field Survey

On November 6, 2023, archaeologist Stephen O'Neil and historian Rodrigo Jacobo visited the project site to conduct a pedestrian survey. During the survey, the project site was inspected for any indication of human activities dating to the prehistoric or historic periods (i.e., 50 years or older).

3.4 National Register of Historic Places

A search of the Built Environmental Resource Directory listing NRHP properties was reviewed to determine if there are any buildings on the project site or in the immediate area had been evaluated for the Register and listed. The search was conducted by Ms. Doukakis on November 8, 2023.

4.0 FINDINGS

4.1 Records Search

4.1.1 Recorded Archaeological Sites

Based on the cultural resources records search, it was determined that two historic era cultural resources have been previously recorded within the project site boundary. Within the 0.5-mile buffer zone there are an additional six recorded historic era cultural resources. There have been no prehistoric resources recorded within the project boundary or the buffer area. **Table 4.1-1** summarizes these resources.

The Marigold Farms historic site, CA-SBr-7139H, was a dairy, farming, and ranching operation dating from 1915 through approximately 1991 (Swope, Slatter and Cardoza 1991). This farm complex occupied the block from Lugonia Avenue on the south to San Bernardino Avenue on the north, and California Stret on the east to Mountain View Avenue on the west (which includes the Kaiser Medical Center property in the southeast corner of the farm). As described by Swope, et al. (1991:1) from their survey of the farm complex, on the southern portion of the site there was a historic milking barn (recorded previously as CA-SBr-6857H; see below) and a presumed modern equipment storage shed. Other historical features associated with Marigold Farms (domestic structure, hammer mill, silos, etc.) were located north of San Bernardino Avenue, outside the boundaries of the property under investigation, and were not formally recorded during this research. A historic resources inventory record of the north portion of the site was prepared. A cluster of residences was once located west of the barn. Wooden structures located at the south-central portion of the property are thought to postdate the historical period. A red fired-brick standpipe was located approximately 10 meters southwest of the southwest corner of the barn. Reservoirs were once present on the property. The Marigold railroad siding was located near the north central portion of the property.

All of these Marigold Farms features were located north of the current project site, around the intersection of Almond Avenue and California Street. The area of the current project site was open land used for cultivating alfalfa and is not shown to have contained any structures (Swope et al. 1991:1, 7). The survey report of the project that the site record derived from concluded that the site record produced mitigated potential impacts of development to the farm (Swope and Lerch 1992:ii).

The barn associated with the Marigold Farms complex was recorded separately as CA-SBr-6857H by Romani, Head and Webb (1990). This was described at the time as an abandoned barn of concrete and wood plank; rectangular in configuration. It was also noted at the time that there were alfalfa fields to the south of the structure which would have encompassed the current project site (Romani, et al. 1990:4). It was located at the southwest corner of California Street and Almond Avenue, which is the northeast corner of the current project site. At the time of the Marigold Farms operations, Almond Avenue ended at California Street; the road has since been extended west of California and this road work would have demolished the barn and any subsurface components.

There were six other historic resources outside of the project APE but within a 0.5-mile radius of it. There was a set of four large metal tanks (P-36-009992, CA-SBr-9992H) located on the northwest corner of Olive Avenue and California Street, approximately 3,000 feet to the north of the project site. Once used for the storge of smudge oil, one was on a platform with the other three situated directly on the ground (Tang 2000:1). No construction date is suggested, though it is known that at least three of the tanks were present by 1938 (Tang 2000:2).

There are three utility related properties recorded within the project buffer zone. The Southern California Edison's Mira Loma-Vista 220kV transmission line, also known as the Hayfield-Chino 220kV (line) (P-36-026051) runs east/west to the north of the project site along San Bernardino Avenue. This was recorded in 2018 by Cunningham, O'Conner and Wintergerst as CA-SBr-17229H. There is also the San Bernardino-Redlands-Timeteo and San Bernardino-Redlands-Tennessee Subtransmission Lines (P-36-026224). Southern California Edison constructed these lines between 1966 and 1967, running east/west through San Bernardino County. They were "historically constructed on lattice poles, single wood poles, or in an H-frame wood pole configuration" (Williams 2014:2); the line in the current project area runs north/south approximately 2,500 feet to the west of the project site. Site P-36-26219 is the San Bernardino Substation, an historic-age electrical substation built in the 1940s; located 2,750 feet to the northwest of the current project site. "It consists of the typical components of a substation, including circuit switches, regulators and reclosers. There is one small concrete control structure located near the center of the substation" (LSA Associates 2013:1).

There is one transportation-associated historic site in the 0.5-mile zone, an abandoned line of the Southern California Railroad (P-36-02619) (ICF 2018). This was constructed in 1882 to provide a direct rail line between San Diego and Colton in San Bernardino County. The remaining abandoned grade is 12 feet across and is associated with six scatters of historic artifacts (ICF 2018:2). It is located approximately 2,100 feet southwest of the current project site.

The San Bernardino County Museum located at 2024 Orange Tree Lane is recorded as P-36-015135 and is noted as a California Department of Parks and Recreation Point of Historic Interest (Anonymous 1969). It is located approximately 1,000 feet to the southwest of the current project site. Originally dedicated in 1957, the original structures have since been replaced.

Table 4.1-1
KNOWN CULTURAL RESOURCES WITHIN A 0.5 MILE RADIUS OF THE PROJECT BOUNDARY

Site Number	Author(s)	Date	Type	Description
P-36-06847	ICF	2018	Historic	The resource consists of a segment of the historic alignment of The Southern California Railroad, a consolidation of California Southern Railroad Company, the California Central Railway Company, and the Redondo Beach Railway Company. "The California Southern Railroad was built in 1882 to provide the first direct route from San Diego to Colton. In November, 1885 the [California Southern Railroad] was officially opened between San Bernardino and Barstow. Only the 0.54-mile-long segment within the current project area is recorded. The grade has been affected by blading, flood, and removal of ties and rail after an

Site Number	Author(s)	Date	Type	Description
				apparent flood even in the mid-1980s.
P-36-06857	Roman, Gwendolyn, Genevieve Head, and Tricia Webb	1990	Historic	Historical structure. Abandoned barn of concrete and wood plank; rectangular in configuration. Time period unknown. There were alfalfa fields to north, west, and south, and a citrus orchard across California street to east.
P-36-007139 CA-SBr-7139H	Fulton, P. (LSA); Swope, K., K. Slater and B. Cardoza	2012; 1991	Historic	The Marigold Farms was a dairy, farming, and ranching operation dating from 1915 through approximately 1991. A dirt road once extended into the property from the east. This road may have been an extension of Almond Avenue, or Hugo Avenue, parallel to and south of Almond. Bryn Mawr Avenue, another dirt road, bisected the center of the property from north to south. A railroad siding named Marigold was located at the north center of the property on the San Bernardino Valley Traction Company line. On the southern portion of the site are a historic milking barn and a presumed modern equipment storage shed. Other historical features associated with Marigold Farms (domestic structure, hammer mill, silos, etc.) were located north of San Bernardino Avenue, outside the boundaries of the property under investigation, and were not formally recorded during this research. A historic resources inventory record of the north portion of the site was prepared. A cluster of residences was once located west of the barn. Wooden structures located at the south-central portion of the property are thought to postdate the historical period. A red fired-brick standpipe was located approximately 10 meters southwest of the southwest corner of the barn. Reservoirs were once present on the property. The Marigold railroad siding was located near the north central portion of the property.

Site Number	Author(s)	Date	Type	Description
P-36-09992 CA-SBr-9992H	Tang, Bai "Tom"	2000	Historic	Consists of four large metal tanks once used for storage of smudge oil, largest with a capacity of 25,000 gallons. Cylindrical in shape, made of galvanized corrugated steel sheets. One on a wooden platform, the other three on the ground surface. Unknown date, but three of the tanks were known to be present in 1938. On the northeast corner of Olive Avenue and California Street.
P-36-0015135	Anon.	1975	Historic	The San Bernardino County Museum recorded as a Point of Historic Interest by the California Department of Parks and Recreation in 1969 and was recommended in 1975. A 1953 Progress Report indicate several buildings present for storage of collections. Museum dedicated in 1957. (No further information is provided in the record but it is known to have been greatly expanded into modern facilities as a comprehensive natural history museum.) Located on Orange Tree Lane, in the City of Redlands.
P-36-026051 CA-SBr-17229H	Cunningham, Robert, John O'Connor, and Steve Wintergerst	2018	Historic	The resource is a segment of the Chino-Hayfield 220kV transmission line. The Chino-Hayfield transmission line was originally recorded by Davidson, Goodwin, and Smith in 2012. It was described as an approximately 43-mile-long transmission line associated with the development of the San Bernardino to Desert Hot Springs corridor through San Gorgonio Pass and San Timoteo Canyon. The transmission line was evaluated for NRHP/CRHR eligibility by Wendy L. Tinsley Becker in 2014 and was recommended as not eligible. A segment of the resource crossing Reche Canyon was revisited by ECORP archaeologists in 2018 as part of a cultural resources survey. The condition of the segment was found to be consistent with previous site records.

Site Number	Author(s)	Date	Type	Description
P-36-026219	Williams, Audry LSA	2014 2013	Historic	The San Bernardino Substation recorded as a historical resource. The San Bernardino Substation is an existing 220/66/12kV substation location north of San Bernardino Avenue and east of Mountain view Avenue in the City of Redlands. The San Bernardino Substation was built in the 1960s by SCE to support the San Bernardino Steam Plant.
P-36-026224	Williams, Audry	2014	Historic	The resource recorded consists of portions of the San Bernardino-Redlands-Timoteo and San Bernardino-Redlands-Tennessee 66kV Subtransmission Lines. SCE constructed the San Bernardino-Redlands-Timoteo 66kV and the San Bernardino-Redlands-Tennessee 66kV subtransmission lines between 1966 and 1967. The lines run parallel to the Devers-San Bernardino No. 1 220kV transmission line from the San Bernardino Substation to Barton Road. The lines consist of lattice steel towers from San Bernardino Substation to Redland Boulevard, and transitions to wood poles to its terminus at Barton Road. The construction of the San Bernardino-Redlands-Timoteo 66kV and the San Bernardino-Redlands-Tennessee 66kV subtransmission lines is associated with post-World War II housing developments expanding into Loma Linda area and the concurrent need for more power.

4.1.2 Previous Cultural Resource Investigations

According to the records at the SCCIC, there have been 17 previous cultural resource studies within portions of the 0.5-mile buffer of the project. Two of the surveys included the project site (SB-2625 and SB-4809), while four other surveys touched upon the boundaries of the project site (SB-2853, -4600, - 8038, and -8199). The remaining 11 prior studies are located outside of the project boundary. Four of these 11 surveys identified cultural resources but none in the 0.5-mile radius of this project. (See **Table 4.1-2** and **Attachment D.**)

The current project parcel was originally surveyed by Michael K. Lerch & Associates in 1992 consisting of 35 acres for the approved Kaiser Medical Center, part of a larger planned development

of the Barton Center of Redlands, a 306-acre subdivision (SB-2625). No prehistoric resources and a single historical resource were discovered during this investigation, being the Marigold Farms buildings. They recorded the Marigold Farms complex and its milking barn (CA-SBR-7139H) – see description in **Section 4.1.1** above. The report concluded that the site record produced mitigated potential impacts of development to the farm (Swope and Lerch 1992:ii).

In 2006, W&S Consultants undertook an archaeological survey of the Kaiser Redlands medical office building project site that encompasses the same footprint as the current project (SB-4809). At that time, the archival research showed the prior presence of two historic sites related to the Marigold Farms that had been present in the northeast corner of the project parcel and that they had subsequently been demolished (W&S Consultants 2006:7). These were the concrete milk barn (CA-SBR-6857) and a portion of the Marigold Farms complex (CA-SBR-7139H) (see **Section 4.1.1** above for a description of these resources).

Adjacent surveys consisted of the Inland Feeder project for the Metropolitan Water District of Southern California (SB-2853) that surveyed a water utility line along California Street; a cultural resources survey for a development (SB-4600) across the northeast corner from the project suite at California Street and Almond Avenue; SB-8038, a paleontological assessment of a parcel that would be developed for the Hillwood Commercial Center on the east side of California Street from the project area; and finally there is a report documenting monitoring during ground disturbing activities for the construction of the Redlands Commercial Center buildings (SB-8199) immediately south of the project site on the south side of Lugonia Avenue.

An archaeological investigation may have taken place at the project site as indicated by the notation of "SB-06633" on the *Redlands, California* USGS map at the SCCIC. The SCCIC staff indicated that this report was no longer in their system and was likely removed by staff. Its potential appearance between reports dating to 2007 and 2015 indicates it may be associated with the site record P-36-007139 recorded by P. Fulton in 2012 at this location.

Table 4.1-2
KNOWN CULTURAL RESOURCE STUDIES WITHIN A 0.5 MILE RADIUS OF THE PROJECT BOUNDARY

Report Number	Author(s)	Date	Title	Resources
SB-00557	Hearn, Joseph E.	1977	ARCHAEOLOGICAL - HISTORICAL RESOURCES ASSESSMENT OF PROJECT SITE LOCATED ON THE NORTH SIDE OF REDLANDS BOULEVARD AND WEST OF CALIFORNIA STREET IN THE BRYN MAWR AREA	N/A

Report Number	Author(s)	Date	Title	Resources
SB-00600	Hearn, Joseph E.	1978	ARCHAEOLOGICAL - HISTORICAL RESOURCES ASSESSMENT OF APPROXIMATELY EIGHT ACRES AT THE NORTHEAST CORNER OF REDLANDS BOULEVARD AND BRYN MAWR AVENUE; LOMA LINDA AREA	N/A
SB-00647	Hearn, Joseph E.	1978	ARCHAEOLOGICAL - HISTORICAL RESOURCES ASSESSMENT OF 63 ACRE PARCEL OF LAND LOCATED ON THE NORTH SIDE OF REDLANDS BOULEVARD BETWEEN MOUNTAIN VIEW AVENUE AND BRYN MAWR AVENUE, LOMA LINDA-REDLANDS AREA	N/A
SB-00931	Smith, Gerald A.	1980	CULTURAL RESOURCES ASSESSMENT OF THE WEST PORTION OF ASSESSOR'S PARCEL NUMBER 292-061-11, REDLANDS AREA	N/A
SB-02486	Hathaway, Roger G., John Romani, and Joanne SanFelippo	1991	AN ARCHITECTURAL DETERMINATION OF ELIGIBILITY/SIGNIFICANCE REPORT AND AN ARCHAEOLOGICAL SURVEY FOR THE MARIGOLD BUSINESS PARK	N/A
SB-02625	Swope, Karen K., and Michael K. Lerch	1992	CULTURAL RESOURCES ASSESSMENT OF THE BARTON CENTER OF REDLANDS, MARIGOLD FARMS, CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA	36-006857, 36-007139

Report Number	Author(s)	Date	Title	Resources
SB-02853	Foster, John M., James J. Schmidt, Carmen A. Weber, Gwendolyn R. Romani, and Roberta S. Greenwood	1991	CULTURAL RESOURCE INVESTIGATION: INLAND FEEDER PROJECT, MWD OF SOUTHERN CA	36-006086, 36-006354, 36-006847, 36-006848, 36-006849, 36-006850, 36-006851, 36-006852, 36-006853, 36-006854, 36-006855, 36-006856, 36-006857, 36-006858, 36-006859, 36-006860, 36-006861, 36-006862, 36-006863, 36-006864, 36-006865, 36-006866, 36-006867, 36-006868, 36-006869, 36-006870, 36-006871, 36-006872, 36-006940, 36-007021, 36-007050, 36-007051, 36-007053, 36-007054, 36-007055, 36-007702
SB-03750	Love, Bruce	2000	WESTSIDE LANDFILL EXPANSION PROJECT. 29PP	36-009990, 36-009991, 36-009992
SB-04048	Love, Bruce	2001	IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES: CITY OF REDLANDS RECYCLED WATER PROJECT IN THE CITY OF REDLANDS, SAN BERNARDINO COUNTY, CA. 27PP	36-007139, 36-009991, 36-009992
SB-04600	Dice, Michael	2004	Phase I Cultural Resources Survey of a 73.45 Acre Property in Unincorporated San Bernardino County, APN: 0292-052-01, -03, - 04, -06, - 08, -10, -11, -12, -16 near Nevada Street/Almond Avenue, Section 13 of Township 1 North Range 6 West, County of San Bernardino, California.	N/A
SB-04809	W & S Consultants	2006	PHASE 1 ARCHAEOLOGICAL SURVEY OF THE KAISER REDLANDS MOB STUDY AREA, REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA	N/A
SB-04812	Dice, Michael	2004	Records Search Results and Site Visit for Sprint Telecommunications Facility SB38XC919E (City Grove), California Street and I-10, Redlands, San Bernardino County, California.	N/A

Report Number	Author(s)	Date	Title	Resources
SB-05805	Crull, Scott	2007	An Archaeological and Paleontological Mitigation-Monitoring Report for Tentative Parcel Map 17815, with APHs: 167-401-02, 03; 167-511-08 and 167-451-05, 06, 07- a 40 Acre Parcel Located in the City of Redlands, San Bernardino County, California.	N/A
SB-06633	[unknown]	[unknown]	[unknown]	[unknown]
SB-07964	DeCarlo, Matthew M. and Diane L. Winslow	2015	Cultural Resources Impact Assessment and Evaluation Status Report for Southern California Edison Company's West of Devers Upgrade Project, Riverside and San Bernardino Counties, California	36-002311, 36-006847, 36-006855, 36-026030
SB-08038	Brunzell, David	2013	Cultural Resources Assessment Hillwood Commerce Center Project, City of Redlands, San Bernardino County, California	36-009991
SB-08199	Abdo-Hintzman, Kholood, and Josh Smallwood	2015	CULTURAL RESOURCES MONITORING REPORT FOR THE REDLANDS COMMERCE CENTER BUILDINGS 1 AND 2 PROJECT CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA	36-028815

4.2 Native American Outreach

On June 8, 2023, Ms. Doukakis contacted the NAHC via email notifying them of the project, requesting a search of their SLF and asking for a list of local tribal organizations and individuals to contact for project outreach. The results of the search request were received from Cameron Vela, Cultural Resources Analyst on July 13, 2023. The NAHC letter stated that "A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were positive [emphasis in the original]. Please contact the San Manuel Band of Mission Indians on the attached list for information." (See **Attachment C.**)

UEI prepared letters to each of the 38 tribal contacts representing 21 tribal organizations describing the project and included a map showing the project's location, asking if they have knowledge of cultural resources in the area, as well as if they had any questions or concerns regarding the project (see **Attachment C**). On October 3, 2023, Ms. Doukakis mailed these letters with accompanying maps

to all 38 tribal contacts, and also emailed identical letters and maps to each of the 37 tribal contacts for which email addresses were known.

Eight email responses were received.

- The Gabrieleno Band of Mission Indians – Kizh Nation Administration responded on behalf of Chairperson Andrew Salas and Christina Swindell Martinez, Secretary on October 3, 2023 requesting the lead agency's contact information. That information was provided by Ms. Doukakis on October 4, 2023.

- Christina Conley, Cultural Resource Administrator for the Gabrielino Tongva Indians of California Tribal Council on behalf of Chairperson Robert Dorame responded on October 3, 2023, indicating that the project would need to have a Native American monitor and suggested calling Sandonne Goad, Chairperson of the Gabrielino/Tongva Nation for this area.

- Chairperson Charles Alvarez of the Gabrielino-Tongva Tribe on behalf of San Dunlap, Cultural Resources Director, responded on October 4, 2023, stating that the tribe would look into this matter and respond accordingly. No response has been received to date.

- Paul Macarro, Cultural Resources Coordinator for the Pechanga Band of Indians on behalf of Chairperson Mark Macarro responded on October 3, 2023 indicating that the project area is outside the ancestral lands of their tribe and the tribe will defer to the appropriate tribes.

- Xitaly Madrigal, Cultural Resources Analyst for the Agua Caliente Band of Cahuilla Indians (ACBCI) on behalf of Chairperson Reid Milanovich and Director Patricia Garcia-Plotkin responded on October 11, 2023 indicating that the project area is not located within the boundaries of the ACBCI reservation but it is within the Tribe's Traditional Use Area and recommends a cultural resources inventory of the project area, documentation of CHRIS cultural resources, a copy of the records received on the project, the presence of cultural resource monitors if any ground disturbance takes place, including a Secretary of the Interior-qualified archeologist. Mr. O'Neil responded to Ms. Madrigal, stating that a cultural resources inventory report would be completed and could be requested from the City of Redlands when completed. As for the other requests recommended, Mr. O'Neil stated that they are best made to the City of Redlands during AB 52 consultation.

- Ana Rios, Administrative Assistant for the Augustine Band of Cahuilla Mission Indians sent an email response on October 9, 2023 on behalf of Chairperson Amanda Vance; an attached letter from Tribal Secretary Geramy Martin indicated that the tribe is unaware of specific cultural resources that may be affected by the proposed project; however, in the event that resources are encountered during the development of this project the tribe asks to be contacted. Mr. O'Neil responded to Ms. Rios, stating that a cultural resources inventory report would be completed and could be requested from the City of Redlands when completed as part of the outreach process; Mr. O'Neil also stated that the City of Redlands, per AB 52, would conduct consultation and the tribe could make any recommendations then.

- Alexandra McCleary, Cultural Lands Manager for the San Manuel Band of Mission Indians responded on November 2, 2023 indicating that the proposed project site is considered sensitive by the Tribe, as it is close to the historic footprint of the Mill Creek Zanja, a historic waterway listed on the National Register which had been built using Serrano labor; there was

no specific mention of a Sacred Lands File site. The tribe would like to engage in government-to-government consultation pursuant to AB 52 with the Lead Agency for the project; Mr. O'Neil indicated on the same day that the Lead Agency is the City of Redlands Planning Department and UEI will let them know that the tribe wishes to engage in AB 52 consultation.

- Laura Chatterton, Cultural Resource Specialist for the Morongo Band of Mission Indians on behalf of Chairperson Robert Martin and Tribal Historic Preservation Officer Ann Brierty provided a response on November 14, 2023 indicating that the tribe considers the project area to be highly sensitive for cultural resources and will be requesting government-to-government AB 52 consultation; Mr. O'Neil indicated on the same day that the Lead Agency is the City of Redlands and UEI will let them know that the Band wishes to participate in consultation.

Following up on the initial letter and email contacts, telephone calls were conducted by Ms. Doukakis on November 3, 2023 and November 6, 2023, to complete the outreach process. These calls were to the 20 tribal contacts (representing 8 additional tribes) who had not already responded to UEI's mailings and emails. Nine telephone calls were placed with no answer and messages were left describing the project and requesting a response. These were to Doug Welmas, Chairperson of the Cabazon Band of Mission Indians; Sandonne Goad, Chairperson of the Gabrielino-Tongva Nation; Robert Martin, Chairperson of the Morongo Band of Mission Indians, to Ann Brierty, Tribal Historic Preservation Officer of the Morongo Band of Mission Indians; Shasta Gaughen, THPO of the Pala Band of Mission Indians, to Alexis Wallick, Assistant Tribal Historic Preservation Officer of the Pala Band of Mission Indians; Wayne Walker, Co-Chairperson of the Serrano Nation of Mission Indians; the Cultural Committee for the Torres-Martinez Desert Cahuilla Indians; and to BobbyRay Esparza, Cultural Director of the Cahuilla Band of Indians.

- In the call to Chairperson Daniel Salgado, and Tribal Historic Preservation Officer Anthony Madrigal, of the Cahuilla Band of Indians the tribal receptionist indicated that Chairperson Salgado and Mr. Madrigal were not in the office and to leave a message on Mr. Esparza's voicemail which was done.

- In the call to John Gomez, Environmental Coordinator for the Ramona Band of Cahuilla Indians on behalf of Chairperson Joseph Hamilton, the tribal receptionist indicated that Mr. Gomez was in the field and provided his cell phone number; that number was called -- there was no answer and a message was left.

- In the call to Lovina Redner, Tribal Chair for the Santa Rosa Band of Cahuilla Indians, the tribal receptionist indicated that Ms. Redner was not in the office at the time and asked that UEI leave our call back number which was done.

- In the call to Mark Cochrane, Co-Chairperson of the Serrano Nation of Mission Indians, the phone line was disconnected and no message could be left. There has been no response to date for any of these calls.

- During the call to Anthony Morales, Chairperson of the Gabrieleno-Tongva San Gabriel Band of Missions Indians, he indicated that he does not have any specific concerns but there are known archaeological sites in the area and freeways like the I-10 that would have been used for traditional transportation routes. Chairperson Morales recommended Native American and archaeological monitoring and would like his tribe to be involved.

- In the call to Manfred Scott, Acting Chairman for the Quechan Tribe of the Fort Yuma Reservation on behalf of President Jordan Joaquin, and Jill McCormick, Historic Preservation Officer indicated that the tribe will defer to more local tribes.

- In the call to Joseph Ontiveros, Cultural Resource Department for the Soboba Band of Luiseño Indians on behalf of Chairperson Isaiah Vivanco indicated that this area is of moderate concern for the tribe and further information will be provided to the lead agency during AB 52 consultation.

- In the call to Dorothy Willis with the EPA Department for the Los Coyotes Band of Cahuilla and Cupeño Indians on behalf of Chairperson Ray Chapparosa, indicated that she was on the other line and to email her our question. This email was sent November 6, 2023.

- In the call to Cheryl Madrigal, Tribal Historic Preservation Officer of the Rincon Band of Luiseño Indians representing Tribal Council Member Joseph Linton, Tribal Council Member Laurie Gonzalez, and Attorney General Denise Turner Walsh, Ms. Madrigal indicated that she will take a look at our email and get back to us with a response.

- A phone call was received from Deneen Pelton, Cultural Resources Coordinator with the Rincon Band, on the same day indicating that they sent an email response for this project on October 27, 2023. Ms. Pelton provided the email response and it indicated that the project location is not within the Band's specific Area of Historic Interest (AHI) and the tribe has no additional information to provide; Ms. Pelton recommended that we directly contact a Tribe that is closer to the project and may have pertinent information. (See **Attachment C.**) There have been no further responses from these tribes to date.

4.3 Pedestrian Survey Results

A pedestrian survey was conducted on November 6, 2023 by Mr. O'Neil and Mr. Jacobo, starting at 9:15 a.m. The survey consisted of walking over, visually inspecting, and photographing the exposed ground surface of the project site using standard archaeological procedures and techniques. Upon arrival the weather was overcast with occasional light rain, which quickly cleared to open sky.

The vacant portion of the project parcel is L-shaped and consists of open flat land except for a water retention basin approximately 10 feet deep in the northwest corner. A current Kaiser medical center occupies the southeast corner of the larger lot surrounded by the L-shaped parcel to the north and west (see **Appendix A, Map 2**). The parcel is bordered by Almond Avenue along the north edge, California Street along the east. West Lugonia Avenue along the south boundary, and a warehouse building to the west.

The survey consisted of walking north/south transects at 15-meter intervals. In the north half the transects started in the northeast corner and progressed to the west (**Figure 4.3-1**). In the south half the transects started in the southeast corner and progressed to the west (**Figure 4.3-2**). The basin in the northwest corner was observed by walking the semi-circular periphery (**Figure 4.3-3**).

The northern half of the parcel was covered by dense vegetation consisting of tumble weeds, aka Russian thistle (*Salsola tragus*) along the north and east edges and in large patches scattered throughout, as well as large areas covered by both dead and living black and tansy mustard *(Brassica nigra* and *Desurainia pinnata),* cheeseweed (*Malva parviflora*), two species of native sun-flower like shrubs (*Asteraceae family*), bachelor button, various *Chenopod* family and other ground-cover plants

as well as various shrubs, consisting predominantly of non-native invasive species. Also, there were areas that had been covered by chipped wood (**Figure 4.3-4**). It is estimated that the visible ground surface in this north half is approximately 15 percent. It was observed that the entire area had been disked within the past year or so along the east/west axis for managing the vegetation.

The southern half of the parcel was also covered by dense vegetation consisting of tumble weeds along the east, south and west edges that covered up to one-third of the surface (**Figure 4.3-5**), as well as large areas covered by mustard, various *Chenopod* plants, portulaca (*Portulaca oleracea*) and other non-native ground-cover, and various shrubs. It is estimated that the visible ground surface in the southern half is approximately five percent. It was observed that the entire area had been disked within the past year or so along the north/south axis (**Figure 4.3-6**) for managing vegetation.

Along with the herbaceous plants, the shrubs here consisted of scattered mule fat (*Baccharis salicifolia*) usually near areas with water, tree tobacco (*Nicotiana glauca*), tamarisk (*Tamarix* sp.), and a single willow (*Salix* sp.). Numerous signs of coyote (*Canis latrans*) were observed throughout the parcel consisting of scores of scat; there was, however, no direct sign of rabbits or hares. The soil was observed to be of silty greyish-tan consistency with little or no gravel or rocks. This is consistent with the known local geology (see **Section2.1**).

No prehistoric or historic features or isolate artifacts were observed. However, due to the extremely poor surface visibility it cannot be ruled out that cultural resources may be present. Features of the Marigold Farms complex, recorded in 1991 and 2012 (see **Section 4.1.1**) were located in what is now Almond Avenue and parcel to the northwest of California Street (**Section 2.2.3**), and so would have been demolished when Almond Avenue and the intersection was expanded between 2002 and 2005 and when the warehouse was built on the lot to the north. It is believed that any remaining building foundations of the complex would have been apparent during the survey and none were observed. A large, apparently old Chinaberry tree (*Melia aszedarach*) (aka white cedar), an ornamental, is present in the northeast corner along Almond Avenue (see central background of **Figure 4.3-4**); this tree can be seen in aerial photos at the south edge of the Marigold Farms complex from at least 1938 onward (**Section 2.2.3.3**).

It is recommended that the parcel be resurveyed during brush removal for construction and the ground surface is made visible.

Figure 4.1-1
OVERVIEW OF NORTH HALF OF PROJECT SITE FROM NORTHEAST CORNER; VIEW TO THE SOUTH; TAKEN NOVEMBER 6, 2024 AT 10:012 A.M.

Figure 4.1-2
OVERVIEW OF SOUTH HALF OF PROJECT SITE FROM SOUTHEAST CORNER; VIEW TO THE WEST;TAKEN NOVEMBER 6, 2023 AT 12:54 P.M.

Figure 4.1-3
OVERVIEW OF BASIN IN NORTHWEST CORNER OF PROJECT SITE; VIEW TO THE NORTH; TAKEN NOVEMBER 6, 2023 AT 11:41 A.M.

Figure 4.1-4
SURFACE COVERED WITH CHIPPED WOOD IN NORTH HALF OF PROJECT SITE; VIEW TO THE EAST; TAKEN NOVEMBER 6, 2023 AT 12:02 P.M.

Figure 4.1-5
TUMBLE WEEDS AND OTHER VEGETATION COVERING THE SURFACE IN SOUTH HALF OF PROJECT SITE; VIEW TO THE SOUTH; TAKEN NOVEMBER 6, 2023 AT 1:08 P.M.

Figure 4.1-6
DISK FURROWS IN SOUTH HALF OF PROJECT SITE; VIEW TO THE NORTH; TAKEN NOVEMBER 6, 2023 AT 1:20 P.M.

4.4 National Register of Historic Places

A search of the Built Environment Resources Directory (BERD) provided by the Office of Historic Preservation (2024) was conducted for this project on November 8, 2023. It was determined that the project boundary does not have any resources present that have been evaluated under the National Register BERD. Within the 0.5-mile radius there is a single resource that has been noted in the BERD located 0.2 mile to the southeast of the project boundary. This resource is the San Bernardino County Museum (36-015135). According to the BERD, this resource has been designated as a State Point of Historical Interest but does not meet the California Register criteria and has not been evaluated for the National Register (7P).

5.0 MANAGEMENT CONSIDERATIONS

5.1 Site Evaluation Criteria

Evaluation of significance under CEQA uses criteria found in eligibility descriptions from the CRHR. Generally, a resource is to be considered historically significant if it meets the criteria for listing in the California Register [Public Resources Code § 5024.1; California Code of Regulations § 15064.5(a)(3)]. These criteria provide that a resource may be listed as potentially significant if it:

- Is associated with the events that have made a significant contribution to the broad patterns of California history and cultural heritage.
- Is associated with the lives of persons important in our past.
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic value.
- Has yielded, or may be likely to yield, information important in prehistory or history.

5.2 Potential Effects

No NRHR or CRHR sites are located within the project boundary. Therefore, no documented cultural resources will be adversely affected by the project. However, the presence of buried cultural (prehistoric and/or historic-period archaeological) resources cannot be ruled out. If prehistoric and/or historic-period artifacts are observed during subsurface excavation, work should be stopped in that area and a Secretary of the Interior qualified archaeologist should be called to assess the finds.

6.0 CONCLUSIONS AND RECOMMENDATIONS

No prehistoric archaeological resources were identified in the CHRIS record literature search in the project site or area. Two historic sites, the Marigold Farms (CA-SBr-7139H) and its associated barn (CA-SBr-6857H), were located adjacent to the current project site and possibly had features within the extreme northeast corner of the current project at the intersection of Almond Avenue and California Street. However, all related structures have been demolished through construction of a commercial development and road construction. Also, it was noted that the site record prepared for CA-SBr-7139H mitigated potential impacts of development to the farm (Swope and Lerch 1992:ii).

As part of this study, none of the tribal responses indicated the presence of known cultural resources at or near the project site. Three of the tribes did express concerns regarding potential nearby traditional cultural resources. The San Manuel Band of Serrano Indians stated that they consider the project site to be sensitive to the tribe due to its proximity to the footprint of the Mill Creek Zanja, an historic waterway listed on the NRHP which had been built using Serrano labor; also, the Soboba Band of Luiseño Indians noted they had concerns for the project area. The Gabrielino-Tongva San Gabriel Band of Mission Indians stated that there are known prehistoric archaeological sites in the project area and that the I-10 freeway (one mile to the south) stems from a traditional transportation route. The Morongo Band of Mission Indians consider the project area to be highly sensitive for cultural resources and will be requesting government-to-government AB 52 consultation. Also, the Gabrielino Tongva Indians of California Tribal Council recommended the presence of a Native American monitor during ground disturbing construction activities. The Augustine Band of Cahuilla Mission Indians stated they would like to be notified if cultural resources are uncovered during ground disturbing activities (see **Section 4.2** and **Attachment C**).

The cultural resources study findings suggest that there is a low potential for the presence of prehistoric cultural resources. The project site is disturbed by several decades of agricultural use. A prior survey of the property resulted in negative findings for prehistoric resources. However given that the prior agricultural use within the project might have masked archaeological deposits, the close proximity of fresh water source (the Santa Ana River) which would have been attractive to Native American use, that one of the contacted tribes did recommend tribal and archaeological monitoring based on the historic presence of local indigenous people along the nearby Santa Ana River, the presence of an adjacent associated farm complex dating back to approximately 1915, and that the present vegetation coverage did not allow for full observation of the project area ground surface, there is the potential for buried archaeological deposits to be present within the project boundaries. Therefore, it is recommended that an archaeological monitor be present during ground-disturbing activities, including during vegetation removal (grubbing) across the site and observe the cleared ground surface for indications of cultural material. If prehistoric and/or historic items are observed during subsurface activities, work should be stopped in that area and a qualified archaeologist and Native American monitor be retained to assess the finding(s) and retrieve the material.

There is also a low potential for the presence of historic cultural resources in the northeast area of the project site. This is due to the prior presence of the Marigold Farm around the intersection of California and San Bernardino Avenue. While the recording of this property by Swope and Lerch (1992; see **Section 4.1.2** above) was determined to mitigate potential impacts of future development and the area of the farm complex has been built over by commercial and road development, there remains the potential for subsurface artifacts. The qualified archaeological monitor already recommended to be present would apply here as well.

If human remains are encountered during excavations associated with this project, work will halt in that area and the San Bernardino County Coroner will be notified (§ 5097.98 of the Public Resources Code). The Coroner will determine whether the remains are of recent human origin or older Native American ancestry. If the coroner, with the aid of the supervising archaeologist, determines that the remains are prehistoric, they will contact the NAHC. The NAHC will be responsible for designating the most likely descendant (MLD), who will make recommendations as to the manner for handling these remains and further provide for the disposition of the remains, as required by § 7050.5 of the California Health and Safety Code. Following notification by the NAHC, the MLD will make these recommendations within 48 hours of having access to the project site following notification by the NAHC. These recommendations may include scientific removal and nondestructive analysis of human remains and items associated with Native American burials (§ 7050.5 of the Health and Safety Code).

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1901 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1904 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1909 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1913 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1924 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1929 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1939 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1946 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1951 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1955 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1958 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1960 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1963 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1964 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1969 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1973 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1977 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1979 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1980 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1986 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1988 *Redlands*, Calif. 7.5', USGS Quadrangle map.

1999 *Redlands*, Calif. 7.5', USGS Quadrangle map.

2012 *Redlands*, Calif. 7.5', USGS Quadrangle map.

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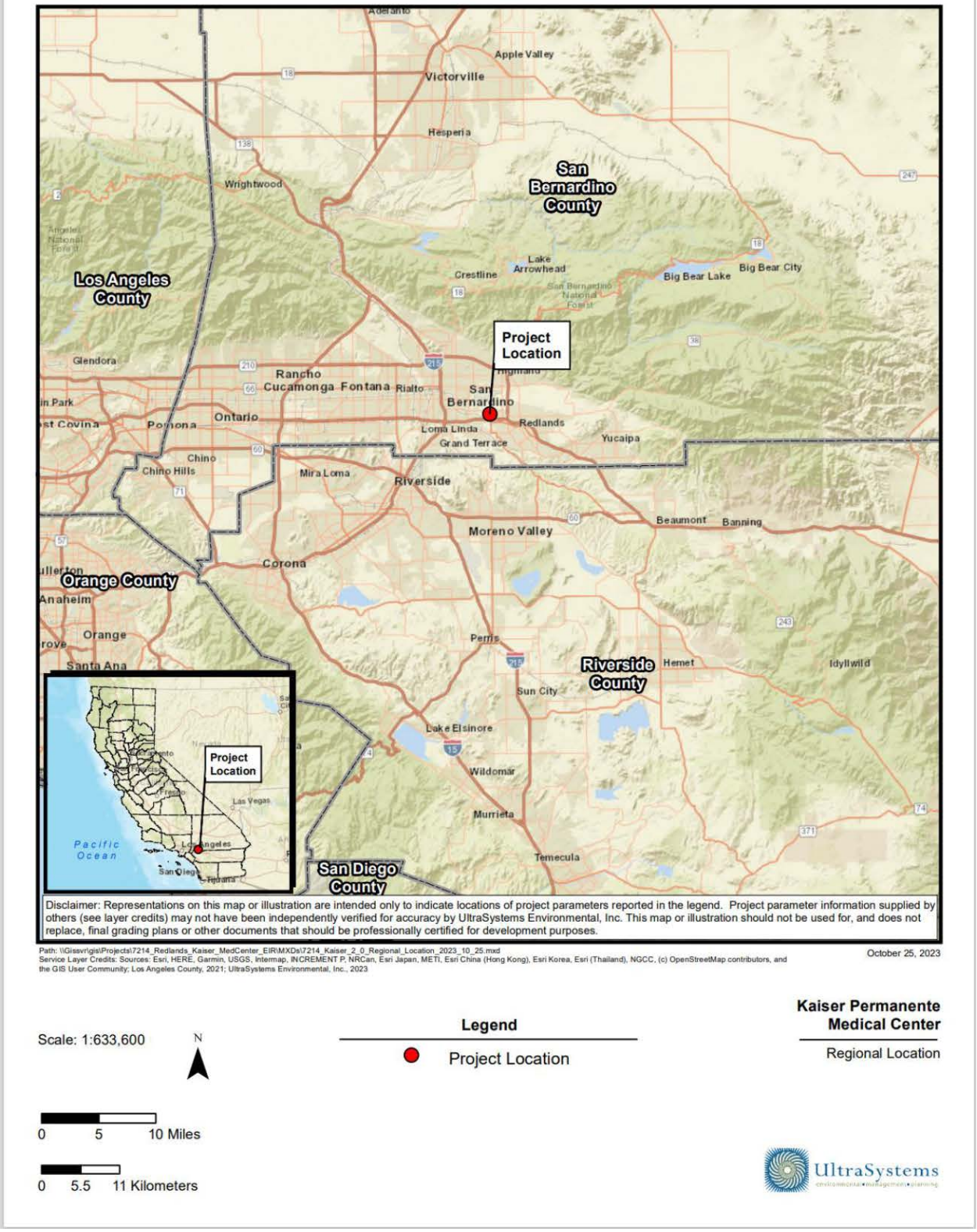
1914 *Spanish and Indian place names of California: their meaning and their romance*. A.M. Robertson. p. 74. Accessed June 25, 2017.

ATTACHMENTS

ATTACHMENT A

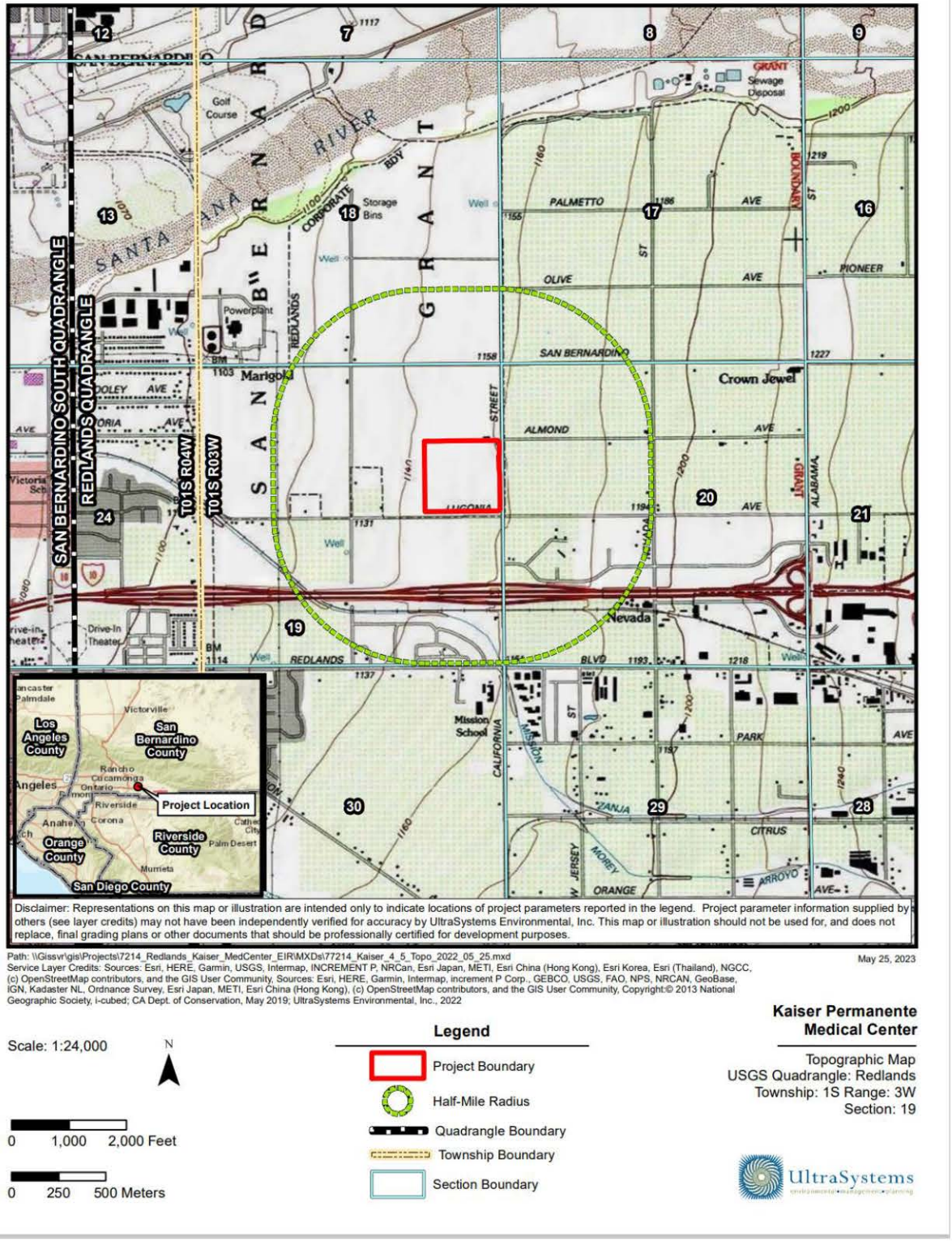
PROJECT MAPS

Map 1
REGIONAL MAP WITH PROJECT LOCATION SHOWN



Map 2
PROJECT STUDY AREA

Map 3
TOPOGRAPHIC MAP WITH APE SHOWN AND QUARTER-MILE BUFFER ZONE



ATTACHMENT B

PERSONNEL BACKGROUND

Stephen O'Neil, M.A., RPA

Cultural Resources Manager, Cultural Anthropology/Archaeology

Education

- M.A., Anthropology (Ethnography emphasis), California State University, Fullerton, CA, 2002
- B.A., Anthropology, California State University, Long Beach, CA, 1979

Professional and Institutional Affiliations

- California Mission Studies Association
- City of Laguna Beach Environmental Sustainability Committee, appointed 2012
- Orange County Natural History Museum; Board Member
- Pacific Coast Archaeological Society; Board Member and Past President
- Society for California Archaeology

Professional Registrations and Licenses

- Register of Professional Archaeologists (No. 16104) (current)
- Riverside County, CA, Cultural Resource Consultant (No. 259) (current)
- Cultural Resource Field Director, BLM Permit (CA-13-19) – California, 2013
- NEPA and CEQ Consultation for Environmental Professionals; course by the National Association of Environmental Professionals, 2013

Professional Experience

Mr. O'Neil has 30 years of experience as a cultural anthropologist in California. He has researched and written on archaeology, ethnography, and history. Mr. O'Neil has archaeological experience in excavation, survey, monitoring, and lab work. Most of this has been on Native American prehistoric sites, but also includes Spanish, Mexican, and American period adobe sites. His supervisory experience includes excavation and survey crew chief and project director of an adobe house excavation. He has a wide range of expertise in Phase I & II Environmental Site Assessments, archaeological resource assessment surveys, salvage operations, and cultural background studies for various EIR projects. Mr. O'Neil has worked for cultural resource management firms as well as government agencies and Native American entities. He has prepared technical reports as well as published journal articles.

Select project experience

Inglewood Avenue Corridor Widening Project, City of Lawndale, Los Angeles County, CA: 2013-2014

Mr. O'Neil directed and conducted archaeological field survey, cultural resource records search, Native American contacts and report writing for this project. The City of Lawndale is widening Inglewood Avenue from Marine Avenue north. The project uses Caltrans funds and the cultural resources report was prepared in Caltrans format. A separate historic properties report was prepared as well. Prepared for Huitt-Zollars Engineering.

Via Ballena Storm Drain Relocation, City of San Clemente, Orange County, CA: 2013

Mr. O'Neil directed and conducted archaeological field survey, cultural resource records search, Native American contacts and report writing for this project. This residential area has a damaged

storm drain under Via Ballena that was causing earth movement and erosion. The requirements for state funding, and cultural resources inventory report was required. Prepared for the City of San Clemente.

Pine Canyon Road – Three Points Road to Lake Hughes Road, Los Angeles County, CA: 2013

Mr. O'Neil directed and conducted archaeological field survey, cultural resource records search, Native American contacts and report writing for this project. This nine-mile portion of Pine Canyon Road lies partially within the Angeles National Forest. A series of widening and culvert repairs is planned by the Los Angeles County Department of Public Works (LACDPW). An assessment was made of possible cultural resources, historic and prehistoric that may be affected by the construction, and four historic sites were recorded. Prepared for LACDPW.

Alton Parkway Extension Project, Cities of Irvine and Lake Forest, Orange County, CA: 2012

Mr. O'Neil directed and conducted archaeological and paleontological monitoring, archaeological excavation, cultural resource records search, Native American contacts and report writing for this project. Alton Parkway was extended 2.1 miles between the cities of Irvine and Lake Forest. For the portion within the City of Irvine, UltraSystems conducted monitoring and excavation services. One prehistoric site was excavated and reported on; a series of living features were discovered and also reported. The final monitoring report described the paleontological and archaeological findings. A separate technical report on the archaeological excavations was also prepared. Mr. O'Neil directed research into historic and prehistoric background and prepared the final assessment of potential impacts. Prepared for the Orange County Department of Public Works.

NEPA and CEQA Documentation, Los Angeles Regional Interoperable Communications System (LA-RICS), Los Angeles County, CA: 2011-2014

Mr. O'Neil is part of the UltraSystems team currently preparing technical studies and NEPA and CEQA documentation toward the construction of LA-RICS, an $800-million emergency communications system due to be operational in 2016. LA-RICS will provide a highly-coordinated emergency communications system to all first responders to natural and man-made disasters throughout Los Angeles County. Mr. O'Neil is the cultural and historical resources studies team leader, directing five researchers. These studies include coordination of field visits to all 260-plus locations for an archaeologist and/or an architectural historian with agency escorts to observe and record any onsite prehistoric and historic features, performing records and literature searches at archaeology information centers and local archives, contacting local agencies for historically listed structures and districts, coordinate public notices of the project throughout Los Angeles County, consultation with the NAHC and all local tribal organizations, and direct consultation with the California State Historic Preservation Officer (SHPO). This information was compiled by Mr. O'Neil and is used to prepare FCC historical resource forms which were submitted to the SHPO for review.

Megan B. Doukakis, M.A.

Assistant Project Archaeologist

Education

- M.A. Public Archaeology, California State University, Northridge, 2012–2018
- B.A., Anthropology, California State University, Long Beach, 2011
- University of California, Los Angeles - Pimu Catalina Archaeological Field School, 2010
- International Scholar Laureate Program: Delegation on Anthropology and Archaeology in China, 2009
- Earthwatch Institute, "Unearthing Mallorca's Past" archaeological excavation, Mallorca, Spain, 2005

Professional and Institutional Affiliations

- Phi Kappa Phi National Honor Society, 2011
- Sigma Alpha Lambda, National Leadership and Honor Organization, 2010
- Society for California Archaeology Membership 2012–2015

Professional Experience

Mrs. Doukakis has worked in the field of cultural resource management for seven years at environmental firms. Before this Mrs. Doukakis had participated in multiple field schools in Southern California and abroad. She has experience in survey, excavation, laboratory work, and information searches. Mrs. Doukakis holds the title of Archaeological Technician at UltraSystems Environmental. Prior to this, she completed a CRM internship at UltraSystems. These positions have provided her with the opportunity to contribute to proposals, final reports, project scheduling, archaeological record searches and paleontological, archaeological and Native American monitor organizing for projects.

Select project experience

Results of the Condition Assessment, Site Monitoring, and Effects Treatment Plan (CASMET) Marine Corps Base Camp Pendleton, San Diego County, CA

Client: Marine Corps Base Camp Pendleton, Duration: 5/11 to 9/11

Mrs. Doukakis conducted survey and excavation for the USMC Base Camp Pendleton condition assessment project. Areas were tested around Camp Pendleton for the presence and condition of cultural material previously recorded. She also conducted laboratory work and curation for the material collected within excavations. Mrs. Doukakis contributed to the final report with background records searches and prehistoric and historic background writing for the report.

Archaeological Excavation Results Report for the Alton Parkway Extension Project, Orange County, CA

Client: Orange County Department of Public Works; Contract: $357,170, 10/10 to 6/12

Mrs. Doukakis participated in the Alton Parkway project, City of Irvine, Orange County, CA. She was responsible for cleaning and cataloging the artifacts recovered from the excavation and surface collections. She also contributed to the final report by compiling the historical background information.

Identification and Evaluation of Historic Properties ADA Wheelchair Access Ramp Improvement Project, City of Lake Forest, Orange County, CA

Client: City of Lake Forest/Penco, Contract: $2,981.62, Duration: 6/12 to 7/12

Mrs. Doukakis contributed to the cultural resource records search, field survey, Native American contacts and report writing for this project. This residential area required wheelchair access ramps on every corner in this neighborhood. An assessment of the possible cultural resources that may be affected with this construction was made for the City of Lake Forest. Mrs. Doukakis contributed the historic and prehistoric background, and the assessment of the possible resources in the area.

Tenaska Solar Projects Imperial Solar Energy Center–South; Imperial Solar Energy Center–West; and Wistaria Ranch, Imperial County, CA

Client: Tenaska/CSOLAR Development, Contract: $3,441,809, 10/13 to 8/15.

Mrs. Doukakis conducted Native American contacts for field monitoring, coordinated with subcontractors to initiate cultural and paleontological field surveys, for the several solar energy projects being handled by UltraSystems Environmental in the El Centro area, Imperial County, CA. She contributed different parts of the survey report and monitoring program documents, including historic and prehistoric background, editorial review. At ISEC- West, Mrs. Doukakis was responsible for contacting and organizing Tribal monitors for this project. She contacted tribal organizations and inquired about their interest in providing tribal monitors for this project. directly organized with Native American groups to sign agreements, and fill out tax paperwork. She was also responsible for organizing and keeping track of and gathering field log from monitors from six tribal groups. She also recovered previously recorded artifacts in the field before the start of the project.

NEPA and CEQA Documentation, Los Angeles Regional Interoperable Communications System -Long Term Evolution, Los Angeles County, CA

Client: LARICS Joint Powers Authority, Contract: $3,051,312, 1/12 to 1/15.

UltraSystems' team prepared technical studies and NEPA and CEQA documentation toward the construction of LA-RICS-LTE, an $800-million emergency communications system that will provide a highly coordinated emergency communications system to all first-responders to natural and man-made disasters throughout Los Angeles County. For this project Mrs. Doukakis conducted record searches at the South Central Coastal Information Center for the Department of Commerce on over 300 project sites throughout the County of Los Angeles. She helped prepare letters to the NAHC and tribal organizations associated with the project area. Mrs. Doukakis contributed to contacting, organizing, and scheduling architectural historians to conduct historical research around the project areas. Letters were written for contact to local agencies and cities. A public notice was constructed and published in three local newspapers. Mrs. Doukakis also constructed hundreds of Federal Communications Commission 620 and 621 forms for submission to California State Historic Preservation Office.

Newton Canyon Monitoring Project, CA

Client: County of Los Angeles Department of Public Works, Contract: $2,930.00, Duration: 7/13 to 12/13

Mrs. Doukakis was an archaeological monitor for this project. She monitored all ground disturbing activities as well as lightly surveying the area for cultural material. Mrs. Doukakis also conducted the records center research at the South Central Coastal Information Center at CSUF. Through email, letter, and telephone correspondence, Mrs. Doukakis contacted the NAHC and associated tribal groups.

Rodrigo Jacobo, MA, BA

Historian/ Cultural Resources Specialist

UltraSystems
environmental • management • planning

Years of Experience
10

Years with Firm
>1

Education

- Bachelor's Degree in History, with an emphasis on Latin American Studies from the University of California, San Diego
- Master's Degree in History, with an emphasis on Latin America/US History from National University
- Online Teaching Certificate in General Education from Palomar College.

Areas of Expertise

- Word
- Excel
- PowerPoint
- Bilingual: Fluent in Spanish

PROFESSIONAL SUMMARY

Rodrigo Jacobo has worked as an academic research historian since 2013 and as an adjunct professor of history since 2017. As both a research historian and adjunct professor he specialized not only in history but also ethnic and cultural studies. He has extensive expertise in the application of research methods and analysis, qualitative and quantitative, as well as the utilization of archival records and primary sources. He has worked with other historians and professionals to compile and compose historical reports, monographs and historiographies. In addition to his historical and research skills, he is also a well-spoken public speaker, a skill he mastered as an academic. He holds a BA from the University of California, San Diego (UCSD) and an MA from National University (NU) in history.

ULTRASYSTEMS PROJECT EXPERIENCE

Addendum 6 for the Westgate Specific Plan FEIR Development Project; Fontana, San Bernardino County, CA; 2023

The Project consists of the development of two medical office buildings located within Planning Area 27 in the Westgate East community area of Planning Area 27 in the City of Fontana. UltraSystems conducted a cultural resources study to evaluate the potential presence of prehistoric and historic resources. The project site is 17.5 acres in area. This is located in northwest Fontana, *Guasti, Calif.*, USGS topo quad, R 06 W, T 01 N, in the NW ¼ of Section 35. The subject property was vacant (abandoned vineyards).

Ms. Stoddard conducted an archaeological field survey of the project site in December 2023 and assisted with preparation of the subsequent Phase I cultural resources inventory report with Stephen O'Neil, M.A., RPA, the Principal Investigator. UEI Project 7170G.

RivCo Parks SARB (Santa Ana River Bottom) Project, City of Riverside, Riverside County, CA; 2023

The Project is in support of the RivCo (Riverside County) Parks SARB (Santa Ana River Bottom) Project located in Rancho Jurupa Park. UltraSystems conducted a cultural resources study to evaluate the potential presence of prehistoric and historic resources. The Project consists of the proposed improvements to the access road and maintenance building and access road along the Santa Ana River and Rancho Jurupa Park. The Project is located at 4600 Crestmore Road; *Riverside West, Calif.*, USGS topo quad, R 05 W, T 02 S, in the S ½ of Sec 21. The project site roadway is located in open land that was once farmland.

Ms. Stoddard conducted an archaeological field survey of the project site in December 2023 and assisted with preparation of the subsequent Phase I cultural resources inventory report with Stephen O'Neil, M.A., RPA, the Principal Investigator. UEI Project 7237.

SELECT PROJECT EXPERIENCE

Adjunct History Professor, Palomar College; August 2017 to Ongoing

Currently teaching history at Palomar College, instructing on the following courses: US History, World History, Western Civilization, Chicano Studies, History of the Americas (Latin American Studies). He has taught these courses in both in-classroom and online settings. This is worth mentioning because it serves to show that he has expertise in

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a wide range of historical fields. These classes have been taught using the Blackboard and Canvas platforms. Furthermore, through his time in the classroom, he has been left with more than adequate experience working with students and their many needs, which has allowed him to adapt to all kinds of individuals, while exposing him to a wide range of learning skills. Finally, through his experiences as a professor he has gained invaluable knowledge about how to go about conducting a class, how to give a lecture, how to grade assignments, how to prepare for a class, how to understand the learning capabilities of students and, most importantly how to engage students intellectually. He has worked with students of all backgrounds and learning abilities, as well different age groups, from high school students to older adults. Other duties: Participate in curriculum development of transfer courses; Serve with full-time Humanities faculty as a resource person in the History Department for part-time faculty and for the college at large; Participate in Humanities Program responsibilities including, but not limited to, program development and review, Student Learning Outcomes assessment and review, and course coordination; serve on college-wide committees and work with other departments and community partners to improve student success; maintain professional currency in the field of history.

Research Historian, Palomar College/Free Agent; August 2013 to Ongoing

Currently assisting a variety of professors in their studies and/or research. Rodrigo has assisted in conducting both qualitative and quantitative research, such as archival research but also statistical research. This roll has allowed him to further develop his knowledge and expertise in the fields of history and historical research. Being a research historian has allowed him to gain much knowledge and insight into how to conduct research dealing with anything historical in nature. This position has left Rodrigo with research skills that are multi-disciplinary. Also, as a Research Assistant he has specific duties that include data organization and management, data analysis, interpretation, and discussion of results with research teams and/or professors, auditing data quality, preparation of draft documents and presentations, interacting with professors/researchers, coordinating research staff, monitoring project budgets and timelines, and other research support as needed. Lastly, this work has allowed him to develop strong interpersonal skills, strong oral and written communication skills, strong quantitative and qualitative analysis skills and a strong grounding in research methodology, and the ability to work in a team environment. Other duties: Having expert level understanding of the historical method of research and inquiry, including the ability to conduct basic historical research, speak and write effectively, keep necessary records and prepare reports, and be highly analytical. Also, being able to and having the knowledge of to access data bases and archival holdings for the purpose of conducting research.

History Instructor, Idyllwild Arts Academy; August 2021 to May 2023

Rodrigo worked as a history instructor at the international boarding school, Idyllwild Arts Academy. I taught sophomores, juniors, and seniors in the subjects of World History and US History. He also taught Latin American History and History of World Revolutions, courses that he created myself. IAA is an international school and that makes it a very diverse environment. Working in this environment allowed him to work with students of all walks of life. He had the responsibility of teaching these many subjects and carrying out all the duties that came with the job, such as giving class, grading homework and tests and taking part in faculty meetings to collaborate. Such experience includes the ability to develop and implement equity minded classroom pedagogy and initiatives to improve student success and close equity gaps. Other duties included: Having expert level understanding of the historical method of research and inquiry, including the ability to conduct basic historical research, speak and write effectively, keep necessary records, and prepare reports, and be highly analytical; have excellent public speaking skills, and be highly adaptable to situations to take effective action.

ATTACHMENT C

NATIVE AMERICAN HERITAGE COMMISSION RECORDS SEARCH

UltraSystems
environmental • management • planning

June 8, 2023

Government Program Analyst
Native American Heritage Commission
1550 Harbor Blvd., Suite 100
West Sacramento, California 95691

Subject: Cultural Resources Inventory, Kaiser Permanente Medical Center Project, Redlands, San Bernardino County, California. UltraSystems Environmental Project No. 7214.

Dear NAHC Staff,

UltraSystems Environmental, Inc. (UEI) has been contracted by City of Redlands to conduct a Cultural Resources Inventory in support of the proposed Kaiser Permanente Medical Center Project, San Bernardino County, California. UltraSystems will conduct a cultural resources study to evaluate the potential presence of prehistoric and historic resources within the project boundary. I am requesting a Native American Contact List of interested tribes, organizations and individuals in the general Project area, and a search of the Sacred Lands File for potential traditional cultural sites.

The proposed project includes the expansion of the existing Kaiser Permanente Redlands Medical Offices site in multiple phases. The first phase includes a new 4-story 165,000 square foot Medical Office Building/Ambulatory Services Center and parking lots. The second phase includes a 7-story 400,000 square foot hospital, a 2-story 35,000 square foot Central Utility Plant building, parking structure and parking lots. The third phase includes a 4-story 83,000 square foot Medical Office Building, and the fourth phase includes a possible 180,000 square foot addition to the future hospital. The project boundary covers an area of approximately 36.5 acres. Currently the only developed area in the project site is 9.6 acres of the southeast quadrant with a three-story medical building and surface parking on the site. The remainder of the site is tilled vacant land.

The Project area is specifically located at 1301 California Street at the northwest corner of California Street and Lugonia Avenue and a quarter mile north of the I-10 Freeway in the city of Redlands. This may be seen on the *Redlands, Calif.*, USGS topographical quadrangle, Range 03 West, Township 01 South, in the SE ¼ of the NE ¼ of Section 19. The project area is surrounded by industrial uses to the east, north, and west, and by a closed theme park to the south. This is shown on the attached map and the Project area is depicted with a one-half mile buffer zone.

If you require additional information or have any questions, please contact me.

Thank you for your help.

Sincerely,

Stephen O'Neil, M.A., RPA
Cultural Resources Manager
soneil@ultrasystems.com

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Irvine, CA 92618-7443
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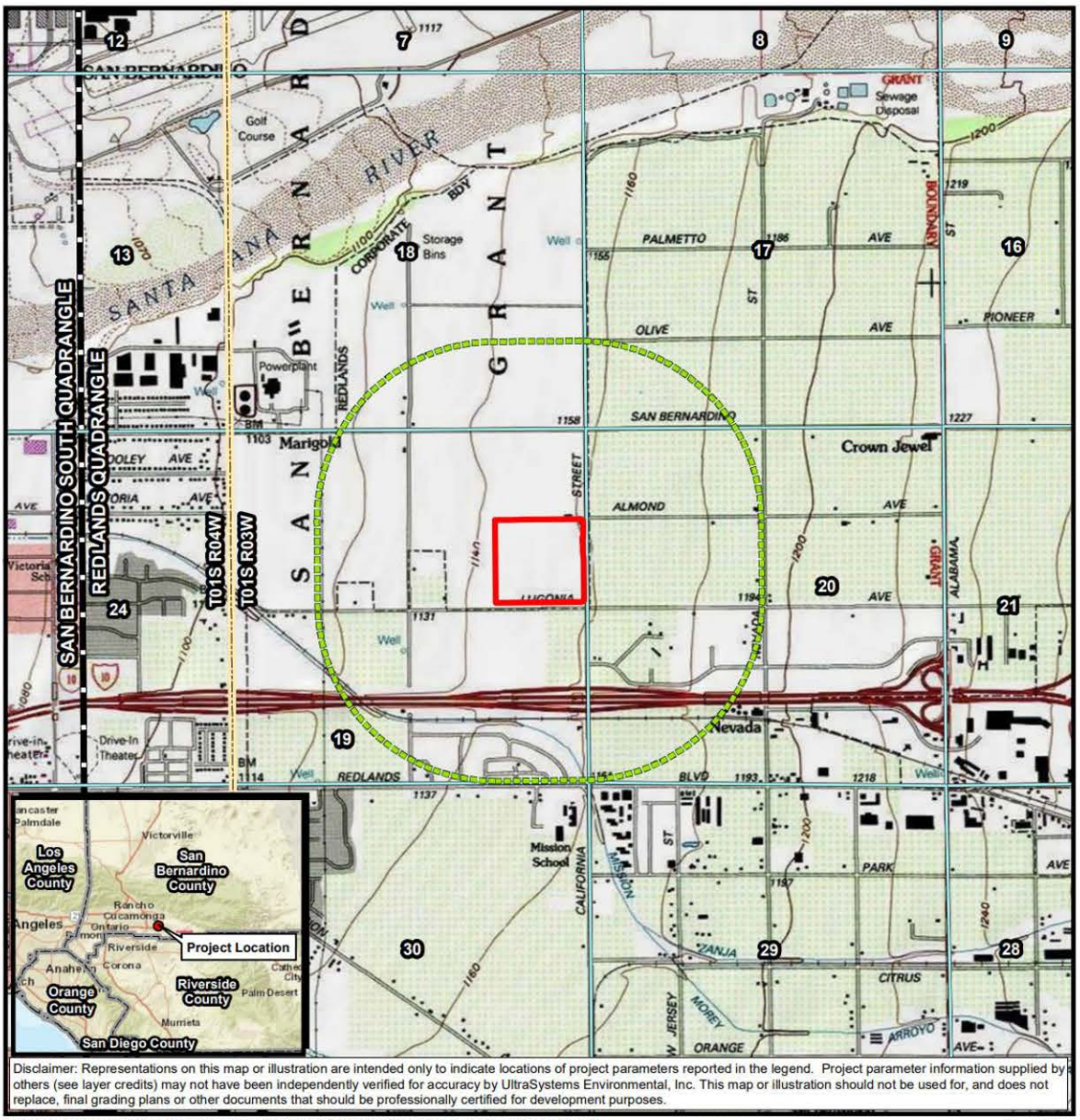

Disclaimer: Representations on this map or illustration are intended only to indicate locations of project parameters reported in the legend. Project parameter information supplied by others (see layer credits) may not have been independently verified for accuracy by UltraSystems Environmental, Inc. This map or illustration should not be used for, and does not replace, final grading plans or other documents that should be professionally certified for development purposes.

Path: \\Gissvr\gis\Projects\7214_Redlands_Kaiser_MedCenter_EIR\MXDs\77214_Kaiser_4_5_Topo_2022_05_25.mxd

May 25, 2023

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed; CA Dept. of Conservation, May 2019; UltraSystems Environmental, Inc., 2022

Scale: 1:24,000

N

0 1,000 2,000 Feet

0 250 500 Meters

Legend

- Project Boundary
- Half-Mile Radius
- Quadrangle Boundary
- Township Boundary
- Section Boundary

Kaiser Permanente Medical Center

Topographic Map
USGS Quadrangle: Redlands
Township: 1S Range: 3W
Section: 19

UltraSystems

STATE OF CALIFORNIA — Gavin Newsom, Governor

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

July 13, 2023

Stephen O'Neil
UltraSystems Environmental

Via Email to: ***soneil@ultrasystems.com***

Re: UltraSystems Environmental Project No. 7214, San Bernardino County

Dear Mr. O'Neil:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information submitted for the above referenced project. The results were positive. Please contact the San Manuel Band of Mission Indians on the attached list for information. Please note that tribes do not always record their sacred sites in the SLF, nor are they required to do so. A SLF search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with a project's geographic area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites, such as the appropriate regional California Historical Research Information System (CHRIS) archaeological Information Center for the presence of recorded archaeological sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. Please contact all of those listed; if they cannot supply information, they may recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Cameron.vela@nahc.ca.gov.

Sincerely,

Cameron Vela

Cameron Vela
Cultural Resources Analyst

Attachment

Page 1 of 1

Native American Heritage Commission
Native American Contact List
San Bernardino County
7/13/2023

County	Tribe Name	Fed (F) Non-Fed (N)	Contact Person	Contact Address	Phone #	Fax #	Email Address	Cultural Affiliation	Counties	Last Updated
San Bernardino	Agua Caliente Band of Cahuilla Indians	F	Reid Milanovich, Chairperson	5401 Dinah Shore Drive Palm Springs, CA, 92264	(760) 699-6800	(760) 699-6919	tribles@aguacalientenet	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	
	Agua Caliente Band of Cahuilla Indians	H	Patricia Garcia-Plotkin, Director	5401 Dinah Shore Drive Palm Springs, CA, 92264	(760) 699-6907	(760) 699-6924	ACBCI-THPO@aguacaliente.net	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	
	Augustine Band of Cahuilla Mission Indians	F	Amanda Vance, Chairperson	84-001 Avenue 54 Coachella, CA, 92236	(760) 396-4777	(760) 369-7161	hbaines@augustinetribe.com	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	
	Cabazon Band of Mission Indians	F	Doug Welmas, Chairperson	84-245 Indio Springs Parkway Indio, CA, 92203	(760) 342-2593	(760) 347-7880	jstapp@cabazonindians-nsn.gov	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	
	Cahuilla Band of Indians	F	Bobby/Ray Esparza, Cultural Director	52701 CA Highway 371 Anza, CA, 92539	(951) 763-5549		bcsparza@cahuilla-nsn.gov	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	6/28/2023
	Cahuilla Band of Indians	F	Daniel Salgado, Chairperson	52701 CA Highway 371 Anza, CA, 92539	(951) 972-2568	(951) 763-2808	chairman@cahuilla-nsn.gov	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	6/28/2023
	Cahuilla Band of Indians	F	Anthony Madrigal, Tribal Historic Preservation Officer	52701 CA Highway 371 Anza, CA, 92539	(951) 763-5549		anthonymsd2002@gmail.com	Cahuilla	Imperial,Riverside,San Bernardino, San Diego	6/28/2023
	Gabrieleno Band of Mission Indians - Kizh Nation	N	Andrew Salas, Chairperson	P.O. Box 393 Covina, CA, 91723	(626) 926-4131		admin@gabrielenoindians.org	Gabrieleno	Los Angeles,Orange,Riverside,San Bernardino,Santa Barbara,Ventura	6/12/2023
	Gabrieleno Band of Mission Indians - Kizh Nation	N	Christina Swindall Martinez, Secretary	P.O. Box 393 Covina, CA, 91723	(818) 406-1362		christinaswindall@yahoo.com	Gabrieleno	Los Angeles,Orange,Riverside,San Bernardino,Santa Barbara,Ventura	6/12/2023
	Gabrieleno/Tongva San Gabriel Band of Mission Indians	N	Anthony Morales, Chairperson	P.O. Box 693 San Gabriel, CA, 91778	(626) 483-3564	(626) 286-1262	GTribalcouncil@aol.com	Gabrieleno	Los Angeles,Orange,Riverside,San Bernardino,Ventura	
	Gabrieleno /Tongva Nation	N	Sandonne Goad, Chairperson	106 1/2 Judge John Aiso St., #231 Los Angeles, CA, 90012	(951) 807-0479		sgoad@gabrielenoindians.com	Gabrielino	Los Angeles,Orange,Riverside,San Bernardino,Ventura	3/28/2023
	Gabrieleno Tongva Indians of California Tribal Council	N	Christina Conley, Cultural Resource Administrator	P.O. Box 941078 Simi Valley, CA, 93094	(626) 407-8761		christina.marie@gabrielenoindians.org	Gabrielino	Los Angeles,Orange,Riverside,San Bernardino,Santa Barbara,Ventura	3/15/2023
	Gabrieleno Tongva Indians of California Tribal Council	N	Robert Dorame, Chairperson	P.O. Box 490 Bellflower, CA, 90707	(562) 761-6417	(562) 761-6417	gtongva@gmail.com	Gabrielino	Los Angeles,Orange,Riverside,San Bernardino,Santa Barbara,Ventura	3/15/2023
	Gabrieleno-Tongva Tribe	N	Sam Dunlap, Cultural Resource Director	P.O. Box 3919 Seal Beach, CA, 90740	(909) 262-9351		tongvatcr@gmail.com	Gabrielino	Los Angeles,Orange,Riverside,San Bernardino,Ventura	5/30/2023
	Gabrieleno-Tongva Tribe	N	Charles Alvarez, Chairperson	23454 Vanowen Street West Hills, CA, 91307	(310) 403-6048		Chavez1956tribal@gmail.com	Gabrielino	Los Angeles,Orange,Riverside,San Bernardino,Ventura	5/30/2023
	Los Coyotes Band of Cahuilla and Cupeno Indians	F	Ray Chapparosa, Chairperson	P.O. Box 189 Warner Springs, CA, 92086-0189	(760) 782-3711	(760) 782-0712		Cahuilla	Imperial,Riverside,San Bernardino,San Diego	
	Morongo Band of Mission Indians	H	Robert Martin, Chairperson	12700 Pumarra Road Banning, CA, 92220	(951) 755-5110	(951) 755-5177	abinerty@morongo-nsn.gov	Cahuilla Serrano	Imperial,Los Angeles,Riverside,San Bernardino,San Diego	
	Morongo Band of Mission Indians	F	Ann Brierty, THPO	12700 Pumarra Road Banning, CA, 92220	(951) 755-5259	(951) 572-6004	abrierty@morongo-nsn.gov	Cahuilla Serrano	Imperial,Los Angeles,Riverside,San Bernardino,San Diego	
	Pala Band of Mission Indians	F	Shasta Gaughen, Tribal Historic Preservation Officer	PMB 50, 35008 Pala Temecula Road Pala, CA, 92059	(760) 891-3515	(760) 742-3189	sgaughen@palatribe.com	Cupeno Luiseno	Orange,Riverside,San Bernardino,San Diego	3/23/2023
	Pala Band of Mission Indians	F	Alexis Wallick, Assistant THPO	PMB 50, 35008 Pala Temecula Road Pala, CA, 92059	(760) 891-3537		awallick@palatribe.com	Cupeno Luiseno	Orange,Riverside,San Bernardino,San Diego	3/23/2023
	Pechanga Band of Indians	H	Paul Macarro, Cultural Resources Coordinator	P.O. Box 1477 Temecula, CA, 92593	(951) 770-8105	(951) 506-9491	pmacarro@pechanga-nsn.gov	Luiseno	Los Angeles,Orange,Riverside,San Bernardino,San Diego,Santa Barbara,Ventura	
	Pechanga Band of Indians	F	Mark Macarro, Chairperson	P.O. Box 1477 Temecula, CA, 92593	(951) 770-8000	(951) 695-1778	epreston@pechanga-nsn.gov	Luiseno	Los Angeles,Orange,Riverside,San Bernardino,San Diego,Santa Barbara,Ventura	
	Quechan Tribe of the Fort Yuma Reservation	F	Manfred Scott, Acting Chairman - Kw'tsan Cultural Committee	P.O. Box 1899 Yuma, AZ, 85366	(928) 210-8739		culturalcommittee@quechantribe.com	Quechan	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	5/16/2023
	Quechan Tribe of the Fort Yuma Reservation	F	Jordan Joaquin, President, Quechan Indian Council	P.O.Box 1899 Yuma, Az, 85366	(760) 919-3600		executivesecretary@quechantribe.com	Quechan	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	5/16/2023
	Quechan Tribe of the Fort Yuma Reservation	H	Jill McCormick, Historic Preservation Officer	P.O. Box 1899 Yuma, AZ, 85366	(928) 261-0254		historicpreservation@quechantribe.com	Quechan	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	5/16/2023
	Ramona Band of Cahuilla	F	Joseph Hamilton, Chairperson	P.O. Box 391670 Anza, CA, 92539	(951) 763-4105	(951) 763-4325	admin@ramona-nsn.gov	Cahuilla	Imperial,Riverside,San Bernardino,San Diego	
	Ramona Band of Cahuilla	F	Jean Gomez, Environmental Coordinator	P. O. Box 391670 Anza, CA, 92539	(951) 763-4105	(951) 763-4325	jgomez@ramona-nsn.gov	Cahuilla	Imperial,Riverside,San Bernardino,San Diego	8/10/2020
	Rincon Band of Luiseno Indians	F	Joseph Linton, Tribal Council/Culture Committee Member	One Government Center Lane Valley Center, CA, 92082	(760) 803-3548		jlinton@rincon-nsn.gov	Luiseno	Los Angeles,Orange,Riverside,San Bernardino,San Diego,Santa Barbara,Ventura	5/31/2023
	Rincon Band of Luiseno Indians	F	Laurie Gonzalez, Tribal Council/Culture Committee Member	One Government Center Lane Valley Center, CA, 92082	(760) 464-4835		lgonzalez@rincon-nsn.gov	Luiseno	Los Angeles,Orange,Riverside,San Bernardino,San Diego,Santa Barbara,Ventura	5/31/2023
	Rincon Band of Luiseno Indians	H	Cheryl Madrigal, Cultural Resources Manager/Tribal Historic Preservation Officer	One Government Center Lane Valley Center, CA, 92082	(760) 648-3000		cmadrigal@rincon-nsn.gov	Luiseno	Los Angeles,Orange,Riverside,San Bernardino,San Diego,Santa Barbara,Ventura	5/31/2023
	Rincon Band of Luiseno Indians	F	Destiny Turner Walsh, Attorney General	One Government Center Lane Valley Center, CA, 92082	(760) 659-5727		dwalsh@rincon-nsn.gov	Luiseno	Los Angeles,Orange,Riverside,San Bernardino,San Diego,Santa Barbara,Ventura	7/7/2023
	San Manuel Band of Mission Indians	F	Alexandra McCleary, Cultural Lands Manager	26569 Community Center Drive Highland, CA, 92346	(909) 633-0054		alexandra.mccleary@sanmanuel-nsn.gov	Serrano	Kern,Los Angeles,Riverside,San Bernardino	3/27/2023
	Santa Rosa Band of Cahuilla Indians	F	Lovina Redner, Tribal Chair	P.O. Box 391820 Anza, CA, 92539	(951) 659-2700	(951) 659-2228	lredner@santarosa-nsn.gov	Cahuilla	Imperial,Los Angeles,Orange,Riverside,San Bernardino,San Diego	
	Serrano Nation of Mission Indians	N	Mark Cochrane, Co-Chairperson	P. O. Box 343 Patton, CA, 92369	(909) 528-9032		serranonation1@gmail.com	Serrano	Los Angeles,Riverside,San Bernardino	
	Serrano Nation of Mission Indians	N	Wayne Walker, Co-Chairperson	P. O. Box 343 Patton, CA, 92369	(253) 370-0167		serranonation1@gmail.com	Serrano	Los Angeles,Riverside,San Bernardino	4/29/2019
	Soboba Band of Luiseno Indians	F	Joseph Ontiveros, Cultural Resource Department	P.O. BOX 487 San Jacinto, CA, 92581	(951) 663-5279	(951) 654-4198	jontiveros@soboba-nsn.gov	Cahuilla Luiseno	Imperial,Los Angeles,Orange,Riverside,San Bernardino,San Diego	
	Soboba Band of Luiseno Indians	F	Isaiah Vivanco, Chairperson	P. O. Box 487 San Jacinto, CA, 92581	(951) 654-5544	(951) 654-4198	ivivanco@soboba-nsn.gov	Cahuilla Luiseno	Imperial,Los Angeles,Orange,Riverside,San Bernardino,San Diego	
	Torres-Martinez Desert Cahuilla Indians	H	Cultural Committee,	P.O. Box 1160 Thermal, CA, 92274	(760) 397-0300	(760) 397-8146	Cultural-Committee@torresmartinez-nsn.gov	Cahuilla	Imperial,Riverside,San Bernardino,San Diego	

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessments for the proposed UltraSystems Environmental Project No. 7214, San Bernardino County

Record: PRO-2023-003513
Report Type: List of Tribes
Counties: San Bernardino
NA IC Group: All

UltraSystems
environmental • management • planning

October 26, 2023

Charles Alvarez, Chairperson
Gabrielino-Tongva Tribe
23454 Vanowen Street
West Hills, CA, 91307

Subject: Cultural Resources Inventory, Kaiser Permanente Medical Center Project, Redlands, San Bernardino County, California. UltraSystems Environmental Project No. 7214.

Chairperson Alvarez,

UltraSystems Environmental, Inc. (UEI) has been contracted by City of Redlands' Development Services Department to conduct a Cultural Resources Inventory in support of the proposed Kaiser Permanente Medical Center Project, Redlands, San Bernardino County, California. UltraSystems is conducting a cultural resources assessment and records search to evaluate the potential presence of prehistoric and historic resources within the project boundary.

The proposed project includes the expansion of the existing Kaiser Permanente Redlands Medical Offices site in multiple phases. The first phase includes a new 4-story 165,000 square foot Medical Office Building/Ambulatory Services Center and parking lots. The second phase includes a 7-story 400,000 square foot hospital, a 2-story 35,000 square foot Central Utility Plant building, parking structure and parking lots. The third phase includes a 4-story 83,000 square foot Medical Office Building, and the fourth phase includes a possible 180,000 square foot addition to the future hospital. The project site covers an area of approximately 36.5 acres. Currently the only developed area in the project site is 9.6 acres of the southeast quadrant with a three-story medical building and surface parking on the site. The remainder of the site is tilled vacant land.

As part of the cultural resources study for the Project, I am writing to request your input on potential Native American resources in or near the Area of Potential Effect (APE). In a letter dated July 13, 2023, the Native American Heritage Commission stated: "A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were positive [emphasis in the original]." The Commission recommended that local Native American individuals and organizations be contacted for further information, including the Gabrielino-Tongva Tribe.

The Project area is specifically located at 1301 California Street at the northwest corner of California Street and Lugonia Avenue and a quarter mile north of the I-10 Freeway in the city of Redlands. This may be seen on the *Redlands, Calif.*, USGS topographical quadrangle, Range 03 West, Township 01 South, in the SE ¼ of the NE ¼ of Section 19. The project area is surrounded by industrial uses to the east, north, and west, and by a closed theme park to the south. This is shown on the attached map and the Project area is depicted with a one-half mile buffer zone.

If you require additional information or have any questions, please contact me.

Thank you for your help.

Respectfully yours,

Stephen O'Neil, M.A., RPA
Cultural Resources Manager
soneil@ultrasystems.com

Corporate Office – Orange County
16431 Scientific Way
Irvine, CA 92618-7443
Telephone: 949.788.4900, ext. 276
Facsimile: 949.788.4901
Website: www.ultrasystems.com

Kaiser Permanente Medical Center Project, Redlands, California.
[UEI #7214]
Native American Contact Log

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
Cameron Vela, Cultural Resources Analyst	Native American Heritage Commission	N/A	June 8, 2023	N/A	Request for Sacred Lands File search and local Native American representatives contact information. Reply received July 13, 2023 from Cameron Vela with "positive" results for the project site. A list of tribes to contact was provided.
Reid Milanovich, Chairperson	Agua Caliente Band of Cahuilla Indians	October 3, 2023	October 3, 2023	N/A	Letter describing project and requesting input on concerns was sent October 3, 2023. An email response was received from Xitaly Madrigal, cultural resources analyst for the tribe, on October 11, 2023. Ms. Madrigal indicated that the project area is not located within the boundaries of the ACBCI reservation but it is within the Tribe's Traditional Use Area and recommends measures be taken. These include: a cultural resources inventory of the project area, documentation of CHRIS cultural resources, a copy of the records received on the project, the presence of cultural resource monitors if any ground disturbance takes place, which including a SoI qualified archeologist. Mr. O'Neil responded to Ms. Madrigal, stating that a cultural resources inventory report would be prepared and when completed could be requested from the City of Redlands. As for the other requests recommended, Mr. O'Neil stated that they are best made to the City of Redlands during AB 52 consultation.
Patricia Garcia-Plotkin, Director	Agua Caliente Band of Cahuilla Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See Chairperson Milanovich response above.
Amanda Vance, Chairperson	Augustine Band of Cahuilla	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
	Mission Indians				response was received on October 9, 2023 from Ana Rios, administrative assistant, including an official letter from Geramy Martin, Tribal Secretary, indicating that the tribe is unaware of specific cultural resources that may be affected by the proposed project. However, in the event that resources are encountered during the development of this project they ask to be contacted. Mr. O'Neil responded to Ms. Rios, stating that a cultural resources inventory report would be completed and can be acquired from the City of Redlands as part of the outreach process. Mr. O'Neil also stated that the City of Redlands, per AB 52, would carry out a process of consultation and the tribe could make any recommendations then.
Doug Welmas, Chairperson	Cabazon Band of Mission Indians	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023 - there was no answer and a message was left. There has been no further response.
BobbyRay Esparza, Cultural Director	Cahuilla Band of Indians	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023. The tribal receptionist indicated that Mr. Esparza was not in the office, and was transferred to his line and a message was left on the Directors voicemail. There has been no further response.
Daniel Salgado, Chairperson	Cahuilla Band of Indians	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023. The tribal receptionist indicated that Chairperson Salgado was not in the office. A voicemail was left on the Director Esparza's voicemail. There has been no further response.
Anthony Madrigal, Tribal Historic Preservation Officer	Cahuilla Band of Indians	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023. The tribal receptionist indicated that Mr.

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
					Madrigal was not in the office. A voicemail was left on the Director Esparza's voicemail. There has been no further response.
Andrew Salas	Gabrieleno Band of Mission Indians – Kizh Nation	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email response was received on October 3, 2023 from the Gabrieleno Administration requesting the lead agency's contact information. That information was provided by Mrs. Doukakis on October 4, 2023.
Christina Swindell Martinez, Secretary	Gabrieleno Band of Mission Indians – Kizh Nation	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email response was received on October 3, 2023 from the Gabrieleno Administration requesting the lead agency's contact information. That information was provided by Mrs. Doukakis, on October 4, 2023.
Anthony Morales, Chairperson	Gabrieleno-Tongva San Gabriel Band of Missions Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and Chairperson Morales indicated that he does not have any specific concerns but there are known archaeological sites in the area and freeways like the I-10 would have been used for transportation routes. The Chairperson recommended Native American and Archaeological monitoring and would like his tribe to be involved.
Sandonne Goad, Chairperson	Gabrielino-Tongva Nation	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023; there was no answer and a message was left. MMM
Christina Conley, Cultural Resource Administrator	Gabrielino Tongva Indians of California Tribal Council	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email response was received on October 3, 2023 from Christina Conley, cultural resource administrator, indicating that the project would need to have a Native American monitor. Ms. Conley

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
					suggested calling Sandonne Goad, Chairperson of the Gabrielino/Tongva Nation for this area.
Robert Dorame, Chairperson	Gabrielino Tongva Indians of California Tribal Council	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response from Ms. Conley above.
Sam Dunlap, Cultural Resource Director	Gabrielino-Tongva Tribe	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response from Chairperson Alvarez below.
Charles Alvarez, Chairperson	Gabrielino-Tongva Tribe	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email response was received on October 4, 2023 from Charles Alvarez, Chairperson of the tribe, stating that they would look into this matter and respond accordingly. There has been no further response.
Ray Chapparosa, Chairperson	Los Coyotes Alvarez Band of Cahuilla and Cupeño Indians	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023 to Ms. Dorothy Willis with the Band's EPA Department. Ms. Willis indicated that she was on another line and to email her our question. This email was sent November 6, 2023. There has been no further response.
Robert Martin, Chairperson	Morongo Band of Mission Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023, there was no answer and a message was left. An email response was received from Laura Chatterton, Cultural Resource Specialist for the tribe on November 14, 2023 indicating that the tribe considers the project area to be highly sensitive for cultural resources and will be requesting government-to-government AB 52 consultation. Mr. O'Neil indicated on the same day that the Lead Agency is the City of Redlands and we will let them know the Band wishes to participate in consultation.

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
Ann Brierty, THPO	Morongo Band of Mission Indians	October 3, 2023	October 3, 2023	November 3, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 3, 2023, there was no answer and a message was left. See response above for Robert Martin.
Shasta Gaughen, THPO	Pala Band of Mission Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023; there was no answer and a message was left. There has been no further response.
Alexis Wallick. Assistant THPO	Pala Band of Mission Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023; there was no answer and a message was left. There has been no further response.
Paul Macarro, Cultural Resources Coordinator	Pechanga Band of Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email response was received on October 3, 2023 from Paul Macarro, cultural resources coordinator, indicating that the project area is outside the ancestral lands of their tribe and they will defer to the appropriate tribes. On October 4, 2023, Mr. O'Neil, cultural resources manager, responded that the tribe's response would be placed in the cultural resources report.
Mark Macarro, Chairperson	Pechanga Band of Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response from P. Macarro above.
Manfred Scott, Acting Chairman	Quechan Tribe of the Fort Yuma Reservation	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023, and the Acting Chairman indicated that the tribe will defer to more local tribes.
Jordan Joaquin, President, Quechan Tribal Council	Quechan Tribe of the Fort Yuma Reservation	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and the tribal secretary transferred our call to the President's secretaries line. There was no answer and a voicemail was left. See the Acting Chairman's; response above.

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
Jill McCormick, Historic Preservation Officer	Quechan Tribe of the Fort Yuma Reservation	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. The email was returned as undeliverable. A phone call was made on November 6, 2023, there was no answer and the mailbox was full so no message was able to be left. See the Acting Chairman's response above.
John Gomez, Environmental Coordinator	Ramona Band of Cahuilla	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and the tribal receptionist indicated that Mr. Gomez was in the field and provided his cell phone number. That number was called -- there was no answer and a message was left. There has been no further response.
Joseph Hamilton, Chairperson	Ramona Band of Cahuilla	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and the tribal receptionist indicated that the Chairperson was not in the office and to contact Mr. Gomez about our question with his cell phone.
Joseph Linton, Tribal Council Member	Rincon Band of Luiseno Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response below from Ms. Madrigal.
Laurie Gonzalez, Tribal Council Member	Rincon Band of Luiseno Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response below from Ms. Madrigal.
Cheryl Madrigal, THPO	Rincon Band of Luiseno Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and Ms. Madrigal indicated that she will look at our email and get back to UEI. A phone call was received from Deneen Pelton indicating that they sent an email response for this project on October 27, 2023. Ms. Pelton provided the email response from Ms. Madrigal and it indicated that the project location is not within the Band's specific Area of Historic Interest (AHI) and the tribe has no additional information to

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
					provide; Ms. Pelston recommended that UEI directly contract a tribe that is closer to the project and may have pertinent information.
Denise Turner Walsh, Attorney General	Rincon Band of Luiseno Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response above from Ms. Madrigal.
Alexandra McCleary, Cultural Lands Manager	San Manuel Band of Mission Indians	October 3, 2023	October 3, 2023	N/A	Letter and email describing project and requesting input on concerns was sent October 3, 2023. An email response was received on November 2, 2023 indicating that the proposed project site is considered sensitive by the Tribe, as it is close to the historic footprint of the Mill Creek Zanja, a historic waterway listed on the National Register which had been built using Serrano labor. The tribe would also like to engage in government-to-government consultation pursuant to AB 52 with the Lead Agency for the project. Mr. O'Neil indicated on the same day that the Lead Agency is the City of Redland's Planning Department and we will let them know that the tribe wishes to engage in AB 52 consultation.
Lovina Redner, Tribal Chair	Santa Rosa Band of Cahuilla Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and the tribal receptionist indicated that Ms. Redner was not in the office and asked that we leave our call back number. This was done. There has been no further response.
Wayne Walker, Co-Chairperson	Serrano Nation of Mission Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023, there was no answer and a message was left. There has been no further response.
Mark Cochrane, Co-Chairperson	Serrano Nation of Mission Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023; the phone line was disconnected and so a message could not be left.

Name	Tribe/Affiliation	Letter Contacts	E-mail Contacts	Telephone Contacts	Comments
Isaiah Vivanco, Chairperson	Soboba Band of Luiseno Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. See response from Mr. Ontiveros below.
Joseph Ontiveros, Cultural Resource Department	Soboba Band of Luiseno Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made on November 6, 2023 and Mr. Ontiveros indicated that this area is of moderate concerns for the tribe and further information will be provided to the lead agency.
Cultural Committee	Torres-Martinez Desert Cahuilla Indians	October 3, 2023	October 3, 2023	November 6, 2023	Letter and email describing project and requesting input on concerns was sent October 3, 2023. A phone call was made November 6, 2023 and the tribal receptionist forwarded the call to the Cultural Committee's line. There was no answer and no answering machine, and so a message could not be left.

From: Aviles, Laura (TRBL)
To: "mblack@ultrasystems.com"
Cc: soneil@ultrasystems.com
Subject: RE: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California
Date: Tuesday, October 3, 2023 3:13:23 PM
Attachments: attachment-1.jpeg

Received. Thank you.

From: THPO Consulting
Sent: Wednesday, October 11, 2023 10:02 AM
To: 'soneil@ultrasystems.com'
Subject: Kaiser Permanente Expansion

Good morning,

If you have any questions about the attached letter please feel free to contact me.

Thank you,

Xitlaly Madrigal
Cultural Resources Analyst
xmadrigal@aguacaliente.net
C: (760) 423-3485 | D: (760) 883-6829
5401 Dinah Shore Drive, Palm Springs, CA 92264

AGUA CALIENTE BAND OF CAHUILLA INDIANS

TRIBAL HISTORIC PRESERVATION

03-027-2023-002

October 11, 2023

[VIA EMAIL TO:soneil@ultrasystems.com]
UltraSystems
Mr. Stephen O'Neil
16431 Scientific way
Irvine, CA 92618

Re: Kaiser Permanente Expansion

Dear Mr. Stephen O'Neil,

The Agua Caliente Band of Cahuilla Indians (ACBCI) appreciates your efforts to include the Tribal Historic Preservation Office (THPO) in the Kaiser Permanente Project project. The project area is not located within the boundaries of the ACBCI Reservation. However, it is within the Tribe's Traditional Use Area. For this reason, the ACBCI THPO requests the following:

*A cultural resources inventory of the project area by a qualified archaeologist prior to any development activities in this area.

*Copies of any cultural resource documentation (report and site records) generated in connection with this project.

*A copy of the records search with associated survey reports and site records from the information center.

*The presence of an approved Cultural Resource Monitor(s) during any ground disturbing activities (including archaeological testing and surveys). Should buried cultural deposits be encountered, the Monitor may request that destructive construction halt and the Monitor shall notify a Qualified Archaeologist (Secretary of the Interior's Standards and Guidelines) to investigate and, if necessary, prepare a mitigation plan for submission to the State Historic Preservation Officer.

*The presence of an archaeologist that meets the Secretary of Interior's standards during any ground disturbing activities.

Again, the Agua Caliente appreciates your interest in our cultural heritage. If you have questions or require additional information, please call me at (760) 423-3485. You may also email me at ACBCI-THPO@aguacaliente.net.

Cordially,

5401 DINAH SHORE DRIVE, PALM SPRINGS, CA 92264
T 760/699/6800 F 760/699/6924 WWW.AGUACALIENTE-NSN.GOV

AGUA CALIENTE BAND OF CAHUILLA INDIANS

TRIBAL HISTORIC PRESERVATION

Xitlaly Madrigal
Cultural Resources Analyst
Tribal Historic Preservation Office
AGUA CALIENTE BAND
OF CAHUILLA INDIANS

5401 DINAH SHORE DRIVE, PALM SPRINGS, CA 92264
T 760/699/6800 F 760/699/6924 WWW.AGUACALIENTE-NSN.GOV

From: Steve Oneil <soneil@ultrasystems.com>
Sent: Wednesday, October 11, 2023 1:23 PM
To: THPO Consulting <ACBCI-THPO@aguacaliente.net>
Cc: Megan Black <mblack@ultrasystems.com>
Subject: RE: 7214 - Kaiser Permanente Expansion

** This Email came from an External Source **

Hello Ms. Madrigal,

Thank you for your email and letter on behalf of the Agua Caliente Band of Cahuilla Indians regarding the 7214 Kaizer Permanente project in Redlands. These will be included in the coming cultural resources report.

Regarding the several items in your letter, know that a cultural resources inventory report is being prepared. When completed this will be submitted to the City of Redlands and you may request a copy of it from them. Your other requests would, I think, best be made to the City of Redlands as the project's Lead Agency during AB 52 consultation. I expect that they will be contacting you, among other tribes, before long to ask if you wish to consult on this project.

Respectfully yours,

Stephen O'Neil | Cultural Resources Manager | M.A./RPA

UltraSystems Environmental | WBE/DBE/SBE/WOSB
16431 Scientific Way
Irvine, CA 92618
Office 949.788.4900 ext. 276
Fax 949.788.4901
Cell 949.677.2391

From: THPO Consulting
To: "Steve Oneil"
Cc: Megan Black
Subject: RE: 7214 - Kaiser Permanente Expansion
Date: Wednesday, October 11, 2023 1:54:11 PM
Attachments: image002.png

Good Afternoon,

Thank you for confirming receipt.
We will reach out to the City of Redlands for a copy of the report once it is available.

Thank you again,

Xitlaly Madrigal
Cultural Resources Analyst
xmadrigal@aguacaliente.net
C: (760) 423-3485 | D: (760) 883-6829
5401 Dinah Shore Drive, Palm Springs, CA 92264

From: Anadalia Rios <ARios@augustinetribe.com>
Sent: Monday, October 9, 2023 11:16 AM
To: soneil@ultrasystems.com

Subject: Kaiser Permanente Medical Center Project

Hello,

Please see the attached cultural resource response letters.

Thank you,

logo-tribe

Ana Rios
Administrative Assistant
Augustine Band of Cahuilla Indians

Office: (760) 398-4722 Ext 7498
Cell: (760) 450-3883
Email: ARios@augustinetribe.com
Website: augustinetribe-nsn.gov

From: Steve Oneil
To: Anadalia Rios; mblack@ultrasystems.com
Subject: RE: 7214 - Kaiser Permanente Medical Center Project, Redlands
Date: Monday, October 9, 2023 11:39:58 AM
Attachments: image006.jpg
image007.png
image008.png
image009.png
image010.png
image011.png

Good morning Ms. Rios,

Thank you for your response on behalf of the Augustine Band of Cahuilla Indians concerning the Kaiser Medical Center project. Your email and the letter from Geramy Martin will be included in the cultural resources report.

Concerning the letter from Martin, I wish to remind you that I am only conducting outreach to the Band to learn of possible cultural resources in the project area that you may know of to include in the cultural resources inventory report. This is not AB 52 consultation, which will be conducted by the project's lead agency, which will be the City of Redlands. I expect they will be contacting you to initiate that consolation.

During that consultation process is where you should bring up the Band's wish to be informed of possible cultural resources discoveries during the development phase of the Kaiser project.

Best regards,

Stephen O'Neil | Cultural Resources Manager | M.A./RPA

UltraSystems Environmental | WBE/DBE/SBE/WOSB
16431 Scientific Way
Irvine, CA 92618
Office **949.788.4900 ext. 276**
Fax 949.788.4901
Cell 949.677.2391

AUGUSTINE BAND OF CAHUILLA INDIANS
84-481 Avenue 54, Coachella CA 92236
Telephone: (760) 398-4722
Fax (760) 369-7161
Tribal Chairperson: Amanda Vance
Tribal Vice-Chairperson: Victoria Martin
Tribal Secretary: Geramy Martin

Date: 10/06/2023

Dear: Stephen O'Neail, MA, RPA
Cultural Resources Manager

SUBJECT: Cultural Resources Inventory, Kaiser Permanente Medical Center Project, Redlands, San Bernardino County, California. Ultra-Systems Environmental Project NO. 7214

Thank you for the opportunity to offer input concerning the development of the above-identified project. We appreciate your sensitivity to the cultural resources that may be impacted by your project and the importance of these cultural resources to the Native American peoples that have occupied the land surrounding the area of your project for thousands of years. Unfortunately, increased development and lack of sensitivity to cultural resources have resulted in many significant cultural resources being destroyed or substantially altered and impacted. Your invitation to consult on this project is greatly appreciated.

At this time, we are unaware of specific cultural resources that may be affected by the proposed project, however, in the event, you should discover any cultural resources during the development of this project please contact our office immediately for further evaluation.

Very truly yours,

Geramy Martin

Geramy Martin, Tribal Secretary
Augustine Band of Cahuilla Indians

From: Charles Alvarez
To: mblack@ultrasystems.com
Cc: soneil@ultrasystems.com
Subject: Re: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California
Date: Wednesday, October 4, 2023 9:59:13 AM
Attachments: image001.jpg
image001.jpg

I will look into this and get back to you.

From: Christina Marsden Conley <christina.marsden@alumni.usc.edu>
Sent: Tuesday, October 3, 2023 3:25 PM
To: Megan Black <mblack@ultrasystems.com>
Subject: Re: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California

Good afternoon,
This project needs to have a Native American Monitor. I would suggest calling Sandonne Goad, Chairperson of the Gabrielino/Tongva Nation for this area.

tehoovet taamet
C H R I S T I N A C O N L E Y
•Native American Monitor - Caretaker of our Ancestral Water and Land
•Cultural Resource Administrator Under Tribal Chair, Robert Dorame (Most Likely Descendant) of Pimugna (Catalina Island)

•Native American Heritage Commission Contact
•Fully qualified as a California State Recognized Native American Tribe fulfilling SB18, AB52 Compliance Regulations
•HAZWOPER Certified
•626.407.8761

https://file.lacounty.gov/SDSInter/lac/1137966_AREPORTONHARMSCountyofLosAngeles.pdf

G A B R I E L I N O T O N G V A I N D I A N S O F C A L I F O R N I A
The Gabrielino Tongva Indians of California tribe is traditionally and culturally recognized in the State of California Bill AJR96 as the aboriginal tribe to encompass the entire Los Angeles Basin area to Laguna Beach, extending to the Channel Islands of Santa Catalina, San Nicholas and San Clemente Islands

GTIOC.png

NAHC recognizes GTIOC Tribal Territory

From: mblack@ultrasystems.com
To: "Christina Marsden Conley"
Subject: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California
Date: Wednesday, October 4, 2023 4:04:34 PM
Attachments: image001.jpg
image003.png

Hello Ms. Conley,

Thank you for providing that direction. We will contact Ms. Goad.

Best regards,

Megan Black Doukakis | Assistant Project Archaeologist | M.A.

UltraSystems Environmental | WBE/DBE/SBE/WOSB
16431 Scientific Way Irvine, CA 92618
Office **949.788.4900 Ext. 228** Fax 949.788.4901
Cell 310.850.8127

Please note that I am working remotely. I can best be reached via email or cell.

> From: Gabrieleno Administration <admin@gabrielenoindians.org>
> Sent: Tuesday, October 3, 2023 3:19 PM
> To: mblack@ultrasystems.com
> Subject: Re: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California
>
> Hello Megan
>
> Can you please provide the lead agency's contact information?
>
>
> Admin Specialist
> Gabrieleno Band of Mission Indians - Kizh Nation PO Box 393 Covina, CA 91723
> Office: 844-390-0787
> website: www.gabrielenoindians.org
>
>
> The region where Gabrieleño culture thrived for more than eight centuries encompassed most of Los Angeles County, more than half of Orange County and portions of Riverside and San Bernardino counties.
> It was the labor of the Gabrieleño who built the missions, ranchos and the pueblos of Los Angeles. They were trained in the trades, and they did the construction and maintenance, as well as the farming and managing of herds of livestock. "The Gabrieleño are the ones who did all this work, and they really are the foundation of the early economy of the Los Angeles area " . "That's a contribution that Los Angeles has not recognized--the fact that in its early decades, without the Gabrieleño, the community simply would not have survived."

On Wed, Oct 4, 2023 at 3:59 PM <mblack@ultrasystems.com> wrote:
>
> Hello,
>
> Please see the lead agencies contact information below:
>
> Brian Foote, City Planner
> City of Redlands
> 35 Cajon Street, Suite 20
> Redlands, CA 92373
> Phone # 909-798-7555 Fax # 909-335-4779
> bfoote@cityofredlands.org
>
> Best regards,
> Megan Black Doukakis| Assistant Project Archaeologist | M.A.
> UltraSystems Environmental | WBE/DBE/SBE/WOSB
> 16431 Scientific Way Irvine, CA 92618
> Office 949.788.4900 Ext. 228 Fax 949.788.4901
> Cell 310.850.8127
>

From: Gabrieleno Administration
To: mblack@ultrasystems.com
Subject: Re: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California
Date: Wednesday, October 4, 2023 4:40:16 PM

Thank you Megan

Admin Specialist
Gabrieleno Band of Mission Indians - Kizh Nation
PO Box 393
Covina, CA 91723
Office: 844-390-0787
website: www.gabrielenoindians.org

The region where Gabrieleño culture thrived for more than eight centuries encompassed most of Los Angeles County, more than half of Orange County and portions of Riverside and San Bernardino counties. It was the labor of the Gabrieleño who built the missions, ranchos and the pueblos of Los Angeles. They were trained in the trades, and they did the construction and maintenance, as well as the farming and managing of herds of livestock. "The Gabrieleño are the ones who did all this work, and they really are the foundation of the early economy of the Los Angeles area " . "That's a contribution that Los Angeles has not recognized--the fact that in its early decades, without the Gabrieleño, the community simply would not have survived."

-----Original Message-----
From: Paul Macarro <pmacarro@pechanga-nsn.gov>
Sent: Tuesday, October 3, 2023 4:33 PM
To: mblack@ultrasystems.com
Cc: soneil@ultrasystems.com
Subject: Re: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California

Miiyu/Hello Megan,

This particular Project is outside of Our Ancestral Territory. Pechanga will be deferring to the appropriate Tribe. We appreciate UltraSystems' diligence and have a great day.

Léoviqap/Thanks,
Paul E. Macarro
Cultural Coordinator
Pechanga Reservation

From: Steve Oneil
To: Paul Macarro; Megan Black
Subject: RE: Project 7214 - Cultural Resources Inventory, Kaiser Permanente Medical Center Project, San Bernardino County, California
Date: Wednesday, October 4, 2023 8:32:06 AM

Good morning Paul,

Thank you for responding on behalf of the Pechanga Band of Luiseno Indians concerning the Kaiser Permanente Redlands project. Your reply will be placed in the cultural resources report.

Have a good day, and say hi to Lisa for me.

Steve

Stephen O'Neil | Cultural Resources Manager | M.A./RPA
UltraSystems Environmental | WBE/DBE/SBE/WOSB
16431 Scientific Way
Irvine, CA 92618
Office 949.788.4900 ext. 276
Fax 949.788.4901
Cell 949.677.2391

From: Deneen Pelton
Sent: Friday, October 27, 2023 3:00 PM
To: Steve Oneil <soneil@ultrasystems.com>
Cc: Cheryl Madrigal <CMadrigal@rincon-nsn.gov>; Shuuluk Linton <slinton@rincon-nsn.gov>
Subject: Kaiser Permanente Medical Center Project, Redlands, CA

Greetings,

This email is written on behalf of Rincon Band of Luiseño Indians, ("Rincon Band" or "Band"), a federally recognized Indian Tribe and sovereign government.

The Band has received the notification for the above referenced project. The location identified within project documents is not within the Band's specific Area of Historic Interest (AHI).

At this time, we have no additional information to provide. We recommend that you directly contact a Tribe that is closer to the project and may have pertinent information.

Thank you for submitting this project for Tribal review. If you have additional questions or concerns, please do not hesitate to contact our office at your convenience at (760) 749-1092 or via electronic mail at crd@rincon-nsn.gov.

Thank you for the opportunity to protect and preserve our cultural assets.

Deneen Pelton
Cultural Resources Department Coordinator
Cultural Resources Department
Rincon Band of Luiseño Indians
1 West Tribal Road | Valley Center, CA 92082
Office: (760) 749 1092 ext. 323 | Cell: 760-705-7304
Fax: 760-888-2016
Email: dpelton@rincon-nsn.gov

Rincon Band of Luiseño Indians
www.rincon-nsn.gov

From: Alexandra Mc Cleary <Alexandra.McCleary@sanmanuel-nsn.gov>
Sent: Thursday, November 2, 2023 4:11 PM
To: soneil@ultrasystems.com
Subject: Response to Information Request - Kaiser Permanente Medical Center Project

Dear Stephen,

Thank you for reaching out to the Yuhaaviatam of San Manuel Nation (formerly known as the San Manuel Band of Mission Indians) concerning the proposed project area. YSMN appreciates the opportunity to review the project documentation received by the Cultural Resources Management Department on October 12, 2023. Based on our current knowledge, the proposed project site is considered sensitive by the Tribe, as it is close to the historic footprint of the Mill Creek Zanja, a historic waterway listed on the National Register which had been built using Serrano labor.

As the area is of concern, the Tribe will wish to engage in government-to-government consultation pursuant to AB 52 with the Lead Agency for the project.

Thank you again for your correspondence, if you have any additional questions or comments please reach out to me at your earliest convenience.

Regards,
Alexandra

Alexandra Mc Cleary
Sr Mgr Cultural Resource Management
Alexandra.McCleary@sanmanuel-nsn.gov
O:(909) 864-8933 Ext 50-2023
M:(909) 633-0054
26569 Community Center Dr Highland, California 92346

From: Steve Oneil
To: Alexandra Mc Cleary
Cc: Megan Black; Rodrigo Jacobo
Subject: RE: 7214 - Response to Information Request - Kaiser Permanente Medical Center Project
Date: Thursday, November 2, 2023 4:34:58 PM
Attachments: ~WRD0001.jpg
image001.jpg

Good afternoon Alexandra,

Thank you for your response on behalf of the Yuhaaviatam of San Manuel concerning the Kaiser Permanente project in Redlands. This will be included in the cultural resources report being prepared.

The Lead Agency is the City of Redland's Planning Department. We will let them know that you wish to engage in AB 52 consultation and that you should be contacted when they reach to tribes to start this process.

Respectfully yours,

Steve

Stephen O'Neil | **Cultural Resources Manager** | **M.A./RPA**

UltraSystems Environmental | **WBE/DBE/SBE/WOSB**
16431 Scientific Way
Irvine, CA 92618
Office **949.788.4900 ext. 276**
Fax 949.788.4901
Cell 949.677.2391

From: Tribal Historic Preservation Office <thpo@morongo-nsn.gov>
Sent: Tuesday, November 14, 2023 1:11 PM
To: steve oneil <soneil@ultrasystems.com>
Cc: Ann Brierty <ABrierty@morongo-nsn.gov>; Laura Chatterton <lchatterton@morongo-nsn.gov>; Joan Schneider <jschneider@morongo-nsn.gov>
Subject: UltraSystems Early Outreach City of Redlands Kaiser Medical Center

Mr. O'Neil,

The Morongo Band of Mission Indians (Tribe/MBMI) Tribal Historic Preservation Office is in receipt of your letter regarding the above referenced project. Thank you for reaching out to Tribe at an early stage. The proposed Project is located within the ancestral territory and traditional use area of the Cahuilla and Serrano people of the Morongo Band of Mission Indians.

Tribal cultural resources are non-renewable resources and therefore of high importance to the Morongo Tribe and tribal participation (a.k.a. tribal monitors) is recommended during the cultural resource surveys and future construction phases(s) of the Project. We look forward to working with the Lead Agency and your company to protect these irreplaceable resources out of respect for ancestors of the Morongo people who left them there, and for the people of today and for generations to come.

Projects within this area are highly sensitive for cultural resources regardless of the presence or absence of remaining surface artifacts and features. At the appropriate stage of the Project, our office will request government-to-government consultation under Assembly Bill (AB) 52 (California Public Resources Code § 21080.3.1) with the Lead Agency.

Please see attached letter.
Respectfully,

Laura Chatterton
Cultural Resource Specialist
Tribal Historic Preservation Office
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, CA 92220
O: (951) 755.5256
M: (951) 663.7570

From: Steve Oneil
To: Tribal Historic Preservation Office; mblack@ultrasystems.com
Cc: Ann Brierty; Laura Chatterton; Joan Schneider; Rodrigo Jacobo
Subject: RE: 7214 - UltraSystems Early Outreach City of Redlands Kaiser Medical Center
Date: Tuesday, November 14, 2023 1:54:35 PM
Attachments: image001.jpg

Good afternoon Ms. Chatterton,

Thank you for your reply on behalf of the Morongo Band of Mission Indians concerning the Kaiser Permanente project in Redlands. Your email reply and letter will be included in the cultural resources inventory report now being prepared. Know that a pedestrian survey has already been conducted.

The Lead Agency will be the City of Redlands Planning Department, which has yet to initiate AB 52 consultation. We will let them know that the Band does wish to participate in that consultation.

Respectfully yours,

Stephen O'Neil | Cultural Resources Manager | M.A./RPA

UltraSystems Environmental | WBE/DBE/SBE/WOSB
16431 Scientific Way
Irvine, CA 92618
Office **949.788.4900 ext. 276**
Fax 949.788.4901
Cell 949.677.2391

ATTACHMENT D

CHRIS RECORDS SEARCH BIBLIOGRAPHY

Report List

7214 Kaiser Permanente

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-00557	NADB-R - 1060557; Voided - 77-9.12	1977	HEARN, JOSEPH E.	ARCHAEOLOGICAL - HISTORICAL RESOURCES ASSESSMENT OF PROJECT SITE LOCATED ON THE NORTH SIDE OF REDLANDS BOULEVARD AND WEST OF CALIFORNIA STREET IN THE BRYN MAWR AREA	SAN BERNARDINO COUNTY MUSEUM ASSOCIATION	
SB-00600	NADB-R - 1060600; Voided - 78-1.7	1978	HEARN, JOSEPH E.	ARCHAEOLOGICAL - HISTORICAL RESOURCES ASSESSMENT OF APPROXIMATELY EIGHT ACRES AT THE NORTHEAST CORNER OF REDLANDS BOULEVARD AND BRYN MAWR AVENUE; LOMA LINDA AREA	SAN BERNARDINO COUNTY MUSEUM ASSOCIATION	
SB-00647	NADB-R - 1060647; Voided - 78-5.7	1978	HEARN, JOSEPH E.	ARCHAEOLOGICAL - HISTORICAL RESOURCES ASSESSMENT OF 63 ACRE PARCEL OF LAND LOCATED ON THE NORTH SIDE OF REDLANDS BOULEVARD BETWEEN MOUNTAIN VIEW AVENUE AND BRYN MAWR AVENUE, LOMA LINDA-REDLANDS AREA	SAN BERNARDINO COUNTY MUSEUM ASSOCIATION	
SB-00931	NADB-R - 1060931; Voided - 80-2.11	1980	SMITH, GERALD A.	CULTURAL RESOURCES ASSESSMENT OF THE WEST PORTION OF ASSESSOR'S PARCEL NUMBER 292-061-11, REDLANDS AREA	SAN BERNARDINO COUNTY MUSEUM ASSOCIATION	
SB-02486	NADB-R - 1062486; Voided - 91-12.4	1991	HATHEWAY, ROGER G., JOHN ROMANI, and JOANNE SANFILIPPO	AN ARCHITECTURAL DETERMINATION OF ELIGIBILITY/SIGNIFICANCE REPORT AND AN ARCHAEOLOGICAL SURVEY FOR THE MARIGOLD BUSINESS PARK	HATHEWAY & ASSOCIATES	
SB-02625	NADB-R - 1062625; Voided - 92-3.7	1992	SWOPE, KAREN K and MICHAEL K. LERCH	CULTURAL RESOURCES ASSESSMENT OF THE BARTON CENTER OF REDLANDS, MARIGOLD FARMS, CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA	MICHAEL K. LERCH & ASSOCIATES	36-006857, 36-007139

Report List

7214 Kaiser Permanente

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-02853	NADB-R - 1062853	1991	FOSTER, JOHN M., JAMES J. SCHMIDT, CARMEN A. WEBER, GWENDOLYN R. ROMANI, and ROBERTA S. GREENWOOD	CULTURAL RESOURCE INVESTIGATION: INLAND FEEDER PROJECT, MWD OF SOUTHERN CA	GREENWOOD & ASSOCIATES	36-006086, 36-006354, 36-006847, 36-006848, 36-006849, 36-006850, 36-006851, 36-006852, 36-006853, 36-006854, 36-006855, 36-006856, 36-006857, 36-006858, 36-006859, 36-006860, 36-006861, 36-006862, 36-006863, 36-006864, 36-006865, 36-006866, 36-006867, 36-006868, 36-006869, 36-006870, 36-006871, 36-006872, 36-006940, 36-007021, 36-007050, 36-007051, 36-007053, 36-007054, 36-007055, 36-007702
SB-03750	NADB-R - 1063750	2000	LOVE, BRUCE	WESTSIDE LANDFILL EXPANSION PROJECT. 29PP	CRM TECH	36-009990, 36-009991, 36-009992
SB-04048	NADB-R - 1064048	2001	LOVE, BRUCE	IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES: CITY OF REDLANDS RECYCLED WATER PROJECT IN THE CITY OF REDLANDS, SAN BERNARDINO COUNTY, CA. 27PP	CRM TECH	36-007139, 36-009991, 36-009992
SB-04600	NADB-R - 1064600	2004	Dice, Michael	Phase I Cultural Resources Survey of a 73.45 Acre Property in Unincorporated San Bernardino County, APN: 0292-052-01, -03, -04, -06, -08, -10, -11, -12, -16 near Nevada Street/Almond Avenue, Section 13 of Township 1 North Range 6 West, County of San Bernardino, California.		
SB-04809	NADB-R - 1064809	2006	W & S CONSULTANTS	PHASE 1 ARCHAEOLOGICAL SURVEY OF THE KAISER REDLANDS MOB STUDY AREA, REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA		
SB-04812	NADB-R - 1064812	2004	Dice, Michael	Records Search Results and Site Visit for Sprint Telecommunications Facility SB38XC919E (City Grove), California Street and I-10, Redlands, San Bernardino County, California.		
SB-05805	NADB-R - 1065805	2007	Crull, Scott	An Archaeological and Paleontological Mitigation-Monitoring Report for Tentative Parcel Map 17815, with APHs: 167-401-02, 03; 167-511-08 and 167-451-05, 06, 07- a 40 Acre Parcel Located in the City of Redlands, San Bernardino County, California.	L&L Environmental, Inc	
SB-06633						

Report List

7214 Kaiser Permanente

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-07964		2015	DeCarlo, Matthew M. and Diane L. Winslow	Cultural Resources Impact Assessment and Evaluation Status Report for Southern California Edison Company's West of Devers Upgrade Project, Riverside and San Bernardino Counties, California	ASM Affiliates	36-002311, 36-006847, 36-006855, 36-026030
SB-08038	Paleo -	2013	Brunzell, David	Cultural Resources Assessment Hillwood Commerce Center Project, City of Redlands, San Bernardino County, California	BCR Consulting LLC	36-009991
SB-08199		2015	Abdo-Hintzman, Kholood and Josh Smallwood	CULTURAL RESOURCES MONITORING REPORT FOR THE REDLANDS COMMERCE CENTER BUILDINGS 1 AND 2 PROJECT CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA	Applied EarthWorks, Inc.	36-028815

APPENDIX C

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

Preliminary

Water Quality Management Plan

For:

Kaiser Permanente Redlands

DEVELOPMENT PLAN SUBMITTAL
July 24, 2024

Prepared for:

Kaiser Permanente

393 E. Walnut Street, 4th Floor

Pasadena, CA 91188

(626) 405-6333

Prepared by:

Michael Baker International

9755 Clairemont Mesa Blvd

San Diego, CA, 92124-1333

(858) 614-5000

Revision Date: _____

Approval Date:_____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Kaiser Permanente by Michael Baker International. The WQMP is intended to comply with the requirements of the City of Redlands, County of San Bernardino County, and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

.

Project Data			
Permit/Application Number(s):	TBD	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	Parcel Map No. 15911	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN: 0167-441-07-0-000

Owner's Signature			
Owner Name: Skyler Denniston			
Title	Contact Person		
Company	Kaiser Permanente		
Address	393 E. Walnut Street 4th Floor		
Email			
Telephone #	626-405-6333		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	TBD	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	Parcel Map No. 15911	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN: 0167-441-07-0-000

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036."

Engineer: Jay Sullivan, PE, CFM, QSD		PE Stamp Below
Title	Technical Manager	
Company	Michael Baker International	
Address	9755 Clairemont Mesa Bvd, STE 100	
Email	Jay.Sullivan@mbakerintl.com	
Telephone #	858.614.5000	
Signature		
Date	9-16-2022	

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Forms

Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name	Redlands Medical Center				
Project Owner Contact Name:	Skyler Denniston				
Mailing Address:	393 E. Walnut Street, Pasadena, CA 91188	E-mail Address:		Telephone:	626.405.6333
Permit/Application Number(s):	TBD		Tract/Parcel Map Number(s):	Parcel Map No. 15911	
Additional Information/ Comments:	Prepared for Entitlements Sept. 2022				
Description of Project:	New medical facilities and associated parking and landscape at an existing Kaiser Permanente site. The total study area is approximately 36.5 acres, total disturbed area is 29.5 acres. Under existing conditions, approximately 7.0 acres are developed consisting of Kaiser medical facilities including a building, parking lot, landscape, and storm water BMPs. These structures and parking will remain, the existing BMPs will be re-designed to mitigate each of the four (4) phases of work. The remaining 29.5 acres are un-developed and consist of scattered brush. Runoff from a majority of the site is conveyed northwesterly to an existing triangular-shaped detention basin (176,494 SF bottom area and approximately eight (8) feet deep). This existing detention basin includes a riser that drains to the public storm drain located in Almond Avenue. The property splits this basin nearly in half, with approximately half the bottom area located on-site and half off-site.				
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	Not Applicable				

Section 2 Project Description

2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

Form 2.1-1 Description of Proposed Project

1 Development Category (Select all that apply):

☒ Significant re-development involving the addition or replacement of 5,000 ft² or more of impervious surface on an already developed site	☐ New development involving the creation of 10,000 ft² or more of impervious surface collectively over entire site	☐ Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	☐ Restaurants (with SIC code 5812) where the land area of development is 5,000 ft² or more
☐ Hillside developments of 5,000 ft² or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	☐ Developments of 2,500 ft² of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	☒ Parking lots of 5,000 ft² or more exposed to storm water	☐ Retail gasoline outlets that are either 5,000 ft² or more, or have a projected average daily traffic of 100 or more vehicles per day

☐ Non-Priority / Non-Category Project *May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements*.

2 Project Area (ft2):	29.5	**3** Number of Dwelling Units:	0	**4** SIC Code:	n/a

5 Is Project going to be phased? Yes ☒ No ☐ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

There are four (4) proposed Phases of construction; however, Phase 2 includes ultimate-condition BMP's thus two (2) Phases are described hererin with the understanding that Phase 2 BMPs are sized for Phase 3 and 4 conditions.

6 Does Project include roads? Yes ☐ No ☒ *If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:
Maintenance of the WQMP facilities will be the sole responsibility of the property owner. The owner may choose to contract out the maintenance of the storm water facilities to a qualified contractor.

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Nutrients - Phosphorous	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Nutrients - Nitrogen	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Noxious Aquatic Plants	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Sediment	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Metals	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Oil and Grease	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Trash/Debris	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Pesticides / Herbicides	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Organic Compounds	E ☒	N ☐	Per Table 3-3 of TGM for WQMP
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits

1 Project Types that Qualify for Water Quality Credits: *Select all that apply N/A*

☐ Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects ☐ Vertical density [20%] ☐ 7 units/ acre [5%]	☐ Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	☐ Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
☐ Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	☐ Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	☐ In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	☐ Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]

2 Total Credit % *(Total all credit percentages up to a maximum allowable credit of 50 percent)*

Description of Water Quality Credit Eligibility (if applicable)	Not Applicable

Section 3 Site and Watershed Description

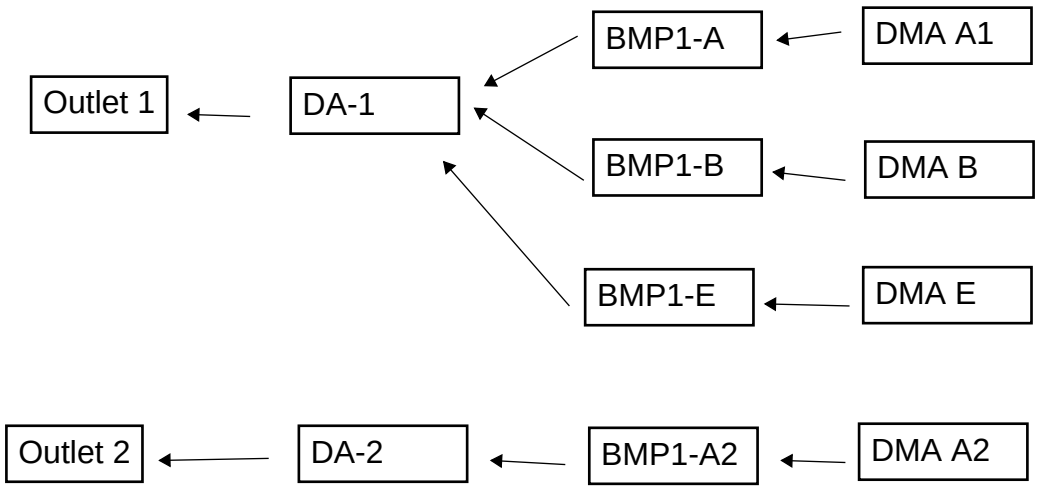
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34°04'19"	Longitude 117°13'43"	Thomas Bros Map page

1 San Bernardino County climatic region: ☒ Valley ☐ Mountain

2 Does the site have more than one drainage area (DA): Yes☒ No☐ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



Phase 1	
DA-1 DMA-A1 flows to BMP 1-A1	Runoff from DMA-A1 is captured by existing and proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 1-A). Mitigated runoff is discharged at-grade to the existing large triangular basin located in the NW corner of the site, and then into the public storm drain within Almond Avenue (northerly project boundary). This BMP is replaced with underground infiltration in Phase 2.
DA-1 DMA-B flows to BMP 1-B	Runoff from DMA-B is captured by proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 1-B). Mitigated runoff is discharged at-grade to the exiting large triangular basin located in the NW corner of the site and then into the public storm drain within Almond Avenue (northerly project boundary). This BMP remains through Phase 2 and the Ultimate condition.
DA-1 DMA-C	No existing or proposed impervious area. Runoff drains to the existing large triangular basin located in the NW corner of the site and then into the public storm drain within Almond Avenue (northerly project boundary).
DA-1 DMA-D	No existing or proposed impervious area. Runoff drains to Almond Avenue (northerly project boundary).
DA-1 DMA-E flows to BMP 1-E	Runoff from DMA-D is captured by existing and proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 1-D). Mitigated runoff is discharged at-grade to the existing large triangular basin located in the NW corner and then into the public storm drain within Almond Avenue (northerly project boundary). This BMP is replaced with underground infiltration in Phase 2.
DA-2 DMA-A2 flows to BMP 2-A2	Runoff from DMA-A2 is captured by proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 2-D). Mitigated runoff is discharged via a newly proposed connection to the existing storm drain within Lugonia Avenue (southerly project boundary). This BMP remains through Phase 2 and the Ultimate condition.
Phase 2 (represents Ultimate Condition)	
DA-1 DMA-A1 flows to BMP 1-A1	Runoff from DMA-A1 is captured by existing and proposed inlets and conveyed via new on-site storm drains to a new underground infiltration BMP (BMP 1-A). Mitigated runoff is discharged at-grade to the existing large triangular basin located in the NW corner of the site, and then into the public storm drain within Almond Avenue (northerly project boundary).
DA-1 DMA-B flows to BMP 1-B	Runoff from DMA-B is captured by proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 1-B). Mitigated runoff is discharged at-grade to the exiting large triangular basin located in the NW corner of the site and then into the public storm drain within Almond Avenue (northerly project boundary).
DA-1 DMA-C flows to BMP 1-C	Runoff from DMA-B is captured by existing and proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 1-C). Mitigated runoff is discharged at-grade to the existing large triangular basin located in the NW corner and then into the public storm drain within Almond Avenue (northerly project boundary).
DA-2 DMA-A2 flows to BMP 2-A2	Runoff from DMA-A2 is captured by proposed inlets and conveyed via new on-site storm drains to a new Bioretention Basin (BMP 2-D). Mitigated runoff is discharged via a newly proposed connection to the existing storm drain within Lugonia Avenue (southerly project boundary).

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A1	DMA B	DMA C	n/a
1 DMA drainage area (ft^2)	469,141	781,030	83,200	
2 Existing site impervious area (ft^2)	398,770	0	0	
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	II	II	II	
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	A	A	A	
5 Longest flowpath length (ft)	1,133	720	865	
6 Longest flowpath slope (ft/ft)	0.014	0.009	0.017	
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Commercial	Open Brush	Open Brush	
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Good	Poor	Poor	

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 2				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A2	n/a	n/a	n/a
1 DMA drainage area (ft^2)	258,311			
2 Existing site impervious area (ft^2)	0			
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	II			
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	A			
5 Longest flowpath length (ft)	766			
6 Longest flowpath slope (ft/ft)	0.009			
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Open Brush			
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Poor			

Form 3-3 Watershed Description for Drainage Area

Receiving waters *Refer to Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/ See 'Drainage Facilities" link at this website*	Santa Ana River, Reach 5
Applicable TMDLs *Refer to Local Implementation Plan*	Indicator Bacteria TMDL (USEPA) for Santa Ana River, Reach 3
303(d) listed impairments *Refer to Local Implementation Plan and Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml*	Santa Ana River Reach 4 is 303(d) listed for pathogens Santa Ana River Reach 3 is 303(d) listed for copper, lead, and pathogens Santa Ana River Reach 2 is 303(d) listed for indicator bacteria
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	N/A
Unlined Downstream Water Bodies *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	N/A
Hydrologic Conditions of Concern	☒ Yes *Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal* ☐ No
Watershed–based BMP included in a RWQCB approved WAP	☐ Yes *Attach verification of regional BMP evaluation criteria in WAP* • *More Effective than On-site LID* • *Remaining Capacity for Project DCV* • *Upstream of any Water of the US* • *Operational at Project Completion* • *Long-Term Maintenance Plan* ☒ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	Prior to occupancy, contractor will provide educational materials to the owner.
N2	Activity Restrictions	☒	☐	Activity restrictions to minimize potential impacts to water quality will be prescribed by the Covenant, Conditions and Restrictions (CC&R's) or a similar effective measure. Activities that violate the ordinances in Chapter 13.54 if the City of Redlands Municipal Code will be restricted.
N3	Landscape Management BMPs	☒	☐	Maintenance activities for landscaped areas shall be consistent with City, County, and manufacturer guidelines for fertilizer and pesticide use.
N4	BMP Maintenance	☒	☐	Regular inspections and removal of debris, sediment buildup, and overgrown vegetation within the bioretention basins will be performed by on-site maintenance crews (Phase 1 and Ultimate-Condition basins). Regular inspection of the (Phase 2/Ultimate Condition) underground infiltration shall be performed in accordance with manufacturers' guidelines and may include the need for vactor-trucks over time to maintain infiltration rates.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Generated waste subject to Title 22 CCR is not anticipated.
N6	Local Water Quality Ordinances	☒	☐	
N7	Spill Contingency Plan	☒	☐	A spill contingency plan will be put into effect during construction. A post-construction spill plan will be developed consistent with Kaiser Permanente medical facilities and stored on-site.
N8	Underground Storage Tank Compliance	☒	☐	There is no underground storage associated with Phase 1. The Phase 2 BMP improvements reflect Ultimate conditions and include underground infiltration that will

Form 4.1-1 Non-Structural Source Control BMPs				
				be designed in accordance with State regulations as enforced but the County Environmental Health Services on behalf of the State.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Not anticipated.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	☒	☐	The proposed project will comply with Article 80 of the Uniform Fire Code
N11	Litter/Debris Control Program	☒	☐	Trash management and litter control procedures will be implemented on-site. Maintenance areas include all common areas, landscape, and BMPs.
N12	Employee Training	☒	☐	Maintenance crews will be trained on the proper use and staging of landscaping, BMPs, and other potential areas that might impact storm water runoff.
N13	Housekeeping of Loading Docks	☒	☐	The proposed loading dock (Phase 2 development) will be kept clean. Storm water runoff will be directed to on-site BMPs. Wash water will either be directed to the sanitary sewer with City approval or not allowed to discharge from the site.
N14	Catch Basin Inspection Program	☒	☐	The owner shall have at least 80% of drainage facilities inspected, cleaned, and maintained, annually. 100% of the facilities shall be included in a 2-year period.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	Parking and dock areas shall be swept regularly using a vacuum assisted sweeper. Frequency will depend on waste accumulations with a minimum of once annually prior to the start of the rainy season.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	The development is not part of a Public Agency Project.
N17	Comply with all other applicable NPDES permits	☒	☐	The project will comply with local, state, and federal requirements for storm water discharge during construction and post-construction. A SWPPP will be completed and processed through the State's SMARTS system.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☒	☐	All storm drain inlets will include stenciling illustrating an anti-dumping message.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	This project does not include the storage of materials outdoors.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	The project will incorporate lined dumpsters to reduce leaking of liquid waste. Trash storage areas shall be located away from storm drain inlets.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	Irrigation systems will be designed to each landscaped area's specific water need. Irrigation controls shall include rain-triggered shutoff devices to prevent irrigation after precipitation.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	Landscaped areas will be 1-2 inches below top of curb or walk.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	All slopes will be vegetated to provide erosion protection and sediment transport. Riprap will be installed at all concentrated flow discharges.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	Covered dock areas are not proposed as part of this development.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	Maintenance bays are not proposed as part of this development.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Vehicle wash areas are not proposed as part of this development.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	Outdoor processing areas is not associated with the proposed development.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Outdoor equipment is not associated with the proposed development.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	Fueling areas are not included as part of this development.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☒	☐	Hillside landscaping will be deep-rooted, drought tolerant plant species selected for erosion control.
S14	Wash water control for food preparation areas	☐	☒	The proposed development does not include food preparation areas.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	The proposed development does not include community car wash areas.

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Preventative LID Site Design Practices Checklist

Site Design Practices *If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*
Minimize impervious areas: Yes ☒ No ☐ Explanation: Bioretention basins are proposed throughout the site as opposed to only using underground storage with paved surfaces above.
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: BMPs have been designed to retain the full DCV for each Phase of development. BMPs implemented during Phase 2 have been designed for the Ultimate Condition (Phase 4).
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: Project runoff will continue to drain to the existing storm drain systems within Almond Avenue (north of the site) and Lugonia Avenue (south of the site).
Disconnect impervious areas: Yes ☒ No ☐ Explanation: All runoff will drain to pervious are (either bioretention basins or underground infiltration) prior to discharge from the site.
Protect existing vegetation and sensitive areas: Yes ☒ No ☐ Explanation: Phase 1 will protect the existing triangular detention basin located in the NW corner of the site.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: Each Phase of work will ensure non-paved areas have re=-established vegetation or stabilized ground cover.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: Compaction will be limited with the proposed BMP areas to the maximum extent. Drywells will be considered during Final Engineering to supplement infiltration within the proposed BMPs.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☒ No ☐ Explanation: Swales have been used to the maximum extent practicable for each of the four (4) phases.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: Areas will be staked off to the maximum extent practicable for each of the four (4) phases.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P_6 method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi^2), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

The proposed BMPs will retain the DCV during each phase of construction.

Under Phase 1 Conditions, bioretention without underdrain basins BMP 1-A, 1-B, 1-E, and 2-D have been designed to retain the full DCV.

Phase 2 Conditions represent the Ultimate Condition from a BMP perspective. The full DCV is retained during Phas2 2 Conditions via BMPs 1-B and 2-D constructed as part of Phase 1, a new bioretention without underdrain BMP 1-C constructed as part of Phase 2; and a new underground infiltration BMP 1-A2 constructed as part of Phase 2.

A drainage study has been prepared under separate cover. The San Bernardino module within Advanced Engineering Software (AES 2016) has been used to determine peak flow under existing and proposed conditions using the 2-year, 1-hour point rainfall obtained from NOAA Atlas 14.

Form 4.2-1a LID BMP Performance Criteria for Design Capture Volume (DA 1 Phase 1)

1 Project area DA 1 (ft^2): 1,353,410	**2** Imperviousness after applying preventative site design practices (Imp%): 67	**3** Runoff Coefficient (Rc): 0.50 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.48 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 0.71 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 79,041 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-1b LID BMP Performance Criteria for Design Capture Volume (DA 2 Phase 1)

1 Project area DA 1 (ft^2): 117,176	**2** Imperviousness after applying preventative site design practices (Imp%): 85	**3** Runoff Coefficient (Rc): 0.66 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.48 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 0.71 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 8,990 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-1c LID BMP Performance Criteria for Design Capture Volume (DA 1 Phase 2/Ultimate)

1 Project area DA 1 (ft^2): 1,584,894	**2** Imperviousness after applying preventative site design practices (Imp%): 85	**3** Runoff Coefficient (Rc): 0.66 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*

4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.48 http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

5 Compute P_6, Mean 6-hr Precipitation (inches): 0.71

*P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*

6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*	24-hrs ☐ 48-hrs ☒

7 Compute design capture volume, DCV (ft^3): 109,935

*DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)*
Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2

Form 4.2-1d LID BMP Performance Criteria for Design Capture Volume (DA 2 Phase 2/Ultimate)

1 Project area DA 1 (ft^2): 152,000	**2** Imperviousness after applying preventative site design practices (Imp%): 85	**3** Runoff Coefficient (Rc): 0.66 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*

4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.48 http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

5 Compute P_6, Mean 6-hr Precipitation (inches): 0.71

*P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*

6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*	24-hrs ☐ 48-hrs ☒

7 Compute design capture volume, DCV (ft^3): 11,662

*DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)*
Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2

Form 4.2-2a Summary of HCOC Assessment (DA 1 Phase 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☒ No ☐

Go to: *http://permitrack.sbcounty.gov/wap/*

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below

(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 1,198 *Form 4.2-3 Item 12*	**2** 17.8 *Form 4.2-4 Item 13*	**3** 12.8 *Form 4.2-5 Item 10*
Post-developed	**4** 50,551 *Form 4.2-3 Item 13*	**5** 15.9 (un-mitigated) *Form 4.2-4 Item 14*	**6** 24.3 (un-mitigated) *Form 4.2-5 Item 14*
Difference	**7** *49,376* *Item 4 – Item 1*	**8** *1.9* *Item 2 – Item 5*	**9** *11.5* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *4,122%* *Item 7 / Item 1*	**11** *11.9%* *Item 8 / Item 2*	**12** *89.8%* *Item 9 / Item 3*

Form 4.2-2b Summary of HCOC Assessment (DA 2 Phase 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☒ No ☐

Go to: *http://permitrack.sbcounty.gov/wap/*

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below

(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 469 *Form 4.2-3 Item 12*	**2** 19.1 *Form 4.2-4 Item 13*	**3** 1.5 *Form 4.2-5 Item 10*
Post-developed	**4** 10,040 *Form 4.2-3 Item 13*	**5** 7.4 (un-mitigated) *Form 4.2-4 Item 14*	**6** 4.4 (un-mitigated) *Form 4.2-5 Item 14*
Difference	**7** *9,571* *Item 4 – Item 1*	**8** *12.3* *Item 2 – Item 5*	**9** *2.9* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *2,041%* *Item 7 / Item 1*	**11** *64.4%* *Item 8 / Item 2*	**12** *193.3%* *Item 9 / Item 3*

Form 4.2-2c Summary of HCOC Assessment (DA 1 Phase 2/Ultimate)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☒ No ☐

Go to: *http://permitrack.sbcounty.gov/wap/*

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below

(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 4,567 *Form 4.2-3 Item 12*	**2** 17.8 *Form 4.2-4 Item 13*	**3** 12.8 *Form 4.2-5 Item 10*
Post-developed	**4** 122,776 *Form 4.2-3 Item 13*	**5** 11.9 (un-mitigated) *Form 4.2-4 Item 14*	**6** 28.4 (un-mitigated) *Form 4.2-5 Item 14*
Difference	**7** *118,209* *Item 4 – Item 1*	**8** *5.9* *Item 2 – Item 5*	**9** *15.6* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *2,588%* *Item 7 / Item 1*	**11** *33.1%* *Item 8 / Item 2*	**12** *121.9%* *Item 9 / Item 3*

Form 4.2-2d Summary of HCOC Assessment (DA 2 Phase 2/Ultimate)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☒ No ☐

Go to: *http://permitrack.sbcounty.gov/wap/*

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below

(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 609 *Form 4.2-3 Item 12*	**2** 19.1 *Form 4.2-4 Item 13*	**3** 1.5 *Form 4.2-5 Item 10*
Post-developed	**4** 13,024 *Form 4.2-3 Item 13*	**5** 7.3 (un-mitigated) *Form 4.2-4 Item 14*	**6** 5.8 (un-mitigated) *Form 4.2-5 Item 14*
Difference	**7** *12,415* *Item 4 – Item 1*	**8** *11.8* *Item 2 – Item 5*	**9** *4.3* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *2,039%* *Item 7 / Item 1*	**11** *61.8%* *Item 8 / Item 2*	**12** *286.7%* *Item 9 / Item 3*

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2). **Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment**.

Form 4.3-1 Infiltration BMP Feasibility (Entire Site, all Phases)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

[1] Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒
Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

[2] Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒
(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

[3] Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[4] Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[5] Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[6] Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒
See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

[7] Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒
If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.

[8] Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒
If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP.
If no, then proceed to Item 9, below.

[9] All answers to Item 1 through Item 6 are "No":
Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

Site Design and Source Control BMPs will be implemented during Final Engineering. As a conservative approach during entitlements, they have not been used to reduce the DCV used for design of Treatment Control BMPs and Volume Reduction.

Form 4.3-2a Site Design Hydrologic Source Control BMPs (DA 1 Phase 1)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3):		$V_{retention}$ *=Sum of Item 4 for all BMPs*	
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			

13 Runoff volume retention from on-lot infiltration (ft^3): 0 $V_{retention}$ =*Sum of Item 12 for all BMPs*

Form 4.3-2a cont. Site Design Hydrologic Source Control BMPs (DA 1 Phase 1)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) $V_{retention}$ = *Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): $V_{retention}$ =*Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) $V_{retention}$ = *Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): $V_{retention}$ = *Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes ☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) $V_{retention}$ = *Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): $V_{retention}$ =*Sum of Item 28 for all BMPs*			

30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *Sum of Items 5, 13, 20, 25 and 29*

Form 4.3-2b Site Design Hydrologic Source Control BMPs (DA 2 Phase 1)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3):		$V_{retention}$ *=Sum of Item 4 for all BMPs*	
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3): 0		$V_{retention}$ *=Sum of Item 12 for all BMPs*	

Form 4.3-2b cont. Site Design Hydrologic Source Control BMPs (DA 2 Phase 1)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒	DA DMA BMP Type	DA DMA BMP Type	DA DMA

If yes, complete Items 15-20. If no, proceed to Item 21			BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) $V_{retention}$ *= Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): $V_{retention}$ *=Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) $V_{retention}$ *= Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): $V_{retention}$ *= Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) $V_{retention}$ *= Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): $V_{retention}$ *=Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *Sum of Items 5, 13, 20, 25 and 29*			

Form 4.3-2c Site Design Hydrologic Source Control BMPs (DA 1 Phase 2/Ultimate Condition)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3): *$V_{retention}$ =Sum of Item 4 for all BMPs*			
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) *$V_{retention}$ = (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3): 0 *$V_{retention}$ =Sum of Item 12 for all BMPs*			

Form 4.3-2c cont. Site Design Hydrologic Source Control BMPs (DA 1 Phase 2/Ultimate Condition)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			

16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) *$V_{retention}$ = Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): *$V_{retention}$ =Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) *$V_{retention}$ = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): *$V_{retention}$ = Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) *$V_{retention}$ = Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): *$V_{retention}$ =Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *Sum of Items 5, 13, 20, 25 and 29*			

Form 4.3-2d Site Design Hydrologic Source Control BMPs (DA 2 Phase 2/Ultimate Condition)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3): *$V_{retention}$ =Sum of Item 4 for all BMPs*			
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) *$V_{retention}$ = (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3): 0 *$V_{retention}$ =Sum of Item 12 for all BMPs*			

Form 4.3-2d cont. Site Design Hydrologic Source Control BMPs (DA 2 Phase 2/Ultimate Condition)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			

16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) *$V_{retention}$ = Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): *$V_{retention}$ =Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) *$V_{retention}$ = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): *$V_{retention}$ = Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) *$V_{retention}$ = Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): *$V_{retention}$ =Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *Sum of Items 5, 13, 20, 25 and 29*			

4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

Form 4.3-3a Infiltration LID BMP - including underground BMPs (DA 1 Phase 1)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 77,194 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30*			
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 DMA A1 BMP Type Bioretention without underdrain	DA 1 DMA B BMP Type Bioretention without underdrain	DA 1 DMA E BMP Type Bioretention without underdrain
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	TBD	TBD	TBD
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2	2	2
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	0.5	0.5	0.5
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48	48	48
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	1	1	1
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	1	1	1
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	22,232	4,200	14,000
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	2	2	2

10 Amended soil porosity	0.4	0.4	0.4
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	1	1	1
12 Gravel porosity	0.4	0.4	0.4
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3	3	3
14 Above Ground Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	51,386	9,765	32,550
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	N/A	N/A	N/A
16 Total Retention Volume from LID Infiltration BMPs: 94,004 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: 100% *Retention% = Item 16 / Form 4.2-1 Item 7*			
18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.*			

Form 4.3-3b Infiltration LID BMP - including underground BMPs (DA 2 Phase 1)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 8,990 V_{unmet} *= Form 4.2-1 Item 7 - Form 4.3-2 Item 30*

BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 2 DMA A2 BMP Type Underground Infiltration	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	TBD		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2		
4 Design percolation rate (in/hr) P_{design} *= Item 2 / Item 3*	0.5		
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48		
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	2		

7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	2		
8 Infiltrating surface area, *SA_{BMP}* (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	6,035		
9 Amended soil depth, *d_{media}* (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	2		
10 Amended soil porosity	0.4		
11 Gravel depth, *d_{media}* (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	1		
12 Gravel porosity	0.4		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3		
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	14,031		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	N/A		
16 Total Retention Volume from LID Infiltration BMPs: 14,031 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: 100% *Retention% = Item 16 / Form 4.2-1 Item 7*			
18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.*			

Form 4.3-3c Infiltration LID BMP - including underground BMPs (DA 1 Phase 2/Ultimate Condition)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 109,935 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30*			
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 DMA A1 BMP Type Underground Infiltration	DA 1 DMA B BMP Type Bioretention without underdrain	DA 1 DMA C BMP Type Bioretention without underdrain
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	TBD	TBD	TBD
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2	2	2
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	0.5	0.5	0.5
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48	48	48
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	2	1	1
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	2	1	1
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	44,500	4,200	4,000
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	N/A	2	2
10 Amended soil porosity	N/A	0.4	0.4
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	1	1	1
12 Gravel porosity	0.4	0.4	0.4
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3	3	3
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	N/A	9,765	9,300
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	94,563	N/A	N/A
16 Total Retention Volume from LID Infiltration BMPs: 111,503 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: 100% *Retention% = Item 16 / Form 4.2-1 Item 7*			

18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐

If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.

Form 4.3-3d Infiltration LID BMP - including underground BMPs (DA 2 Phase 2/Ultimate Condition)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 11,662 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30*

BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 2 DMA A2 BMP Type Underground Infiltration	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	TBD		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2		
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	0.5		
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48		
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	1		
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	1		
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	6,035		
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	2		
10 Amended soil porosity	0.4		
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	1		
12 Gravel porosity	0.4		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3		
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	14,031		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	N/A		

16 Total Retention Volume from LID Infiltration BMPs: 14,031 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*
17 Fraction of DCV achieved with infiltration BMP: 100% *Retention% = Item 16 / Form 4.2-1 Item 7*
18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.*

4.3.3 Harvest and Use BMP

The full DCV is retained on-site. Per Section 5.5 WQMP Conformance Analysis, if the DCV can be retained/or treated and released with BMPs designed in accordance with the mythologies described in Section 5.4, no additional BMPs are required to achieve water quality treatment.

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs has been intentionally omitted.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

4.3.4 Biotreatment BMP

The full DCV is retained on-site. Per Section 5.5 WQMP Conformance Analysis, if the DCV can be retained/or treated and released with BMPs designed in accordance with the mythologies described in Section 5.4, no additional BMPs are required to achieve water quality treatment.

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations has been intentionally omitted.

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9a Conformance Summary and Alternative Compliance Volume Estimate (DA 1 Phase 1)

1 Total LID DCV for the Project DA-1 (ft^3): 77,194 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 88,950 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 94,004 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☒ No ☐
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☒ No ☐
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

Form 4.3-9b Conformance Summary and Alternative Compliance Volume Estimate (DA 2 Phase 1)

1 Total LID DCV for the Project DA-1 (ft^3): 8,990 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 13,277 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 14,031 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☒ No ☐
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☒ No ☐
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

Form 4.3-9c Conformance Summary and Alternative Compliance Volume Estimate (DA 1 Phase 2/Ultimate)

1 Total LID DCV for the Project DA-1 (ft^3): 109,935 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 120,040 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 113,628 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☒ No ☐
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☒ No ☐
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  *Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} = (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

Form 4.3-9d Conformance Summary and Alternative Compliance Volume Estimate (DA 2 Phase 2/Ultimate)

1 Total LID DCV for the Project DA-1 (ft^3): 11,662 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 13,277 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 14,031 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☒ No ☐
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☒ No ☐
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

4.3.6 Hydromodification Control BMP

The full DCV is retained on-site. Per Section 5.5 WQMP Conformance Analysis, if the DCV can be retained/or treated and released with BMPs designed in accordance with the mythologies described in Section 5.4, no additional BMPs are required to achieve water quality treatment.

Form 4.3-10 has been intentionally omitted.

4.4 Alternative Compliance Plan (if applicable)

Not applicable.

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1a BMP Inspection and Maintenance (Phase 1)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
BMP 1-A1	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum
BMP 1-B	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum
BMP 1-E	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum
BMP 2-A2	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum

Form 5-1b BMP Inspection and Maintenance (Phase 2/ Ultimate)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
BMP 1-A1	Owner	Inspect all inlets to ensure debris is not conveyed to underground infiltration. Check for standing runoff within underground storage after large storm events to ensure infiltration is functioning. System may require pumping and proper disposal of accumulated debris and sediment if not maintained properly; and may require full replacement if infiltration is completely cut off due to accumulate fines. Good Housing Keeping measures throughout the site will help prolong a functioning infiltration system.	At the completion of each runoff producing rainfall event.
BMP 1-B	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum
BMP 1-C	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum
BMP 2-A2	Owner	Remove trash, debris, over-grown vegetation, and accumulated sediment.	1/Month Minimum

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

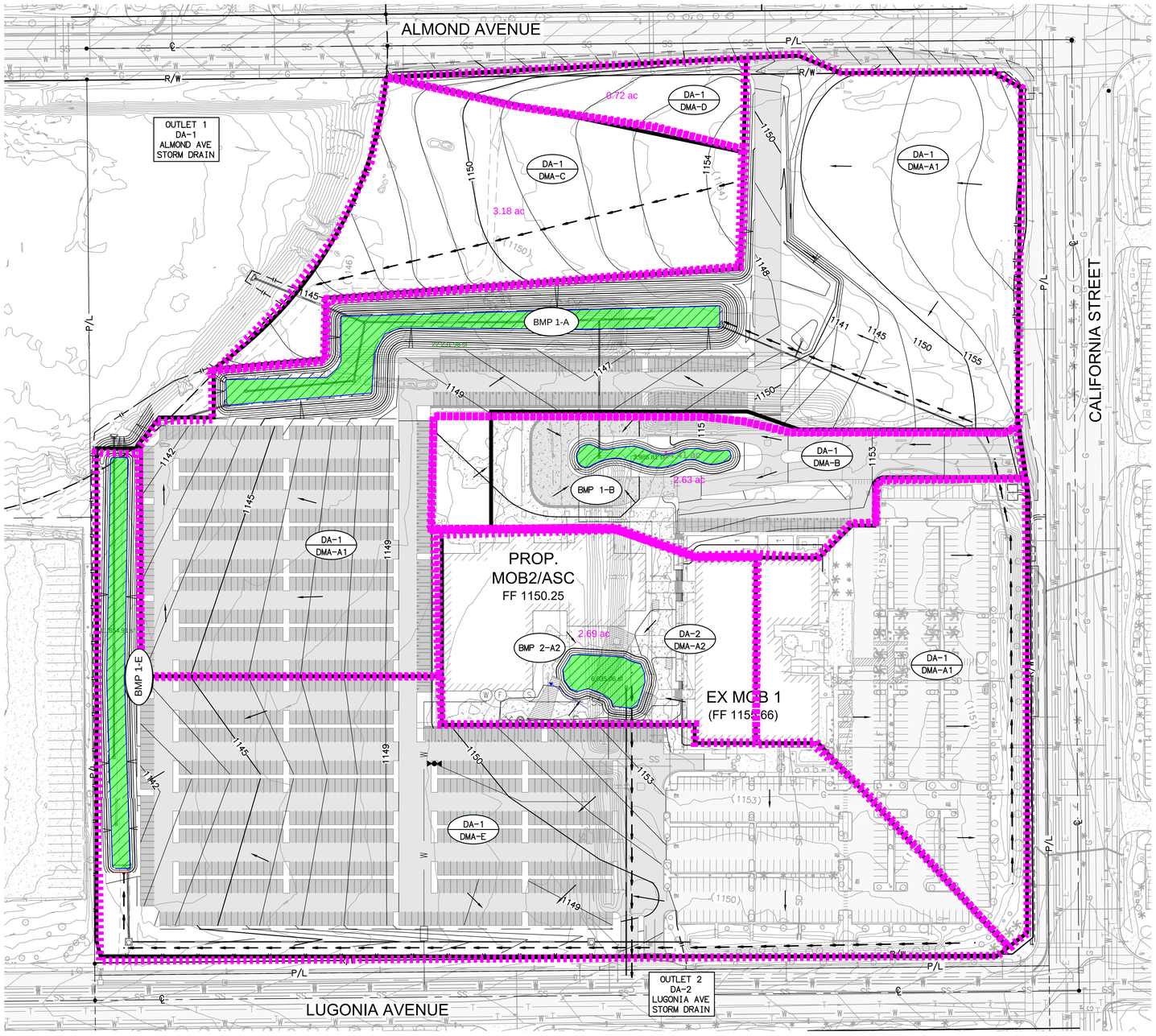
6.4 Other Supporting Documentation

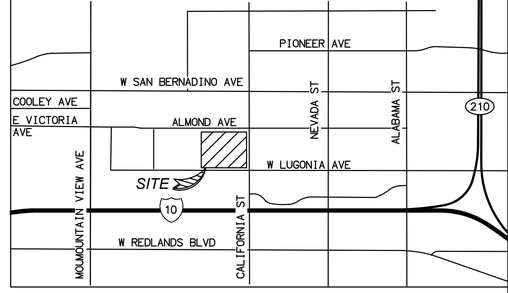
- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements

Appendix A

Vicinity Map and WQMP Exhibit

PHASE 1
BMP Plan



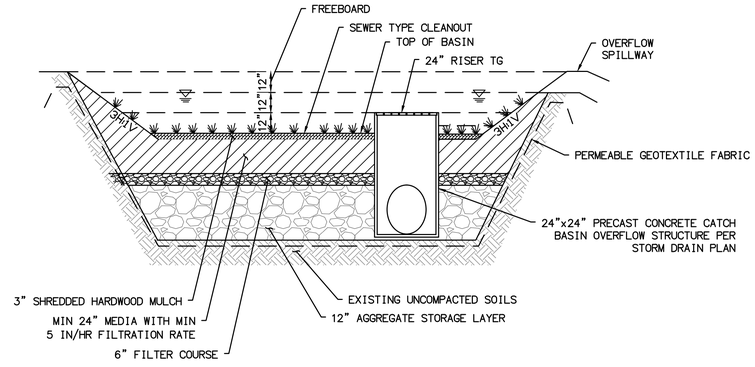


VICINITY MAP

N.T.S.

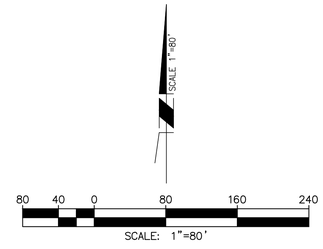
LEGEND

- STORM WATER BASIN
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE



DA	DMA	TOTAL AREA (SF)	IMPERVIOUS RATIO	DMA RUNOFF FACTOR	DESIGN CAPTURE VOLUME (CF)	BMP PROPOSED SURFACE AREA (SF)	VOLUME RETAINED BY BMP (CF)	BMP TYPE
1	A1	627,670	70%	0.49	35,967	22,232	51,689	BIORETENTION WITH NO UNDERDRAIN
1	B	114,563	85%	0.66	8,790	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	138,521	0%	0.04	643	N/A	N/A	SELF TREATING (NO EXISTING OR PROPOSED IMPERVIOUS AREA)
1	D	31,363	0%	0.04	146	N/A	N/A	SELF TREATING (NO EXISTING OR PROPOSED IMPERVIOUS AREA)
1	E	412,513	85%	0.66	31,649	14,000	32,550	BIORETENTION WITH NO UNDERDRAIN
2	A2	117,176	85%	0.66	8,990	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

SITE PHASING - 1
BMP PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C2.03**

CITY OF REDLANDS

Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333

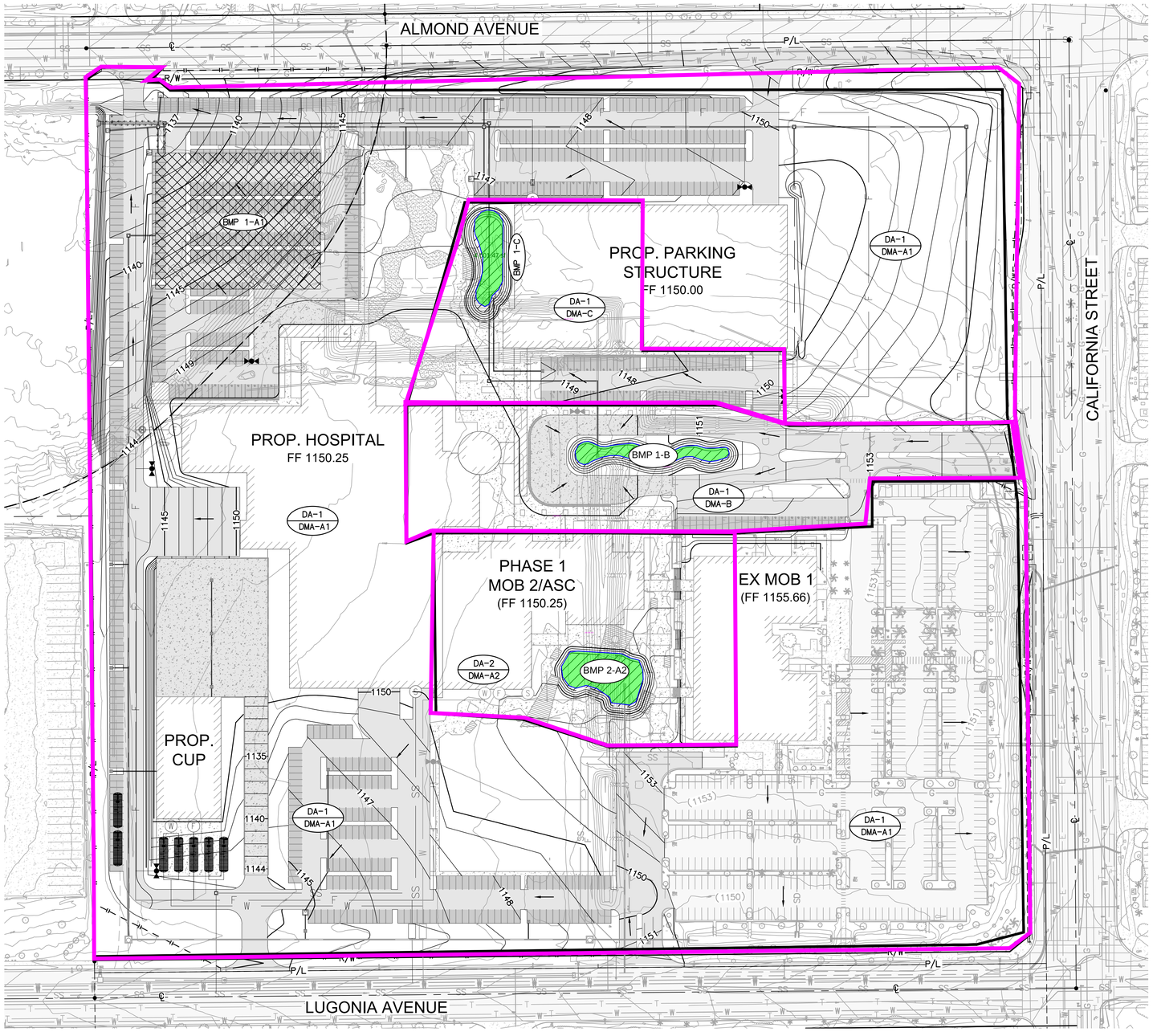
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188

ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects

ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect) PHONE: 323.525.0500 (Architect)

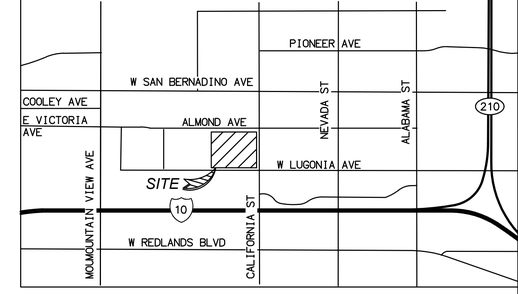
TYPE OF DEVELOPMENT: XXXXX LOCATION: 1301 California Street, Redlands, CA 92374

ZONE: CR ZONE ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



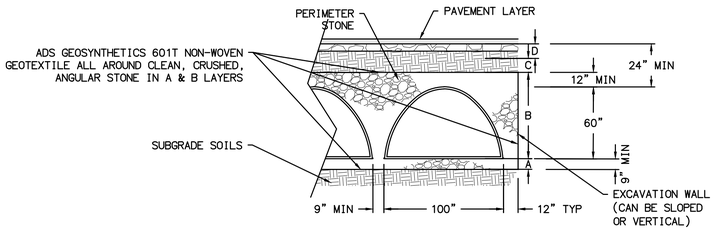
LEGEND

- STORM WATER BASIN
- UNDERGROUND INFILTRATION CHAMBERS
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



VICINITY MAP

N.T.S.



NOTES:

1. SECTION A - FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER
2. SECTION B - EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.
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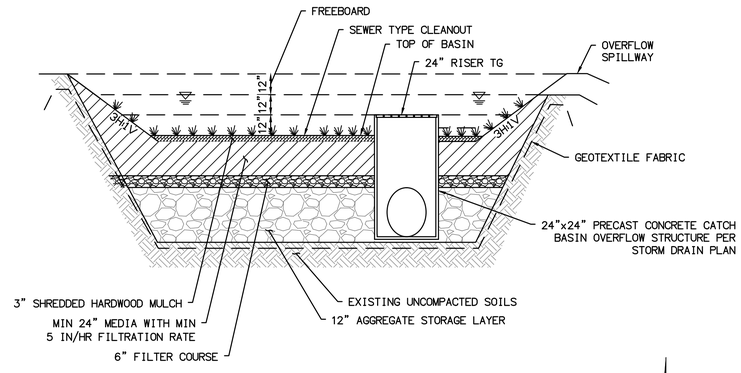
TYPICAL UNDERGROUND ADS STORMWATER CHAMBER INFILTRATION DETAIL

SCALE: NOT TO SCALE



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE

DA	DMA	TOTAL AREA (SF)	IMPERVIOUS RATIO	DMA RUNOFF FACTOR	DESIGN CAPTURE VOLUME (CF)	BMP PROPOSED SURFACE AREA (SF)	VOLUME RETAINED BY BMP (CF)	BMP TYPE
1	A1	1,197,394	85%	0.66	91,866	43,500	92,438	UNDERGROUND INFILTRATION (SIZED FOR ULTIMATE PHASE 4)
1	B	126,200	85%	0.66	9,682	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	109,300	85%	0.66	8,386	4,000	9,300	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
2	A2	152,000	85%	0.66	11,662	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

PHASE 2
BMP Plan

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 2
BMP PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

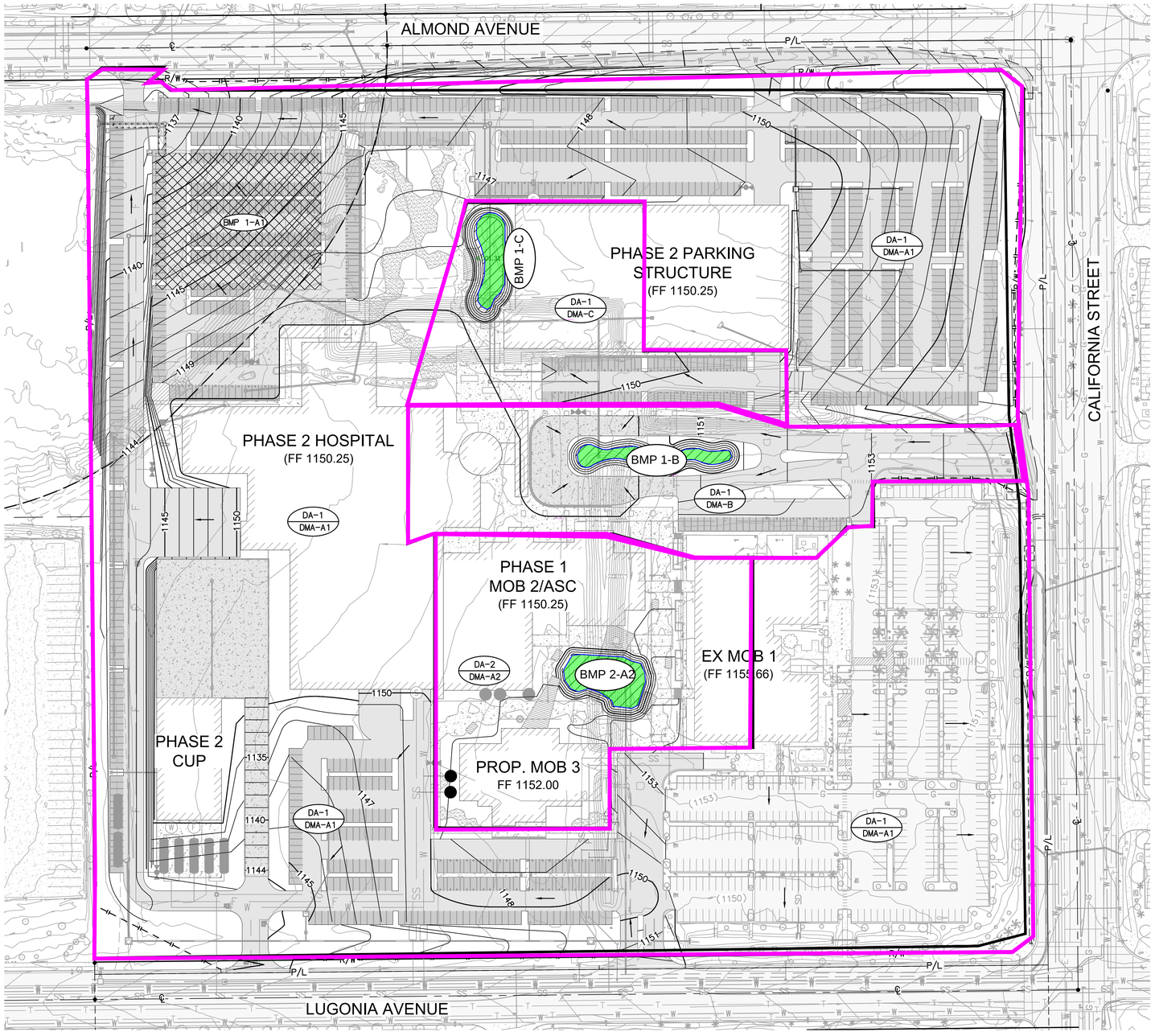
REDLANDS MEDICAL CENTER

Sheet: **C3.03**

CITY OF REDLANDS

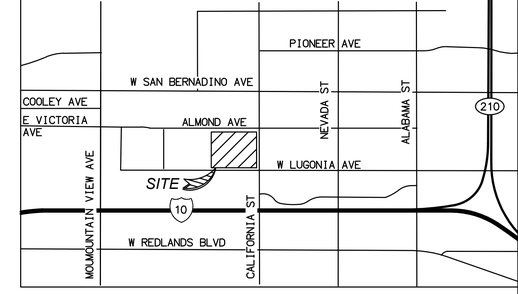
Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Int., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
TYPE OF DEVELOPMENT: XXXXX
ZONE: CR ZONE
LOCATION: 1301 California Street, Redlands, CA 92374
ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



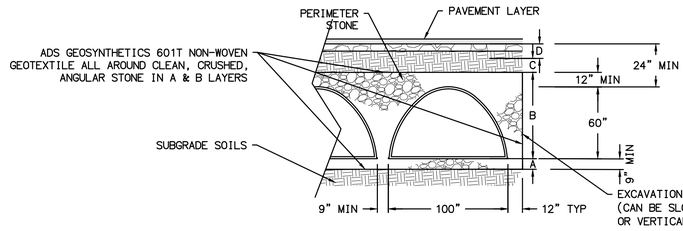
LEGEND

- STORM WATER BASIN
- UNDERGROUND INFILTRATION CHAMBERS
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



VICINITY MAP

N.T.S.



NOTES:

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TYPICAL UNDERGROUND ADS STORMWATER CHAMBER INFILTRATION DETAIL

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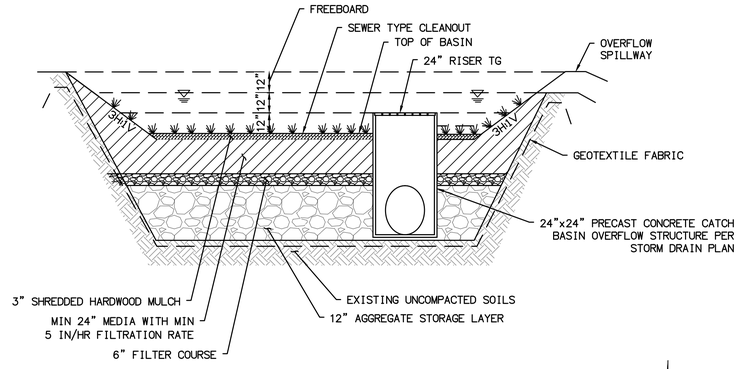

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1	B	126,200	85%	0.66	9,682	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	109,300	85%	0.66	8,386	4,000	9,300	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
2	A2	152,000	85%	0.66	11,662	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

PHASE 3
BMP Plan

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 3
BMP PLAN

SEPTEMBER 09, 2022

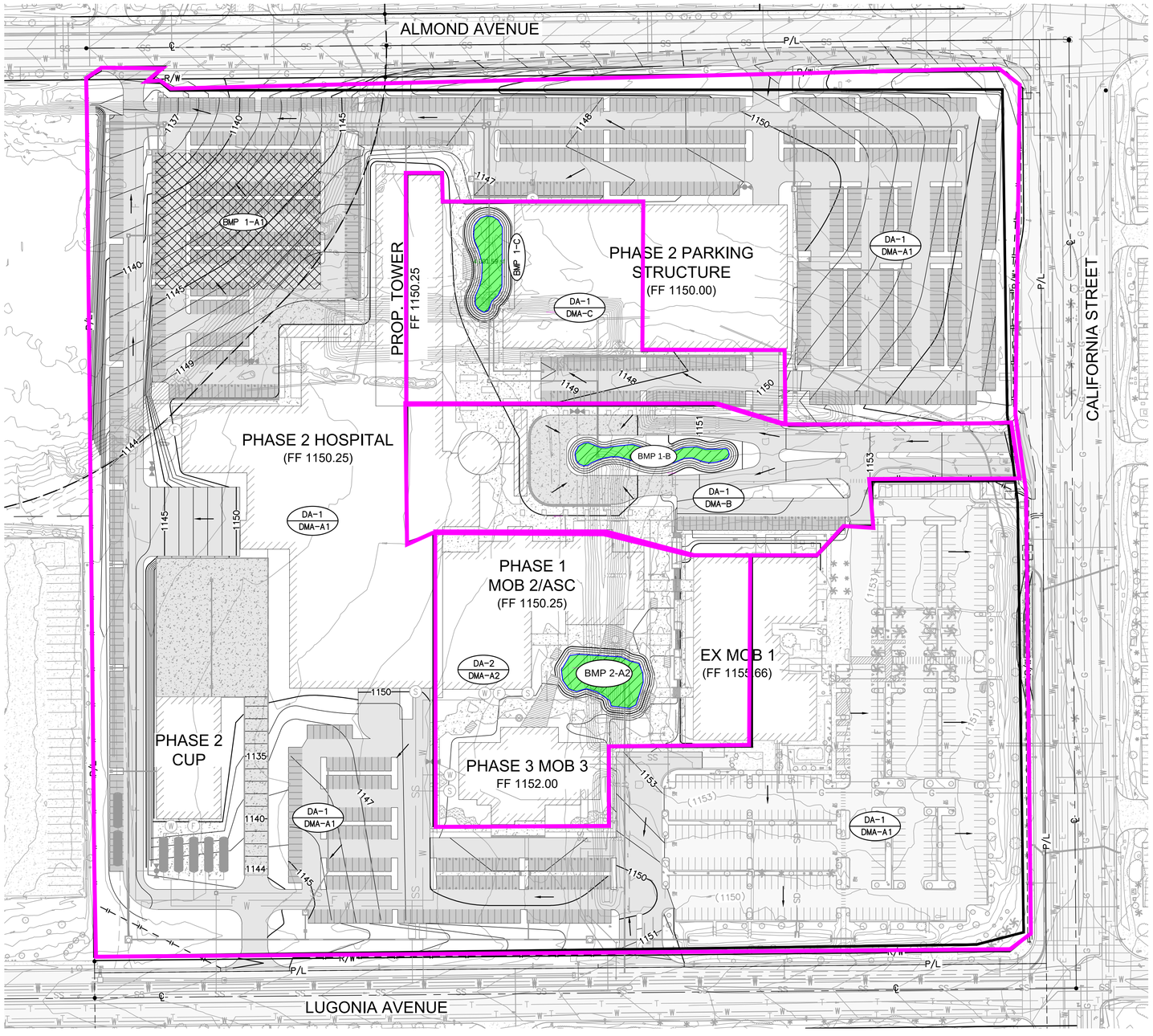
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C4.03**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



LEGEND

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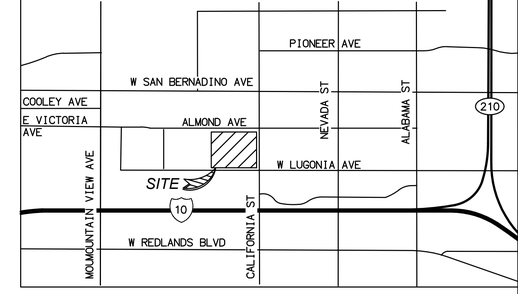
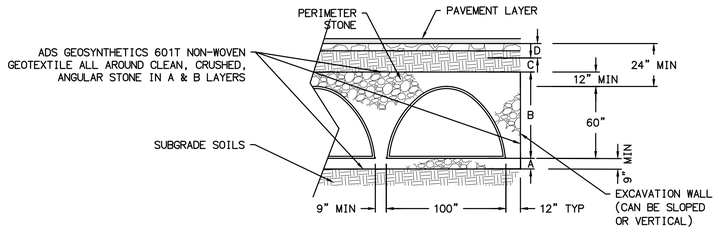
- UNDERGROUND INFILTRATION CHAMBERS
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



VICINITY MAP

N.T.S.



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TYPICAL UNDERGROUND ADS STORMWATER CHAMBER INFILTRATION DETAIL

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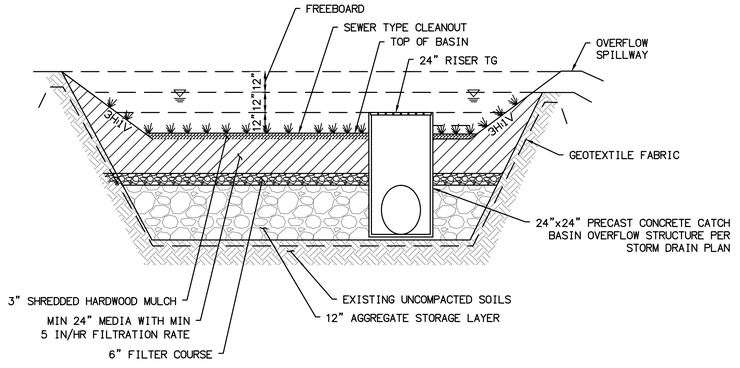

TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE

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PHASE 4
BMP Plan

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 4
BMP PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C5.03**

CITY OF REDLANDS

Site Development Plan Number:

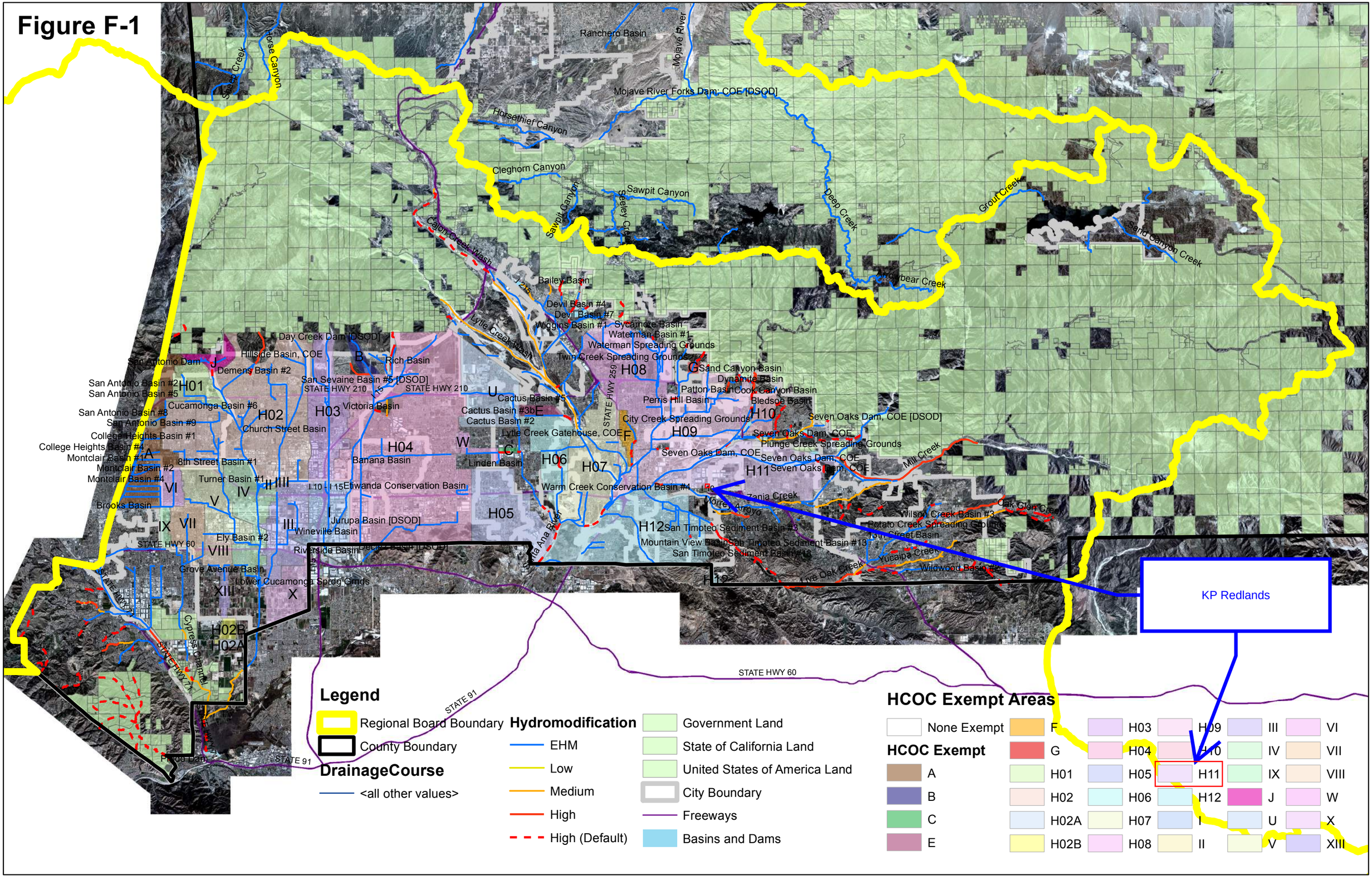
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188

ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)

TYPE OF DEVELOPMENT: XXXXX
ZONE: CR ZONE

LOCATION: 1301 California Street, Redlands, CA 92374
ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000

Figure F-1



Legend

- Regional Board Boundary
- County Boundary

DrainageCourse

- <all other values>

Hydromodification

- EHM
- Low
- Medium
- High
- High (Default)

- Government Land
- State of California Land
- United States of America Land
- City Boundary
- Freeways
- Basins and Dams

HCOC Exempt Areas

- None Exempt

HCOC Exempt

- A
- B
- C
- E
- F
- G
- H01
- H02
- H02A
- H02B
- H03
- H04
- H05
- H06
- H07
- H08
- H09
- H10
- H11
- H12
- I
- II
- III
- IV
- V
- VI
- VII
- VIII
- IX
- J
- U
- W
- X
- XIII

Hydromodification

A.1 Hydrologic Conditions of Concern (HCOC) Analysis

HCOC Exemption:

1. **Sump Condition:** All downstream conveyance channel to an adequate sump (for example, Prado Dam, Santa Ana River, or other Lake, Reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

2. **Pre = Post**: The runoff flow rate, volume and velocity for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e, naturally occurring condition for the 2-year, 24-hour rainfall event utilizing latest San Bernardino County Hydrology Manual.

    a. Submit a substantiated hydrologic analysis to justify your request.

3. **Diversion to Storage Area**: The drainage areas that divert to water storage areas which are considered as control/release point and utilized for water conservation.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

4. **Less than One Acre**: The Priority Development Project disturbs less than one acre. The Co-permittee has the discretion to require a Project Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The project disturbs less than one acre and is not part of a common plan of development.

5. **Built Out Area**: The contributing watershed area to which the project discharges has a developed area percentage greater than 90 percent.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

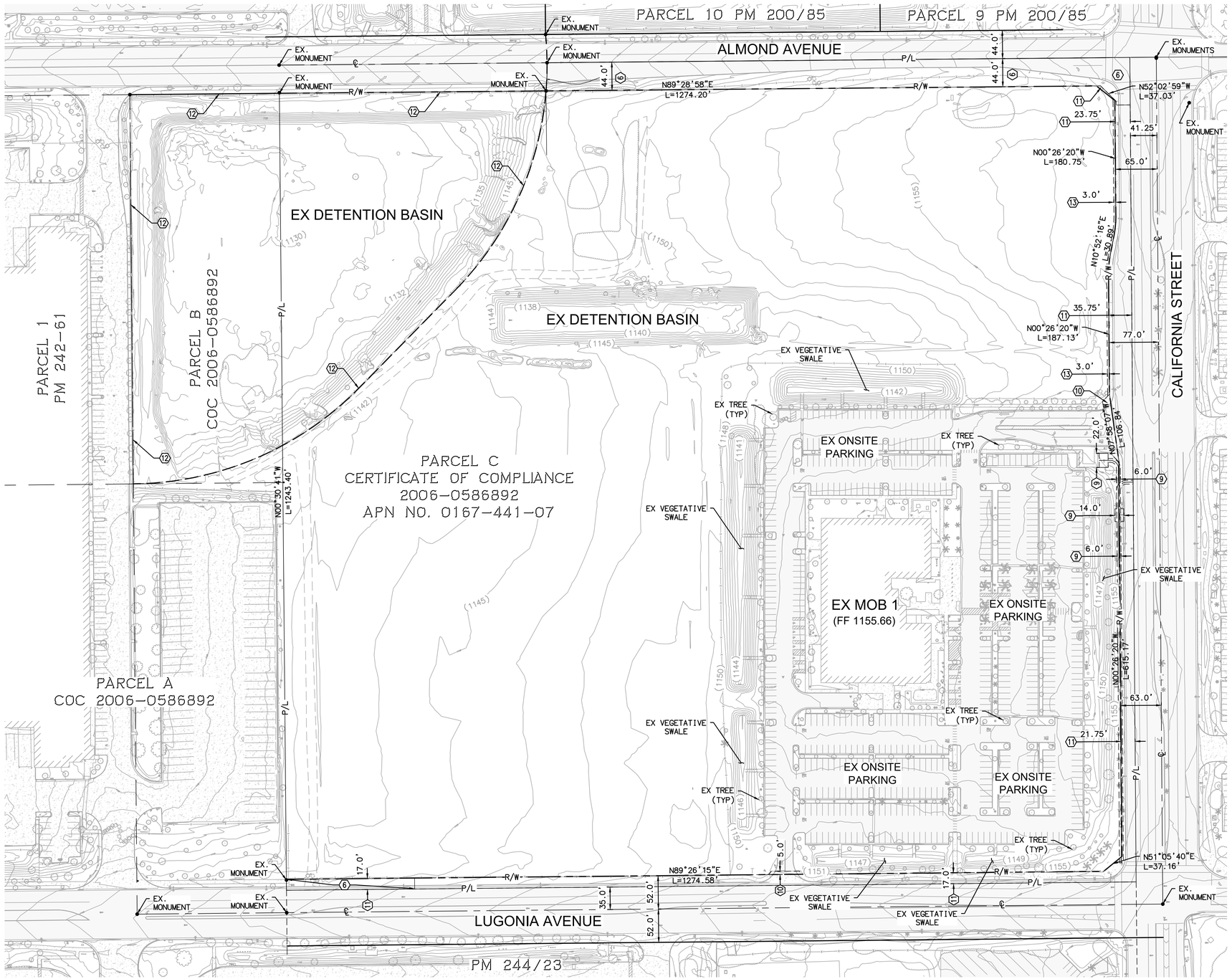
Summary of HCOC Exempted Area

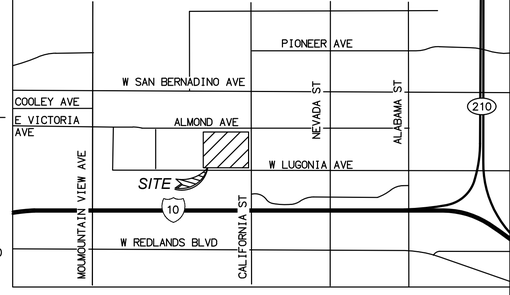
	HCOC Exemption reasoning				
	1	2	3	4	5
Area					
A			X		X
B			X		
C					X
E			X		
F					X
G			X		X
H01	X		X		
H02	X		X		
H02A	X		X		
H02B			X		
H03			X		
H04	X		X		
H05	X				
H06			X		
H07	X				
H08	X		X		
H09	X				
H10	X		X		
H11	X		X		
H12	X				
J			X		
U			X		
W			X		
I			X		
II			X		
III					X
IV			X		X
V			X*		
VI					X
VII					X
VIII			X		
IX					X
X			X		
XIII			X		

*Detention/Conservation Basin

Appendix B

Entitlement Plans





VICINITY MAP

N.T.S.

OWNER/DEVELOPER

KAISER PERMANENTE
393 E. WALNUT STREET, 4TH FLOOR
PASADENA, CA 91188
CONTACT PERSON: SKYLER DENNISTON
PHONE NO. (626) 405-6333

CIVIL ENGINEER

MICHAEL BAKER INTERNATIONAL
9755 CLAIREMONT MESA BOULEVARD, SUITE 100
SAN DIEGO, CA 92124
PHONE NO. (858) 614-5000

ARCHITECT

CO ARCHITECTS
5055 WILSHIRE BOULEVARD, 9TH FLOOR
LOS ANGELES, CA 90036
PHONE NO. (323) 525-0500

SITE ADDRESS

1301 CALIFORNIA STREET
REDLANDS, CA 92374

FEMA ZONE

ZONE X, MINIMAL FLOOD HAZARD

EXISTING UTILITY NOTE

EXISTING UTILITIES HAVE BEEN SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL LOCATE AND MARK OUT ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONTACT THE ENGINEER IF ANY UTILITIES ARE LOCATED THAT ARE NOT IDENTIFIED ON THESE PLANS.

STORM WATER NOTE

A STORMWATER POLLUTION PREVENTION PLAN (SWPPP), WHICH INCLUDES BEST MANAGEMENT PRACTICES TO REDUCE POLLUTANTS REACHING DOWNSTREAM WATER BODIES, WILL BE PREPARED PRIOR TO ISSUANCE OF GRADING PERMIT AND A NOTICE OF INTENT SUBMITTED TO THE STATE REGIONAL WATER QUALITY CONTROL BOARD.

EARTHWORK

PHASE 1
CUT: 33,000 CY
FILL: 33,000 CY
NET:: 0 CY

PHASE 2
CUT: 79,000 CY
FILL: 105,000 CY
NET: 26,000 CY

PHASE 3
CUT: 79,000 CY
FILL: 105,000 CY
NET: 26,000 CY

PHASE 4
CUT: 79,000 CY
FILL: 105,000 CY
NET: 26,000 CY

DISTURBED AREA

GROSS DISTURBED AREA: 29.5 ACRES

LEGEND

STREET CENTERLINE
EASEMENT LINE
RIGHT OF WAY/PROPERTY LINE
PARCEL LINE

TOPOGRAPHY SOURCE

AEROTECH MAPPING, INC.
200 SPECTRUM CENTER DRIVE, SUITE 300
IRVINE, CA 92618
PHONE NO. (619) 606-5020
TOPO SOURCE: AERIAL TOPO
TOPO SOURCE DATE: 2022-07-13

BENCHMARK

THE BASIS OF ELEVATIONS FOR THIS SURVEY IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) PER NATIONAL GEODETIC SURVEY (NGS) DESIGNATION U1418. LOCATED APPROXIMATELY 196 FEET WEST OF THE CL INT OF CHURCH ST & E PENNSYLVANIA AVE, NORTH SIDE OF E PENNSYLVANIA BETWEEEN SIDEWALK AND CURB ELEVATION: 1404.80

BASIS OF COORDINATES & BEARINGS

THE BASIS OF BEARINGS IS THE CALIFORNIA COORDINATE SYSTEM OF 1983, CCS83, ZONE 5, (CSRS EPOCH 2017.5) BASED LOCALLY UPON FIELD-OBSERVED TIES TO THE FOLLOWING CONTINUOUS OPERATING REFERENCE STATIONS (CORS) AS PUBLISHED BY SCRIPPS ORBIT & PERMANENT ARRAY CENTER (SOPAC).

STATION	NORTHING (ft.)	GRID EASTING (ft.) GRID
P612	1891277.943	6768672.068
MSOB	1907327.945	6800419.744

DISTANCES SHOWN HEREON ARE GROUND AND IN TERMS OF THE U.S. SURVEY FOOT. CONTROL POINT 1: GRID DISTANCE = GROUND DISTANCE X COMBINED SCALE FACTOR (0.9999428)

THE BASIS OF BEARINGS IS THE CALCULATED BEARING BETWEEN SAID CONTROL STATIONS P612 & MSOB I.E. N63°10'52"E

LEGAL DESCRIPTION

REAL PROPERTY IN THE CITY OF REDLANDS, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THOSE PORTIONS OF PARCEL 26 OF PARCEL MAP NO. 15911, IN THE CITY OF REDLANDS, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP FILED IN BOOK 200, PAGES 85 TO 92, INCLUSIVE OF PARCEL MAPS, AND PARCEL "C" OF CERTIFICATE OF COMPLIANCE RECORDED AUGUST 16, 1991 AS INSTRUMENT NO. 91-312389, OF OFFICIAL RECORDS, BEING A PORTION OF LOTS 1, 2, 3, 4, 18, 19 AND 20 AND HUGO STREET (VACATED) OF THE ORANGE GROVE HOMESTEAD, AS PER MAP RECORDED IN BOOK 2, PAGE 5, OF MAPS, ALL IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF A LINE PARALLEL WITH AND 233.23 FEET EASTERLY, MEASURE AT RIGHT ANGLES FROM THE WESTERLY LINE OF SAID PARCEL 26 WITH THE NORTHERLY LINE OF SAID PARCEL 26, SAID NORTHERLY LINE ALSO BEING THE SOUTHERLY LINE OF ALMOND AVENUE, (88.00 FEET WIDE) AS SHOWN ON SAID PARCEL MAP NO. 15911; THENCE ALONG SAID PARALLEL LINE, SOUTH 00° 30' 44" EAST, 1243.45 FEET TO THE SOUTHERLY LINE OF SAID PARCEL "C"; THENCE ALONG SAID SOUTHERLY LINE OF PARCEL "C" NORTH 89° 25' 49" EAST, 1325.45 FEET TO THE EASTERLY LINE OF SAID PARCEL "C" THENCE ALONG SAID EASTERLY LINE OF SAID PARCEL "C" NORTH 00° 26' 27" WEST, 1286.12 FEET TO THE NORTHERLY LINE OF SAID PARCEL "C"; THENCE ALONG SAID NORTHERLY LINE OF PARCEL "C", SOUTH 89° 29' 16" WEST, 90908 FEET TO THE WESTERLY CURVED LINE OF SAID PARCEL "C" BEING THE BEGINNING OF A NON-TANGENT CURVE, CONCAVE WESTERLY, HAVING A RADIUS OF 500.00 FEET, A RADIAL LINE OF SAID CURVE TO ITS POINT OF BEGINNING BEARS NORTH 89° 29' 16" EAST; THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 5° 02' 55" AN ARC DISTANCE OF 44.06 FEET TO THE NORTHEASTERLY CORNER OF SAID PARCEL 26; THENCE ALONG SAID NORTHERLY LINE OF PARCEL 26, SOUTH 89° 29' 16" WEST, 416.03 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM ALL MINERALS AND ALL WINERAL RIGHTS OF EVERY KIND AND CHARACTER NOW KNOWN TO EXIST OR HEREAFTER DISCOVERED, EXCLUDING THE AREA WITHIN THE TOP FIVE HUNDRED (500) FEET OF THE SURFACE OF THE LAND, INCLUDING, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, OIL AND GAS AND RIGHTS THERETO, TOGETHER WITH THE SOLE, EXCLUSIVE AND PERPETUAL RIGHT TO EXPLORE FOR, REMOVE AND DISPOSE OF SAID MINERALS BY ANY MEANS OR METHODS SUITABLE TO GRANTOR, ITS SUCCESSORS AND ASSIGNS, BUT WITHOUT ENTERING UPON OR USING THE SURFACE OF THE PROPERTY, AND IN SUCH MANNER AS NOT TO DAMAGE THE SURFACE OF SAID LANDS OR ITS LATERAL OR HORIZONTAL SUPPORT OR TO INTERFERE WITH THE USE THEREOF BY GRANTEE, ITS SUCCESSORS OR ASSIGNS, AS RESERVED IN THE DEED FROM UNION PACIFIC RAILROAD COMPANY, A DELAWARE CORPORATION, RECORDED NOVEMBER 2, 2001 AS INSTRUMENT NO. 2001-503313, OFFICIAL RECORDS.

APN: 0167-441-07-0-000

EASEMENT NOTES

(6) AN OFFER OF DEDICATION FOR PUBLIC ROAD, UTILITY AND PUBLIC SERVICE USES AND INCIDENTAL PURPOSES, RECORDED JUNE 19, 2003 AS INSTRUMENT NO.2003-0414272 OF OFFICIAL RECORDS TO THE CITY OF REDLANDS (PORTIONS ALMOND & LUGONIA STREETS)

(9) ELECTRIC EASEMENT TO SO. CAL EDISON CO. FOR UNDERGROUND ELECTRICAL SUPPLY AND COMMUNICATION SYSTEMS AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 05, 2007 AS INSTRUMENT NO. 2007-0511648 OF OFFICIAL RECORDS. (4 STRIPS, VARYING WIDTHS, AS SHOWN)

(10) AN EASEMENT FOR SIDEWALK PURPOSES AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 06, 2007 AS INSTRUMENT NO. 2007-0514600 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF REDLANDS, A MUNICIPAL CORPORATION AFFECTS: AS DESCRIBED THEREIN

(11) ROADWAY EASEMENT AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 06, 2007 AS INSTRUMENT NO. 2007-0514601 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF REDLANDS, A MUNICIPAL CORPORATION

(12) THE TERMS, PROVISIONS AND EASEMENT(S) CONTAINED IN THE DOCUMENT ENTITLED "RECIPROCAL EASEMENT AGREEMENT" RECORDED SEPTEMBER 10, 2007 AS INSTRUMENT NO. 2007-0520620 OF OFFICIAL RECORDS. (DETENTION BASIN AS SHOWN)

(13) AN EASEMENT FOR SIDEWALK PURPOSES AND INCIDENTAL PURPOSES, RECORDED OCTOBER 02, 2008 AS INSTRUMENT NO. 2008-0443990 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF REDLANDS, A MUNICIPAL CORPORATION AFFECTS: AS DESCRIBED THEREIN

80 40 0 80 160 240
SCALE: 1"=80'

SCALE 1"=80'

EXISTING CONDITIONS

SEPTEMBER 09, 2022

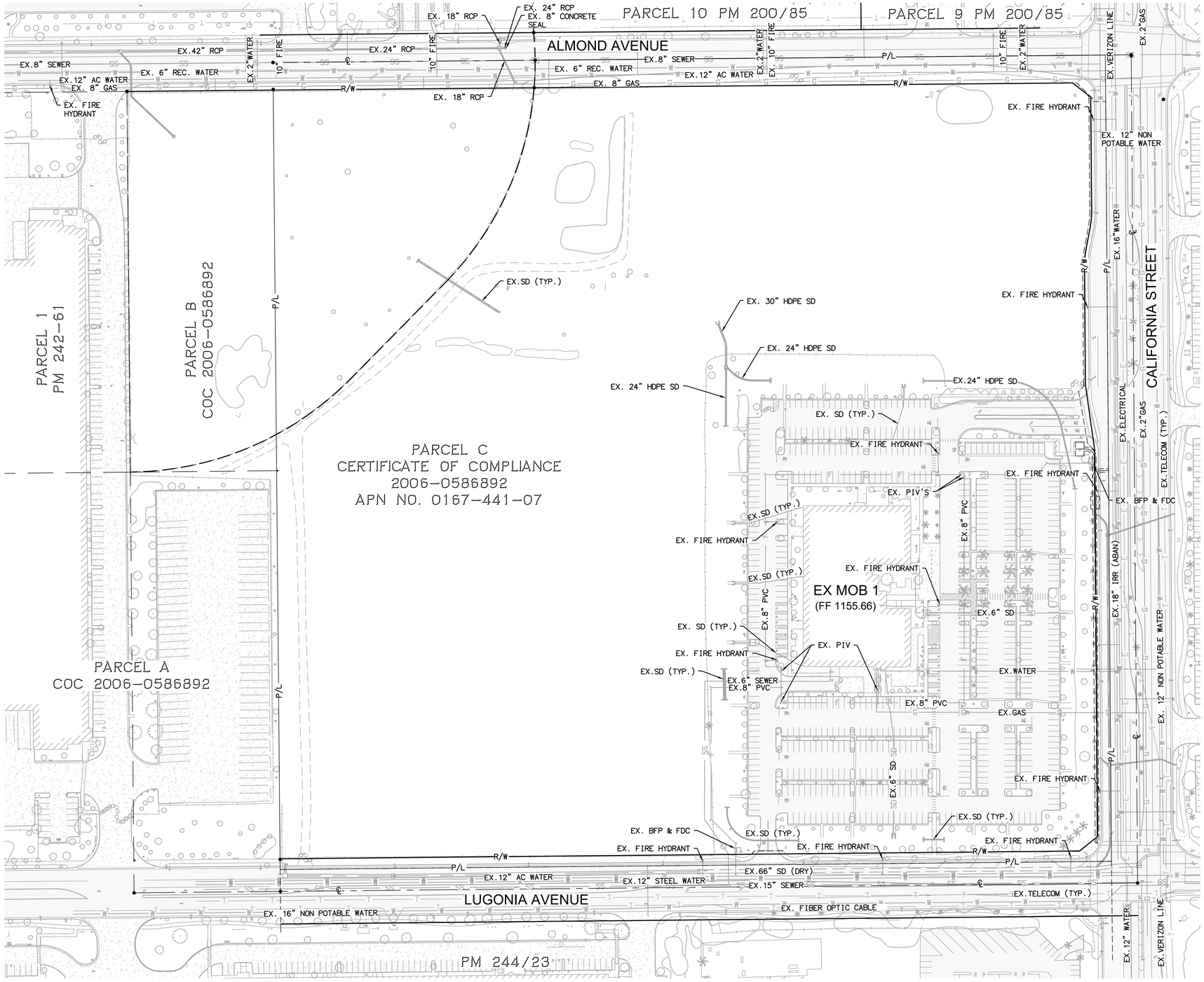
CO ARCHITECTS

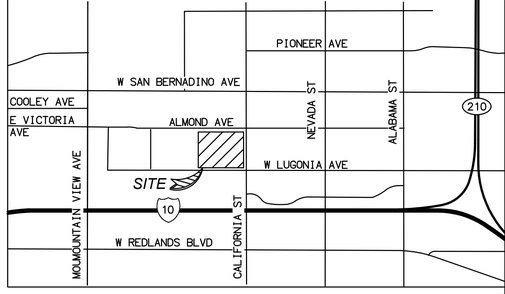
REDLANDS MEDICAL CENTER

Sheet: **C1.00**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000





VICINITY MAP

N.T.S.

LEGEND

- EXISTING STORM DRAIN
- EXISTING SEWER — SS
- EXISTING WATER — W
- EXISTING GAS — G
- EXISTING FIRE — F
- EXISTING TELECOM — T

EXISTING UTILITY NOTE

EXISTING UTILITIES HAVE BEEN SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL LOCATE AND MARK OUT ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONTACT THE ENGINEER IF ANY UTILITIES ARE LOCATED THAT ARE NOT IDENTIFIED ON THESE PLANS.

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

EXISTING UTILITIES

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C1.01**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
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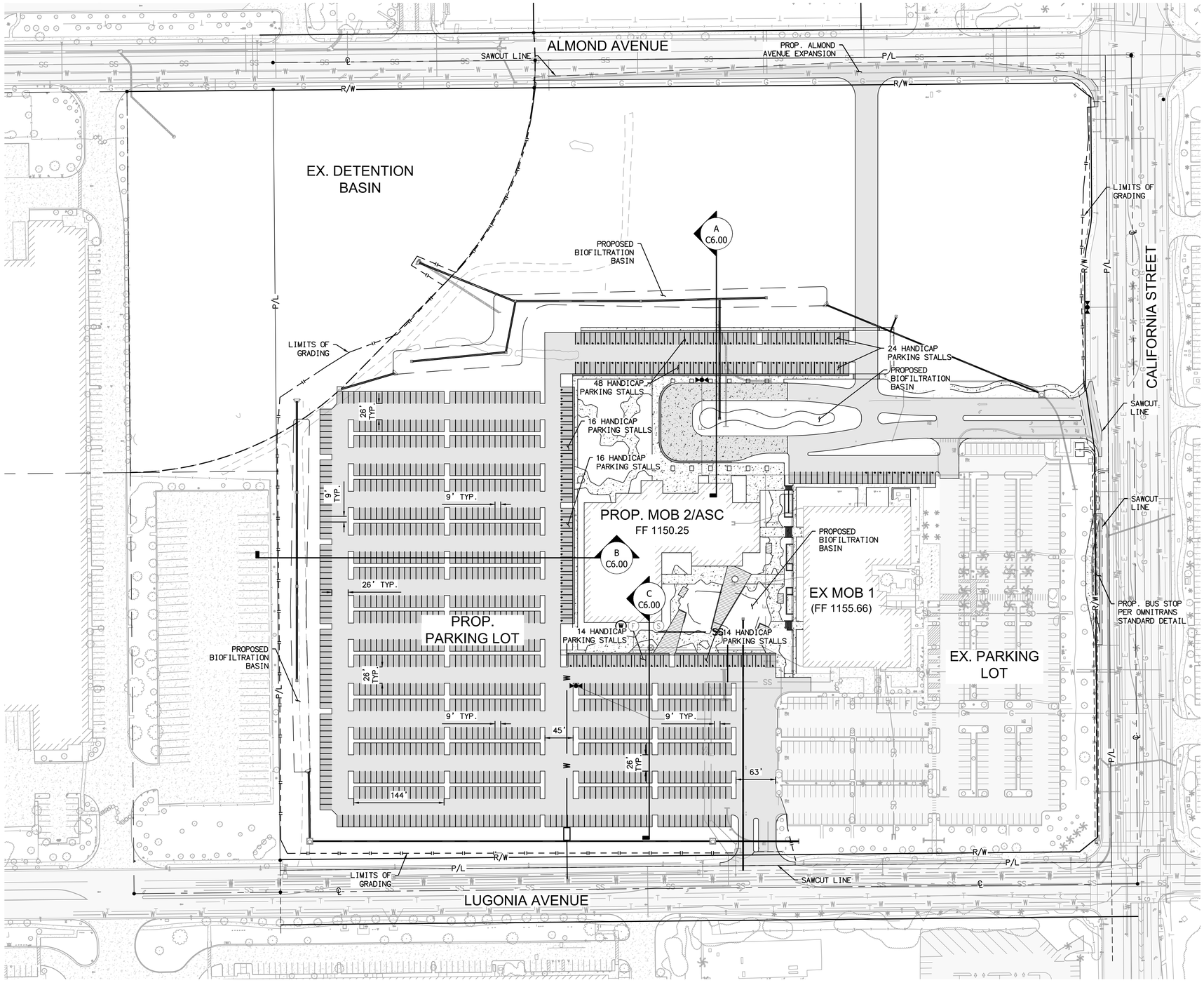
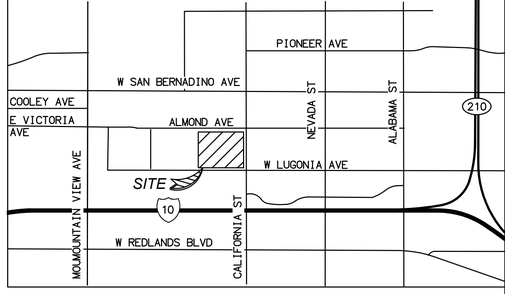


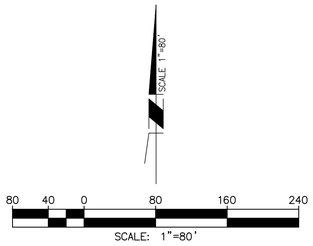


VICINITY MAP

N.T.S.

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- CURB AND GUTTER
- AC PAVEMENT
- HEAVY VEHICULAR AC PAVEMENT
- HEAVY VEHICULAR CONCRETE PAVEMENT
- PEDESTRIAN CONCRETE PAVEMENT
- DG PATH
- PROPOSED BUILDING
- TRUNCATED DOMES



SITE PHASING - 1
SITE PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C2.00**

CITY OF REDLANDS

Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333

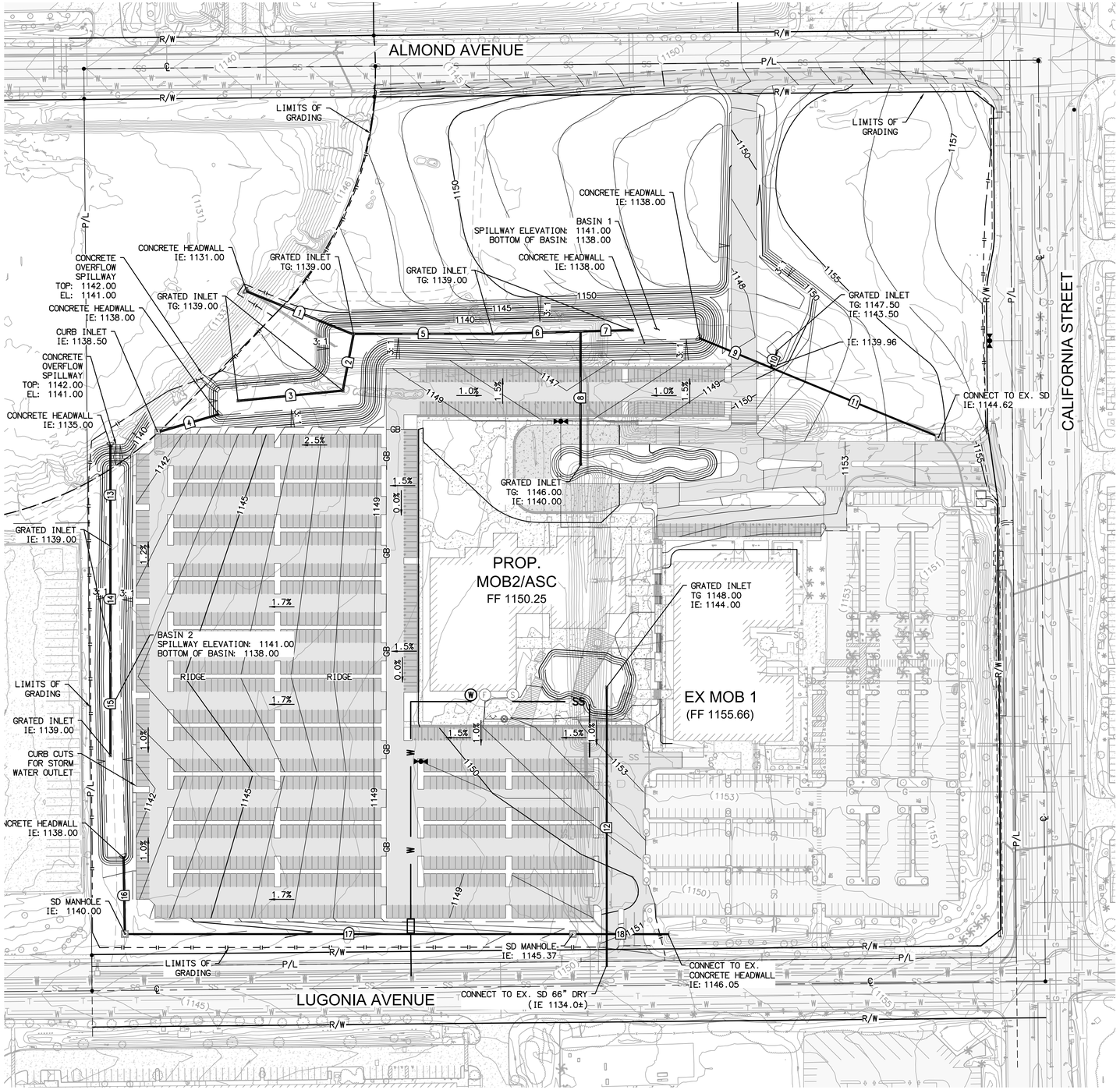
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188

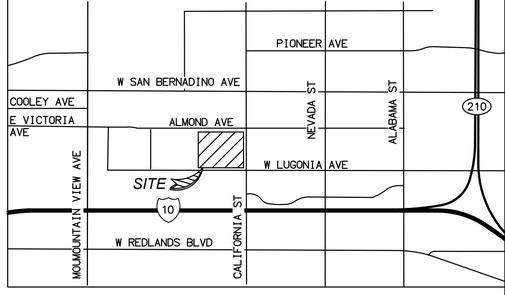
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)

ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)

TYPE OF DEVELOPMENT: XXXXX LOCATION: 1301 California Street, Redlands, CA 92374

ZONE: CR ZONE ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000





VICINITY MAP

N.T.S.

GRADING GENERAL NOTES

1. ALL GRADING AND ON-SITE CONSTRUCTION SHALL MEET THE MINIMUM REQUIREMENTS OF THE UNIFORM BUILDING CODE, LATEST EDITION, APPENDIX CHAPTER 33 AND THE CALIFORNIA BUILDING CODE, LATEST EDITION. THESE CODES ARE AMENDED IN THE CITY OF REDLANDS MUNICIPAL CODE. IF CONTRADICTIONS ARISE BETWEEN PROVISIONS IN THESE PLANS FROM THOSE IN THE VARIOUS CODES, THE MOST RESTRICTIVE PROVISIONS WILL GOVERN.
2. AFTER THE GRADING PERMIT HAS BEEN ISSUED, THE PROJECT MANAGER SHALL CONVENE AN ON-SITE PRECONSTRUCTION MEETING WITH THE CITY OF REDLANDS INSPECTOR, THE ENGINEER OF RECORD, THE GEOTECHNICAL ENGINEER AND THE GRADING CONTRACTOR. AT THIS MEETING, THE PROJECT SUPERINTENDENT SHALL BE IDENTIFIED AND AN EMERGENCY CONTACT PERSON SHALL BE IDENTIFIED TO THE INSPECTOR.
3. USE BEST MANAGEMENT PRACTICES (BMPS) TO PREVENT AND CONTAIN ILLEGAL DISCHARGES WITHIN THE PROJECT BOUNDARY. THIS WILL BE IN EFFECT FOR THE ENTIRE DURATION OF THE PROJECT CONSTRUCTION TO ITS COMPLETION.
4. BUILDING PERMITS SHALL NOT BE ISSUED UNTIL THE PROJECT SITE HAS BEEN GRADED AND THE ENGINEER OF RECORD HAS CERTIFIED TO THE SATISFACTION OF THE CITY ENGINEER THAT THE SITE HAS BEEN PREPARED ACCORDING TO THE RECOMMENDATIONS OF THE SOILS REPORT(S) AND TO THE SPECIFICATIONS OF THE APPROVED GRADING PLANS. IN ADDITION, A FINAL COMPACTION REPORT SHALL BE SUBMITTED TO BOTH THE INSPECTOR AND THE BUILDING OFFICIAL FOR APPROVAL.
5. A WRITTEN REPORT BY A GEOTECHNICAL ENGINEER IS TO BE FURNISHED TO BOTH THE CITY'S MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT AND BUILDING AND SAFETY DIVISION, TO CERTIFY THAT ALL FILL MATERIAL AND MATERIAL UPON WHICH FILL IS TO BE PLACED IS ADEQUATE TO SUPPORT THE LOADS OF THE PROPOSED DEVELOPMENT. THIS REPORT SHALL INCLUDE SOIL TEST DATA ON ALL FILLS OF TWO FEET OR MORE.
6. PREPARATION OF THE SITE SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE INSTRUCTIONS OF A GEOTECHNICAL ENGINEER AND ALL FILLS WILL BE MADE UNDER HIS DIRECTION.
7. IN NO CASE IS ANY SLOPE TO EXCEED A GRADIENT OF TWO HORIZONTAL TO ONE VERTICAL (2:1).
8. THE ENGINEER OF RECORD ASSUMES NO LIABILITY FOR THE EXISTENCE AND LOCATIONS OF UNDERGROUND UTILITY LINES, STRUCTURES OR IRRIGATION LINES. THE CONTRACTOR IS TO MAKE AN ON-SITE INSPECTION AND NOTIFY ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATION OF ANY AND ALL UNDERGROUND FACILITIES.
9. THE CONTRACTOR SHALL BE FAMILIAR WITH AND RESPONSIBLE FOR CLEARING THE SITE IN PREPARATION FOR CONSTRUCTION.
10. THE ENGINEER'S ESTIMATE IS 33,000 CY OF EXCAVATION AND 33,000 CY OF EMBANKMENT FOR THE SITE GRADING. THESE ARE RAW QUANTITIES WITHOUT ALLOWANCES FOR LOSS, SHRINKAGE OR COMPACTION.
11. INSTALL FIRE HYDRANTS AS REQUIRED PRIOR TO THE DELIVERY OF ANY BUILDING MATERIAL TO THE SITE.
12. BENCHMARK: ENTER PROJECT SPECIFIC DATA HERE. ELEVATION:
13. ALL SLOPES THREE FEET OR GREATER MUST BE LANDSCAPED AND IRRIGATED PRIOR TO OCCUPANCY.
14. ACREAGE OF THE PROJECT IS: ACRE(S).
15. APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL FOR THE CONSTRUCTION OF ANY WALLS, SIDEWALKS, SLABS, PAVING, ETC. TO BE CONSTRUCTED ON-SITE AS SHOWN HEREON. A SEPARATE PERMIT IS REQUIRED FROM THE BUILDING AND SAFETY DIVISION FOR THE CONSTRUCTION OF THESE ON-SITE ITEMS.
16. ALL EARTHWORK SHALL CONFORM TO THE PRELIMINARY GEOTECHNICAL AND/OR GEOLOGIC INVESTIGATION REPORT FOR TBD PREPARED BY TBD, DATED TBD .
17. THE ENGINEER OF RECORD MUST SET GRADE STAKES FOR ALL DRAINAGE DEVICES.
18. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INSPECTIONS PRIOR TO POURING ANY CONCRETE.

LEGEND

- MAJOR CONTOUR (1150)
- MINOR CONTOUR (1151)
- DAYLIGHT LINE
- SAWCUT LINE
- STORM DRAIN
- CURB INLET
- STORM DRAIN MANHOLE
- CATCH BASIN INLET
- CONCRETE HEADWALL
- CONCRETE STRUCTURE INLET

EARTHWORK

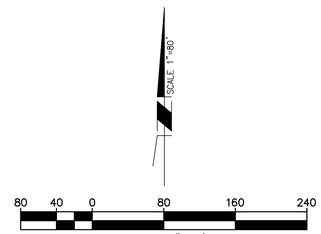
CUT: 33,000 CY

FILL: 33,000 CY

NET: 0 CY

STORM DRAIN DATA TABLE

NO	BEARING/DELTA	LENGTH	SLOPE (%)	SIZE/TYPE
1	N68°06'52"W	162.75'	5.0	24" HDPE
2	N10°49'23"E	78.96'	0.5	12" HDPE
3	N84°22'55"E	147.14'	0.5	12" HDPE
4	N73°41'37"E	87.50'	0.5	12" HDPE
5	N89°59'25"E	196.00'	0.5	12" HDPE
6	N88°27'29"E	123.65'	0.5	12" HDPE
7	N88°27'29"E	72.42'	0.5	12" HDPE
8	N00°00'00"W	190.70'	0.5	12" HDPE
9	N67°35'04"W	109.99'	1.8	18" HDPE
10	N22°24'56"E	23.64'	15.0	12" HDPE
11	N67°35'04"W	260.99'	1.8	18" HDPE
12	N00°00'00"E	398.61'	2.5	18" HDPE
13	N00°00'00"E	142.93'	2.8	18" HDPE
14	N00°00'30"W	147.89'	0.5	12" HDPE
15	N00°00'29"E	152.11'	0.5	12" HDPE
16	N00°53'37"W	110.68'	1.8	12" HDPE
17	N90°00'00"E	642.38'	0.8	12" HDPE
18	N89°55'53"W	137.06'	0.5	12" HDPE



SITE PHASING - 1
GRADING PLAN

SEPTEMBER 09, 2022

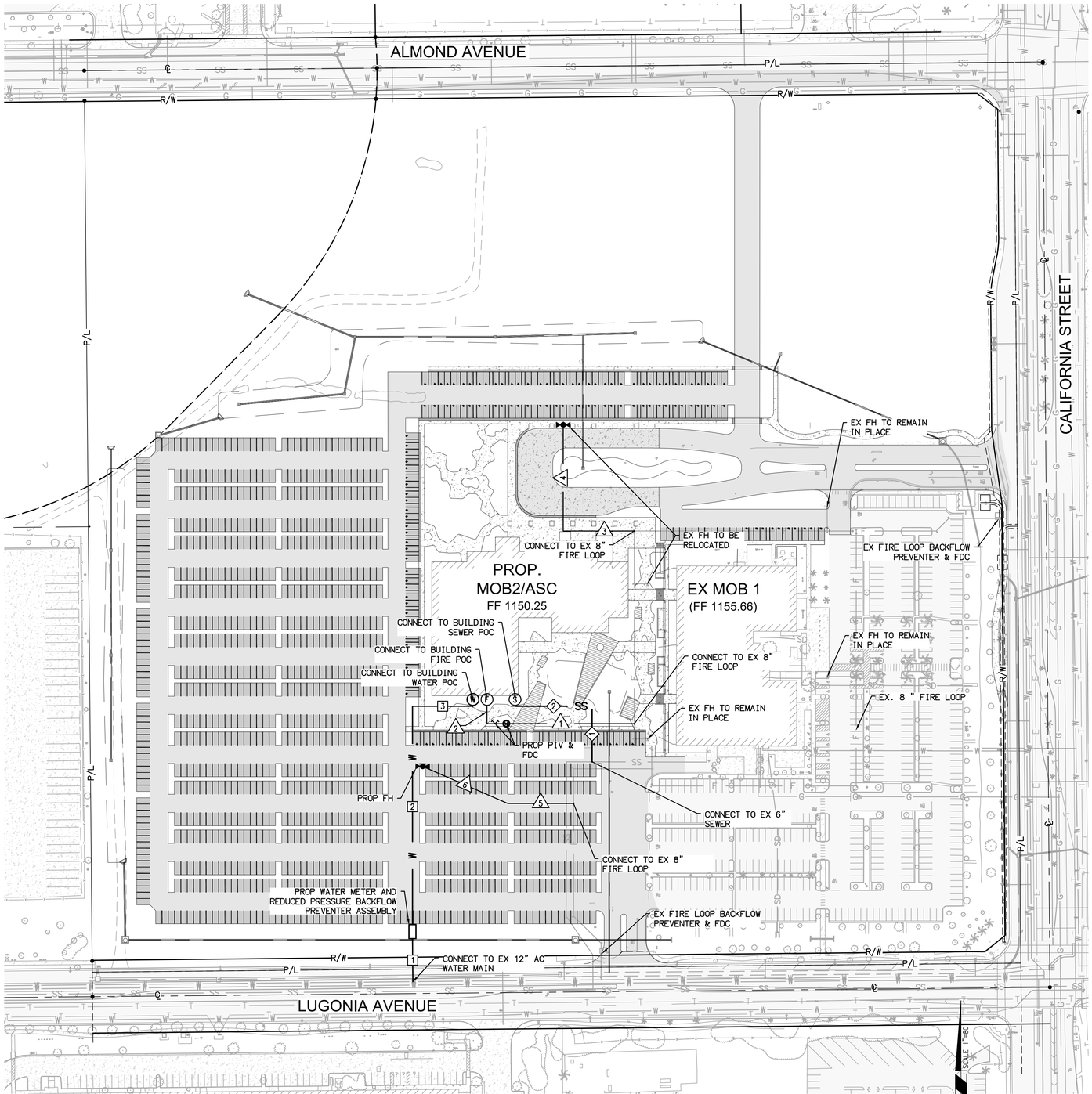
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C2.01**

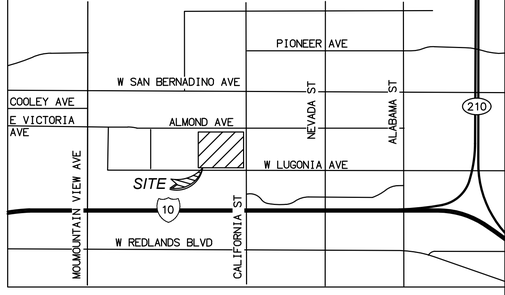
CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000
ZONE: CR ZONE	



LEGEND

WATER LINE	W
SEWER LINE	SS
FIRE LINE	F
PROP. FIRE HYDRANT	
EX. FIRE HYDRANT	
UTILITY POC	Ⓢ Ⓦ Ⓕ



VICINITY MAP

N.T.S.

WATER GENERAL NOTES

1. MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF REDLANDS MUNICIPAL WATER DIVISION STANDARD SPECIFICATION (LATEST REVISION THEREOF).
2. THE APPROXIMATE LOCATIONS OF EXISTING UNDERGROUND UTILITY LINES ARE SHOWN IN THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA, AND THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK, THE CONTRACTOR AGREES PRIOR TO EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK, AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR TRUNKLINE UTILITY FACILITIES.
3. ALL SERVICE CONNECTIONS TO BE MINIMUM 1-INCH COPPER LATERALS.
4. STANDARD WATER MAIN LOCATION IS 7 FEET OFF CURB FACE.
5. THIS DRAWING IS SCHEMATIC ONLY, DO NOT SCALE.
6. THE CONTRACTOR SHALL MAKE ALL WATER MAIN CONNECTIONS TO EXISTING WATER MAINS, UNLESS OTHERWISE NOTED.
7. EXISTING UTILITIES ARE SHOWN ON DEVELOPMENT PLAN.
8. HYDRO TEST TO XXX P.S.I. MIN 2 HOUR DURATION AT THE LOWEST POINT IN THE WATER MAIN.
9. BUTTERFLY VALVES TO BE DRESSER 450 OR KENNEDY ADAP-TORQ, CLOW STYLE #2810.
10. CONTRACTOR SHALL USE DOUBLE STRAP SERVICE CLAMPS OR H.D. TAPPED COUPLINGS WHEN CONNECTING SERVICE LATERALS.
11. CONTRACTOR SHALL NOTIFY CITY 48 HOURS PRIOR TO SHUTDOWN OF WATER MAINS.
12. INSTALLATION SHALL CONFORM TO MANUFACTURERS SPECIFICATIONS AND LATEST CITY SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.
13. METER BOXES IN THE SIDEWALK SHALL HAVE CAST IRON LIDS.
14. PROVIDE A MINIMUM OF 10 FOOT SEPARATION BETWEEN SEWER AND WATER LATERALS WHERE POSSIBLE.
15. BACKFILL COMPACTION AND RE-SURFACING IN EXISTING STREETS SHALL CONFORM TO STREET DIVISION SPECIFICATIONS (LATEST REVISION THEREOF).
16. ALL VALVES INSTALLED BY THE CONTRACTOR SHALL BE ACCESSIBLE FOR OPERATION WITH COMPLETE VALVE BOX TO GRADE DIRECTLY FOLLOWING CONNECTION TO EXISTING WATER SYSTEM.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE SIZING OF THRUST BLOCKS BASED ON FIELD CONDITIONS. THE SIZE SHOWN ON THE PLANS IS THE MINIMUM SIZE REQUIRED.
18. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED.
19. IF WATER MAINS ARE ABANDONED AS A RESULT OF THIS PROJECT THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RECONNECTION OR REPLACEMENT OF SERVICE LATERALS AS DIRECTED BY THE CITY INSPECTOR. SERVICE LATERALS THAT ARE REPLACED SHALL BE THE SAME SIZE AS EXISTING.
20. INTERIOR WATER SYSTEM INCLUDING FIRE HYDRANTS SHALL BE COMPLETE AND ACCEPTED BY THE CITY BEFORE ANY FRAMING PERMITS WILL BE ISSUED. CONTACT CITY FIRE MARSHALL FOR INTERIOR SYSTEM INSPECTIONS.
21. CONTACT THE MUNICIPAL WATER DIVISION 48 HOURS PRIOR TO ANY WATER SYSTEM CONSTRUCTION.
22. WHERE DESIGNATED ON THE PLANS, THE CONTRACTOR SHALL INSTALL POLY PIGS AND POLY PIG OUTLETS. THE CONTRACTOR SHALL NOTIFY THE CITY 48 HOURS IN ADVANCE TO REQUEST THE CITY TO FLUSH POLY PIGS THROUGH THE MAINS. THE FLUSHING PROCESS SHALL TAKE PLACE PRIOR TO HYDROSTATIC TESTING CHLORINATION AND FINAL FLUSHING OF THE MAIN BY THE CONTRACTOR. FINAL CONNECTIONS SHALL NOT BE MADE PRIOR TO BACTERIA TEST SAMPLES THAT MEET CITY REQUIREMENTS AND AUTHORIZATION FOR TIE-INS BY THE CITY INSPECTOR.
23. A COMPLETE SET OF AS BUILT DRAWINGS SHALL BE SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT PRIOR TO FINAL INSPECTION.
24. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING CITY WATER SYSTEM VALVES.
25. WATER VALVE CANS SHALL BE PER SPEC A-20514 (SLIP CAN TYPE).

SEWER GENERAL NOTES

1. SEWER INSTALLATION IS TO BE IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS AND DETAIL DRAWINGS OF THE CITY OF REDLANDS LATEST REVISION THEREOF.
2. ALL SEWER PIPE ELEVATIONS GIVEN REFER TO THE FLOW LINE INVERT ELEVATIONS.
3. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING UNDERGROUND UTILITY LINES ARE SHOWN ON THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA. THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK THE CONTRACTOR AGREES, PRIOR TO ANY EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR SERVICE UTILITY FACILITIES.
4. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED FOR ALL SEWER PIPE MAY BE REQUIRED IF IN THE OPINION OF THE CITY, THE NATIVE BACKFILL MATERIAL IS DEEMED UNSUITABLE.
5. PVC SEWER IS NOT PERMITTED ON ANY HORIZONTAL OR VERTICAL CURVE.
6. THE CONTRACTOR SHALL AIR TEST THE SEWER SYSTEM IN ACCORDANCE WITH CITY STANDARDS AFTER ALL OTHER UTILITIES HAVE BEEN INSTALLED AND COMPLETED WITHIN THE TRACT OR DEVELOPMENT. IN ADDITION, AFTER FINAL AIR TEST, THE CONTRACTOR SHALL CONNECT THE SEWER LATERALS TO THE HOUSE LATERALS AT THE PROPERTY.
7. SEWER LATERALS SHALL BE CLEARLY MARKED WITH AN "L" CHISELED IN CURB FACE.
8. REQUIRED SEPARATION OF THE WATER AND SEWER MAINS AND LATERALS SHALL BE STRICTLY ADHERED TO. INSTALLATION SHALL COMPLY WITH THE STATE DEPARTMENT OF HEALTH REGULATIONS AND BE A MINIMUM OF 10 FEET SEPARATION.
9. SEWER LATERAL LOCATIONS SHALL NOT BE CHANGED MORE THAN 3 FEET (HORIZONTAL) WITHOUT AUTHORIZATION FROM THE CITY.
10. IF PLASTIC SEWER PIPE IS USED, A MANDREL TEST SHALL BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE OF THE CITY INSPECTOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE MUNICIPAL UTILITIES DEPARTMENT. LATEST REVISIONS EXCEPT THE MANDREL SHALL BE SUPPLIED BY THE PIPE MANUFACTURER APPROVED BY CITY OF REDLANDS AND SHALL BE PULLED THROUGH THE PIPE BY HAND. PVC PIPE-MAXIMUM 15" DIAMETER ALLOWABLE.
11. PRIOR TO PAVING OF STREETS OVER A NEW SEWER MAIN ALL COMPACTION TESTS, AIR TESTS, BALLING AND MANDREL TESTS SHALL BE COMPLETED AND APPROVED BY THE CITY AND A COMPLETE SET OF AS-BUILT DRAWINGS SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION OF AS-BUILT DRAWINGS.
12. PRIOR TO ACCEPTANCE BY THE CITY. NEW SEWER LINE SHALL REMAIN PLUGGED AT OR PHYSICALLY SEPARATED FROM THE DOWNSTREAM MANHOLE AND STREETS SHALL BE PAVED.
13. THE CONTRACTOR SHALL REPLACE EXISTING STRIPING AS NECESSARY. THE CONTRACTOR SHALL OBTAIN AN ENCROACHMENT PERMIT FOR SEWER CONSTRUCTION FROM THE CITY OF REDLANDS PUBLIC WORKS DEPARTMENT PRIOR TO COMMENCEMENT OF WORK.
14. PVC SEWER PIPE AND FITTINGS SHALL CONFORM TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (A.S.T.M.) DESIGNATION D-3034, 15" MAXIMUM SIZE, SDR 35 LATEST REVISION.
15. THE JOINTING OF PVC SEWER PIPE SHALL BE BY USING ELECTROMETRIC GASKET JOINTS. THE CRITICAL SEALING DIMENSIONS OF THE BELL, SPIGOT, AND GASKET SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S STANDARD DIMENSIONS AND TOLERANCES.
16. MANHOLE RIM ELEVATIONS INDICATED HEREON ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL RIMS TO FINAL FINISH GRADE, IN COORDINATION WITH STREET IMPROVEMENTS.
17. ALL SEWER STATIONS ARE CENTERLINE SEWER MAIN UNLESS OTHERWISE INDICATED.
18. DURING THE PERIOD OF CONSTRUCTION THE CONTRACTOR SHALL FURNISH, ERECT, AND MAINTAIN ALL WARNINGS, SIGNS, BARRICADES, AND OTHER SAFETY MEASURES IN CONFORMANCE WITH THE STATE MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES, LATEST EDITION. THE CONTRACTOR SHALL PROVIDE SAFE AND CONTINUOUS PASSAGE FOR PEDESTRIAN AND VEHICULAR TRAFFIC AT ALL TIMES.

UNDERGROUND UTILITY NOTE

THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE GENERATED FROM RECORDS AND/OR UTILITY PROVIDER RECORD MAPS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHERS NOT OF RECORD OR NOT SHOWN ON THESE PLANS. ALL DAMAGES THERETO CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE APPROPRIATE SPECIFICATIONS AND STANDARDS AT THE EXPENSE OF THE CONTRACTOR.

FIRE DATA TABLE

NO.	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 90°00'00" E	---	210.26'	4" PVC (C900 DR14)
2	N 00°00'00" E	---	34.73'	4" PVC (C900 DR14)
3	N 90°00'00" E	---	24.00'	6" PVC (C900 DR14)
4	N 00°00'00" E	---	151.59'	6" PVC (C900 DR14)
5	N 90°00'00" E	---	93.98'	6" PVC (C900 DR14)
6	N 66°27'53" W	---	132.49'	6" PVC (C900 DR14)

WATER DATA TABLE

NO	BEARING/DELTA	LENGTH	SIZE/TYPE
1	N 00°33'50" W	61.38'	6" PVC (C900 DR18)
2	N 00°00'00" E	286.75'	6" PVC (C900 DR18)
3	N 90°00'00" E	86.25'	4" PVC (C900 DR18)

SEWER DATA TABLE

NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 00°00'00" E	---	79.32'	6" PVC (SDR-35)
2	N 90°00'00" E	---	110.10'	6" PVC (SDR-35)

SITE PHASING - 1
UTILITY PLAN

SEPTEMBER 09, 2022

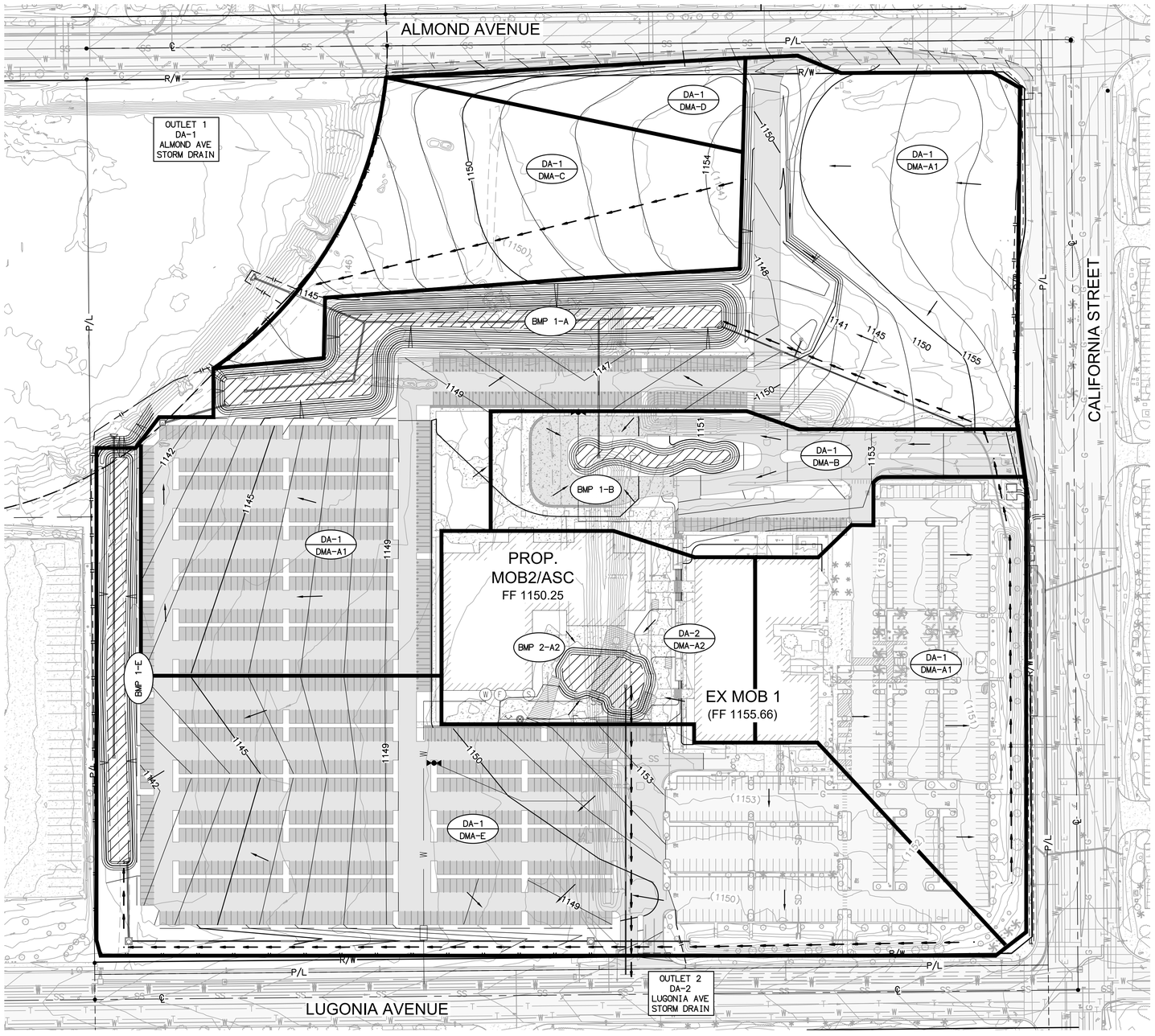
CO ARCHITECTS

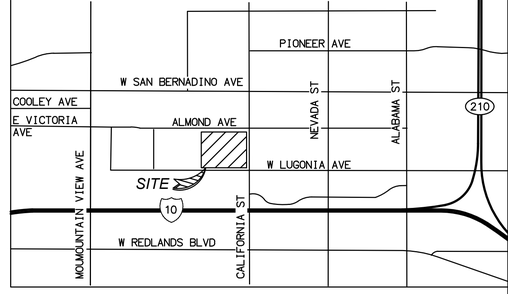
REDLANDS MEDICAL CENTER

Sheet: **C2.02**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	
TYPE OF DEVELOPMENT: XXXXX	LOCATION: 1301 California Street, Redlands, CA 92374
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



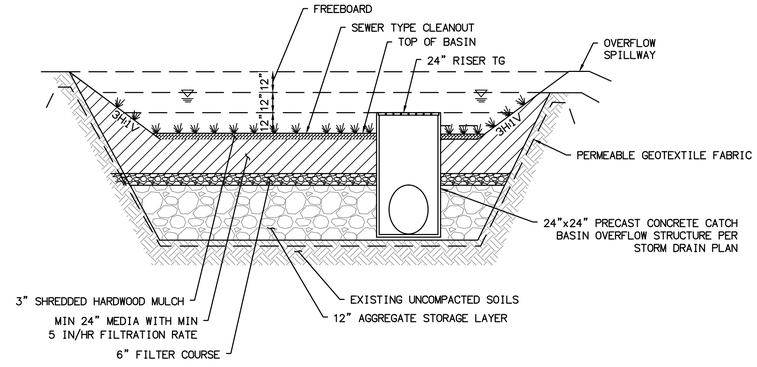


VICINITY MAP

N.T.S.

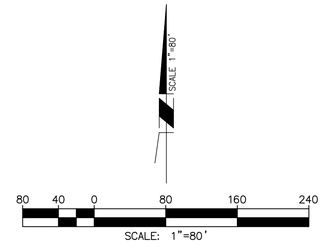
LEGEND

- STORM WATER BASIN
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID — DA 1 / DMA 1
- BMP ID — BMP 1



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE



DA	DMA	TOTAL AREA (SF)	IMPERVIOUS RATIO	DMA RUNOFF FACTOR	DESIGN CAPTURE VOLUME (CF)	BMP PROPOSED SURFACE AREA (SF)	VOLUME RETAINED BY BMP (CF)	BMP TYPE
1	A1	627,670	70%	0.49	35,967	22,232	51,689	BIORETENTION WITH NO UNDERDRAIN
1	B	114,563	85%	0.66	8,790	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	138,521	0%	0.04	643	N/A	N/A	SELF TREATING (NO EXISTING OR PROPOSED IMPERVIOUS AREA)
1	D	31,363	0%	0.04	146	N/A	N/A	SELF TREATING (NO EXISTING OR PROPOSED IMPERVIOUS AREA)
1	E	412,513	85%	0.66	31,649	14,000	32,550	BIORETENTION WITH NO UNDERDRAIN
2	A2	117,176	85%	0.66	8,990	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

SITE PHASING - 1
BMP PLAN

SEPTEMBER 09, 2022

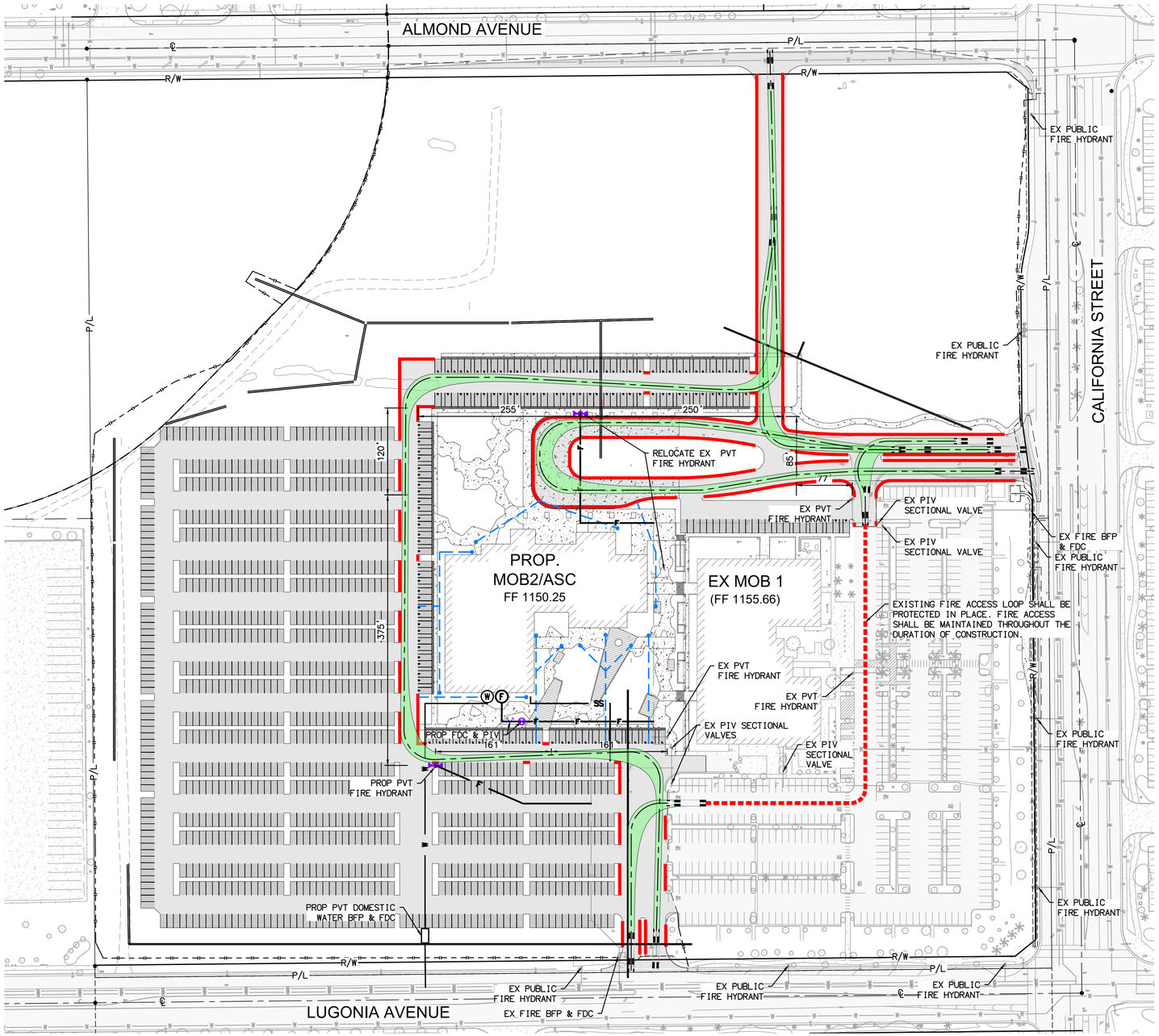
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C2.03**

CITY OF REDLANDS

Site Development Plan Number:
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect) PHONE: 323.525.0500 (Architect)
TYPE OF DEVELOPMENT: XXXXX LOCATION: 1301 California Street, Redlands, CA 92374
ZONE: CR ZONE ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



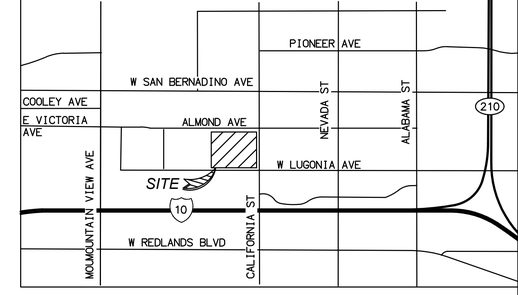
80 40 0 80 160 240

SCALE: 1"=80'

SCALE 1"=80'

FIRE PROTECTION LEGEND

- PROPOSED FIRE HYDRANT
- PROPOSED PIV
- PROPOSED FDC
- PROPOSED FIRE MAIN
- HOSE PULL (150' MAX)
- RED PAINTED CURB
- FIRE TRUCK TURNING MOVEMENT
- EXISTING FIRE HYDRANT
- EXISTING PIV
- EXISTING FDC
- EXISTING FIRE MAIN
- EXISTING FIRE ROUTE

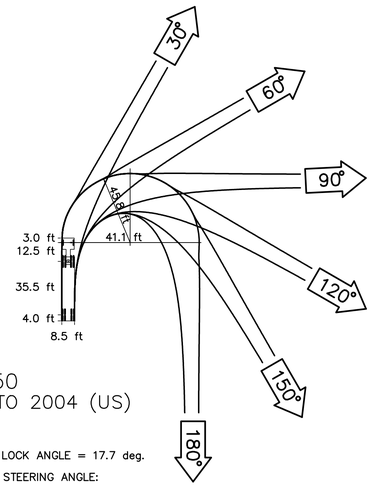


VICINITY MAP

N.T.S.

FIRE NOTES

1. FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION. CFC 501.4
2. STREET OR ROAD SIGNS - TEMPORARY SIGNS SHALL BE INSTALLED AT EACH STREET INTERSECTION WHEN CONSTRUCTION OF NEW ROADWAYS ALLOWS PASSAGE BY VEHICLES. SINGS SHALL BE OF AN APPROVED SIZE, WEATHER RESISTANT AND BE MAINTAINED UNTIL REPLACED BY PERMANENT SIGNS. CFC 505.2
3. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS AND SHALL BE SURFACED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES. CFC 503.2.3
4. POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELL ARE TO BE LOCATED ON THE ADDRESS/ACCESS SIDE OF THE BUILDING.
5. CLEAR SPACE AROUND HYDRANTS - A THREE (3) FOOT CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF FIRE HYDRANTS, EXCEPT AS OTHERWISE REQUIRED OR APPROVED. CFC 507.5.5
6. PHYSICAL PROTECTION - WHERE FIRE HYDRANTS ARE SUBJECT TO IMPACT BY A MOTOR VEHICLE, GUARD POSTS OR OTHER APPROVED MEANS SHALL COMPLY WITH SECTION 312. CFC 507.5.6
7. DEAD ENDS - DEAD END FIRE APPARATUS ACCESS ROADS IN EXCESS OF 150 FEET IN LENGTH SHALL BE PROVIDED WITH AN APPROVED AREA FOR TURNING AROUND FIRE APPARATUS. CFC 503.2.5
8. SECURITY GATES - WHERE SECURITY GATES ARE INSTALLED, THEY SHALL HAVE AN APPROVED MEANS OF EMERGENCY OPERATION. THE SECURITY GATES AND EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM G 2200.
9. VEGETATION SHALL BE SELECTED AND MAINTAINED IN SUCH A MANNER AS TO ALLOW IMMEDIATE ACCESS TO ALL HYDRANTS, VALVES, FIRE DEPARTMENT CONNECTIONS, PULL STATIONS, EXTINGUISHERS, SPRINKLER RISERS, ALARM CONTROL PANELS, RESCUE WINDOWS AND OTHER DEVICES OR AREAS USED FOR FIREFIGHTING PURPOSES. VEGETATION OF BUILDING FEATURES SHALL NO OBSTRUCT ADDRESS NUMBERS OR INHIBIT THE FUNCTIONING OF ALARM BELLS, HORNS OR STROBES.
10. APPROVED DOCUMENTS - CONSTRUCTION DOCUMENTS APPROVED BY THE FIRE CODE OFFICIAL ARE APPROVED WITH THE INTENT THAT SUCH CONSTRUCTION DOCUMENTS COMPLY IN ALL RESPECTS WITH THIS CODE. REVIEW AND APPROVAL BY THE FIRE CODE OFFICIAL SHALL NOT RELIEVE THE APPLICANT OF THE RESPONSIBILITY OF COMPLIANCE WITH THIS CODE. CFC 105.4.4

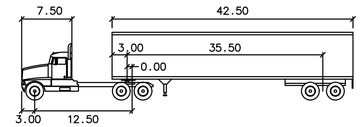


WB-50
AASHTO 2004 (US)
[ft]

STEERING LOCK ANGLE = 17.7 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 14.4 deg.
60 deg. SWEEP ANGLE: 17.1 deg.
90 deg. SWEEP ANGLE: 17.6 deg.
120 deg. SWEEP ANGLE: 17.7 deg.
150 deg. SWEEP ANGLE: 17.7 deg.
180 deg. SWEEP ANGLE: 17.7 deg.



WB-50

feet			
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

TABLE OF FIRE-FLOW & FIRE HYDRANT REQUIREMENTS FOR BUILDINGS

BUILDING	OCCUPANCY CLASS (CBC-CH.3)	CONSTRUCTION TYPE (CBC-CH.6)	SQUARE FOOTAGE CALC (SF)	AUTO SPRINKLER SYS. (Y/N/PART)	FIRE FLOW (GPM) (CFC-B105.2)	REDUCED FIRE FLOW (GPM) (CFC-B105.2)	FLOW DURATION @ REDUCED FLOW (HR) (CFC-B105.2)	MIN. NO. FIRE HYDRANTS (FH) (CFC-C102.1)	REQUIRED AVG. FH SPACING (FT) (CFC-C102.1)	PROPOSED AVG. FH SPACING (FT)	MAX SPACING ACCESS ROAD TO FH (FT) (CFC-C102.1)
PROP MOB	B	1A	165,000 *	Y	4,500 *	1,125 **	2	1	750 ***	357	375 ***

* - FOR TYPE IA & IB CONSTRUCTION, SQUARE FOOTAGE CALC FOR OPEN PARKING GARAGE SHALL BE DETERMINED BY AREA OF LARGEST FLOOR (CFC-B104.3)
** - REDUCED FIRE FLOW SHALL NOT BE LESS THAN 1,000 GPM (CFC-B105.2)
*** - 50% SPACING INCREASE FOR BUILDINGS EQUIPPED THROUGHOUT WITH APPROVED AUTO SPRINKLER SYSTEM IN ACCORDANCE WITH CFC-903.3.1.1 (CFC-C102.1)

SITE PHASING - 1
FIRE PROTECTION PLAN

SEPTEMBER 09, 2022

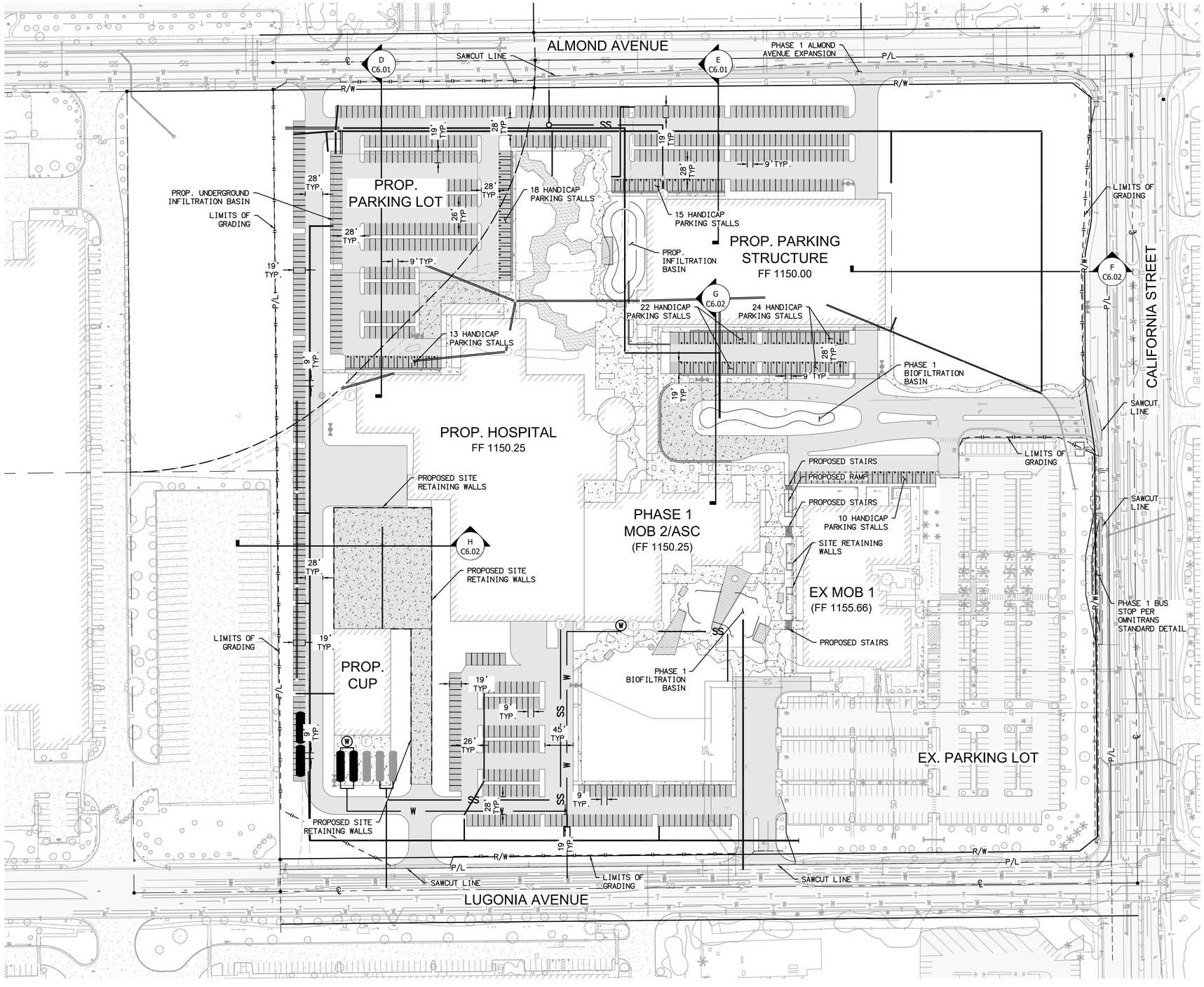
CO ARCHITECTS

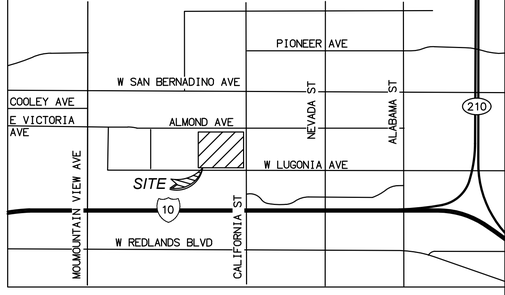
REDLANDS MEDICAL CENTER

Sheet: **C2.04**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000
ZONE: CR ZONE	





VICINITY MAP

N.T.S.

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- CURB AND GUTTER
- AC PAVEMENT
- HEAVY VEHICULAR AC PAVEMENT
- HEAVY VEHICULAR CONCRETE PAVEMENT
- PEDESTRIAN CONCRETE PAVEMENT
- DG PATH
- PROPOSED BUILDING
- TRUNCATED DOMES
- LIMITS OF WORK LINE

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 2
SITE PLAN

SEPTEMBER 09, 2022

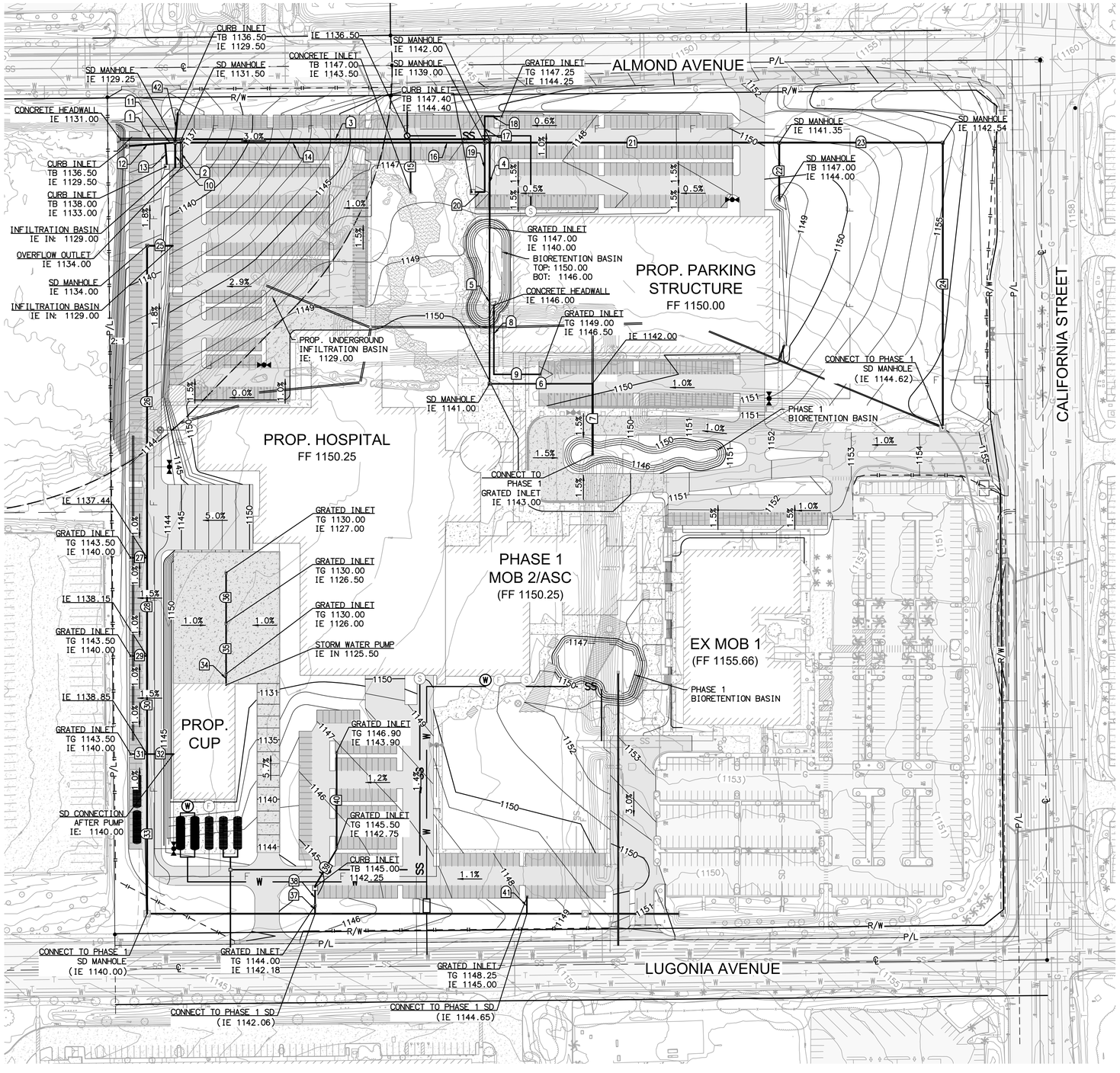
CO ARCHITECTS

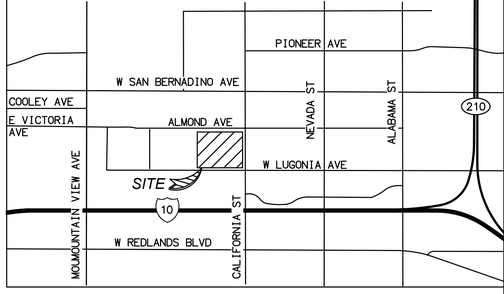
REDLANDS MEDICAL CENTER

Sheet: **C3.00**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals	PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000





VICINITY MAP

N.T.S.

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- DAYLIGHT LINE
- STORM DRAIN
- CURB INLET
- STORM DRAIN MANHOLE
- CATCH BASIN INLET
- CONCRETE HEADWALL
- CONCRETE STRUCTURE INLET

EARTHWORK

CUT: 79,000 CY

FILL: 105,000 CY

NET: 26,000 CY FILL

GRADING GENERAL NOTES

1. ALL GRADING AND ON-SITE CONSTRUCTION SHALL MEET THE MINIMUM REQUIREMENTS OF THE UNIFORM BUILDING CODE, LATEST EDITION, APPENDIX CHAPTER 33 AND THE CALIFORNIA BUILDING CODE, LATEST EDITION. THESE CODES ARE AMENDED IN THE CITY OF REDLANDS MUNICIPAL CODE. IF CONTRADICTIONS ARISE BETWEEN PROVISIONS IN THESE PLANS FROM THOSE IN THE VARIOUS CODES, THE MOST RESTRICTIVE PROVISIONS WILL GOVERN.

2. AFTER THE GRADING PERMIT HAS BEEN ISSUED, THE PROJECT MANAGER SHALL CONVENE AN ON-SITE PRECONSTRUCTION MEETING WITH THE CITY OF REDLANDS INSPECTOR, THE ENGINEER OF RECORD, THE GEOTECHNICAL ENGINEER AND THE GRADING CONTRACTOR. AT THIS MEETING, THE PROJECT SUPERINTENDENT SHALL BE IDENTIFIED AND AN EMERGENCY CONTACT PERSON SHALL BE IDENTIFIED TO THE INSPECTOR.

3. USE BEST MANAGEMENT PRACTICES (BMPS) TO PREVENT AND CONTAIN ILLEGAL DISCHARGES WITHIN THE PROJECT BOUNDARY. THIS WILL BE IN EFFECT FOR THE ENTIRE DURATION OF THE PROJECT CONSTRUCTION TO ITS COMPLETION.

4. BUILDING PERMITS SHALL NOT BE ISSUED UNTIL THE PROJECT SITE HAS BEEN GRADED AND THE ENGINEER OF RECORD HAS CERTIFIED TO THE SATISFACTION OF THE CITY ENGINEER THAT THE SITE HAS BEEN PREPARED ACCORDING TO THE RECOMMENDATIONS OF THE SOILS REPORT(S) AND TO THE SPECIFICATIONS OF THE APPROVED GRADING PLANS. IN ADDITION, A FINAL COMPACTION REPORT SHALL BE SUBMITTED TO BOTH THE INSPECTOR AND THE BUILDING OFFICIAL FOR APPROVAL.

5. A WRITTEN REPORT BY A GEOTECHNICAL ENGINEER IS TO BE FURNISHED TO BOTH THE CITY'S MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT AND BUILDING AND SAFETY DIVISION, TO CERTIFY THAT ALL FILL MATERIAL AND MATERIAL UPON WHICH FILL IS TO BE PLACED IS ADEQUATE TO SUPPORT THE LOADS OF THE PROPOSED DEVELOPMENT. THIS REPORT SHALL INCLUDE SOIL TEST DATA ON ALL FILLS OF TWO FEET OR MORE.

6. PREPARATION OF THE SITE SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE INSTRUCTIONS OF A GEOTECHNICAL ENGINEER AND ALL FILLS WILL BE MADE UNDER HIS DIRECTION.

7. IN NO CASE IS ANY SLOPE TO EXCEED A GRADIENT OF TWO HORIZONTAL TO ONE VERTICAL (2:1).

8. THE ENGINEER OF RECORD ASSUMES NO LIABILITY FOR THE EXISTENCE AND LOCATIONS OF UNDERGROUND UTILITY LINES, STRUCTURES OR IRRIGATION LINES. THE CONTRACTOR IS TO MAKE AN ON-SITE INSPECTION AND NOTIFY ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATION OF ANY AND ALL UNDERGROUND FACILITIES.

9. THE CONTRACTOR SHALL BE FAMILIAR WITH AND RESPONSIBLE FOR CLEARING THE SITE IN PREPARATION FOR CONSTRUCTION.

10. THE ENGINEER'S ESTIMATE IS 79,000 CY OF EXCAVATION AND 105,000 CY OF EMBANKMENT FOR THE SITE GRADING. THESE ARE RAW QUANTITIES WITHOUT ALLOWANCES FOR LOSS, SHRINKAGE OR COMPACTION.

11. INSTALL FIRE HYDRANTS AS REQUIRED PRIOR TO THE DELIVERY OF ANY BUILDING MATERIAL TO THE SITE.

12. BENCHMARK: ENTER PROJECT SPECIFIC DATA HERE. ELEVATION:

13. ALL SLOPES THREE FEET OR GREATER MUST BE LANDSCAPED AND IRRIGATED PRIOR TO OCCUPANCY.

14. ACREAGE OF THE PROJECT IS: ACRE(S).

15. APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL FOR THE CONSTRUCTION OF ANY WALLS, SIDEWALKS, SLABS, PAVING, ETC. TO BE CONSTRUCTED ON-SITE AS SHOWN HEREON. A SEPARATE PERMIT IS REQUIRED FROM THE BUILDING AND SAFETY DIVISION FOR THE CONSTRUCTION OF THESE ON-SITE ITEMS.

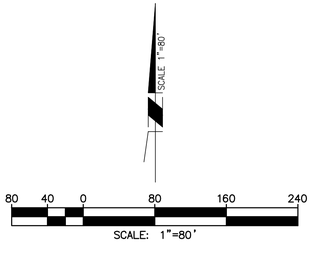
16. ALL EARTHWORK SHALL CONFORM TO THE PRELIMINARY GEOTECHNICAL AND/OR GEOLOGIC INVESTIGATION REPORT FOR _____ PREPARED BY_____, DATED _____ .

17. THE ENGINEER OF RECORD MUST SET GRADE STAKES FOR ALL DRAINAGE DEVICES.

18. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INSPECTIONS PRIOR TO POURING ANY CONCRETE.

STORM DRAIN DATA TABLE

NO	BEARING/DELTA	LENGTH	SLOPE (%)	SIZE/TYPE
1	N90°00'00"E	87.39'	0.5	36" HDPE
2	N00°00'00"E	41.44'	6.0	36" HDPE
3	N90°00'00"E	451.79'	1.7	24" HDPE
4	N00°00'00"E	127.48'	0.8	18" HDPE
5	N00°00'00"E	224.81'	0.5	18" HDPE
6	N89°58'41"E	151.13'	0.7	18" HDPE
7	N00°00'00"E	102.21'	1.0	18" HDPE
8	N00°00'00"E	101.20'	0.5	12" HDPE
9	N90°00'00"E	66.00'	0.5	12" HDPE
10	N00°00'00"E	34.43'	13.8	24" HDPE
11	N85°41'29"E	12.76'	0.5	18" HDPE
12	N85°41'29"E	52.85'	0.5	18" HDPE
13	N04°18'31"W	31.36'	0.5	18" HDPE
14	N90°00'00"E	345.19'	2.0	24" HDPE
15	N00°00'00"E	71.31'	9.9	12" HDPE
16	N90°00'00"E	106.62'	2.4	24" HDPE
17	N00°00'35"W	36.55'	3.8	12" HDPE
18	N89°59'12"E	22.84'	3.8	12" HDPE
19	N00°01'00"W	70.46'	6.4	18" HDPE
20	N89°59'01"E	14.37'	6.4	18" HDPE
21	N90°00'00"E	431.81'	0.5	18" HDPE
22	N00°00'00"E	82.75'	3.2	18" HDPE
23	N90°00'00"E	239.84'	0.5	18" HDPE
24	N00°00'00"W	415.13'	0.5	18" HDPE
25	N90°00'00"E	37.70'	13.3	24" HDPE
26	N00°00'02"E	457.85'	0.6	24" HDPE
27	N89°59'27"W	22.26'	0.5	12" HDPE
28	N00°00'48"W	144.03'	0.6	24" HDPE
29	N90°00'00"E	22.19'	0.5	12" HDPE
30	N00°00'48"W	144.00'	0.6	24" HDPE
31	N89°59'12"E	22.19'	0.5	12" HDPE
32	N90°00'00"E	38.86'	0.5	12" HDPE
33	N00°00'00"E	234.32'	0.6	18" HDPE
34	N00°00'00"W	11.90'	1.0	12" HDPE
35	N00°00'00"W	70.18'	1.0	12" HDPE
36	N00°00'00"W	72.18'	1.0	12" HDPE
37	N00°00'00"E	9.91'	1.0	12" HDPE
38	N00°00'00"E	20.59'	1.0	12" HDPE
39	N30°22'10"E	62.36'	0.8	12" HDPE
40	N00°00'48"W	136.05'	0.8	12" HDPE
41	N00°00'00"E	22.71'	1.5	18" HDPE
42	N05°16'30"E	38.73'	0.6	12" HDPE



SITE PHASING - 2
GRADING PLAN

SEPTEMBER 09, 2022

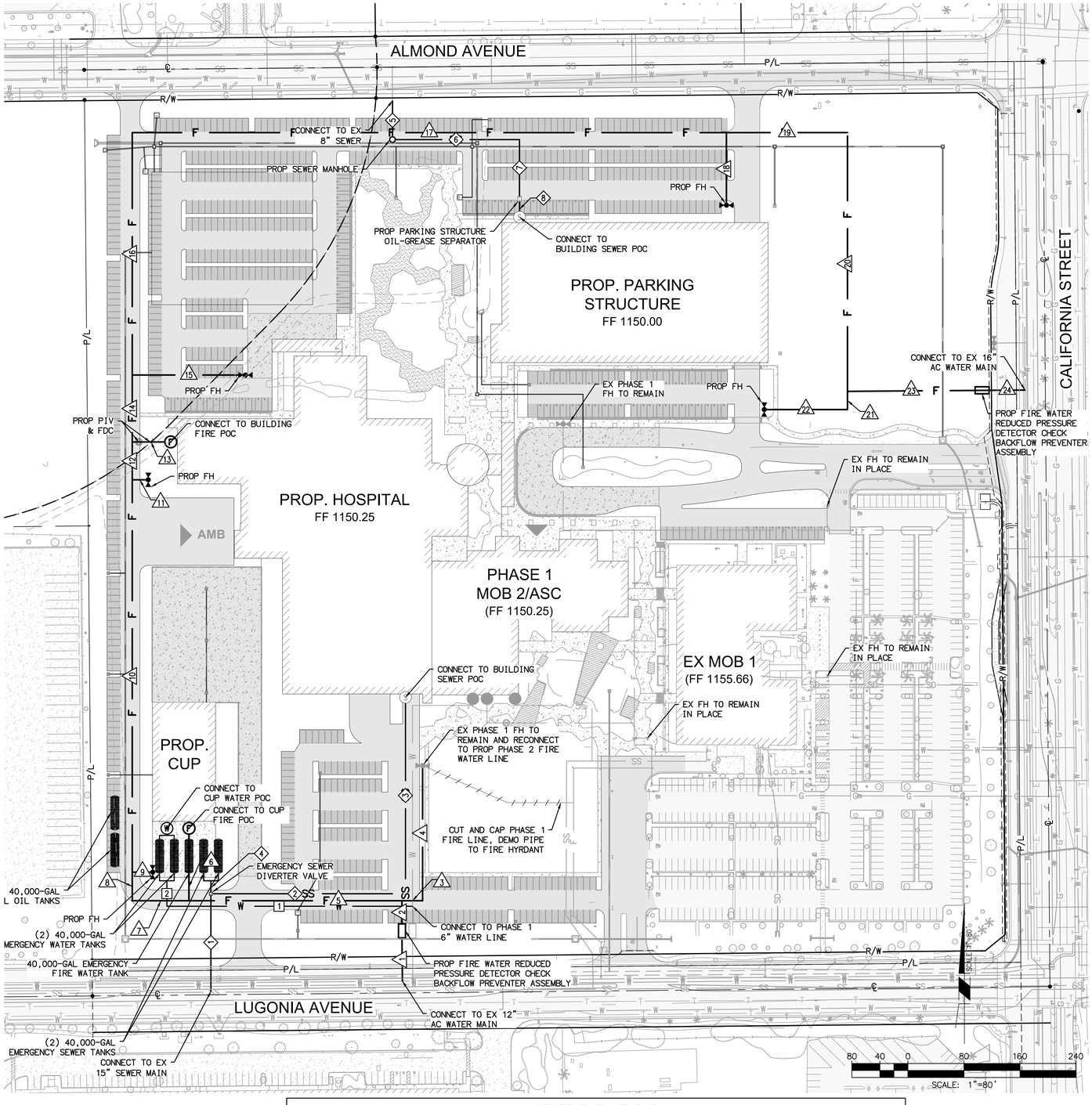
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C3.01**

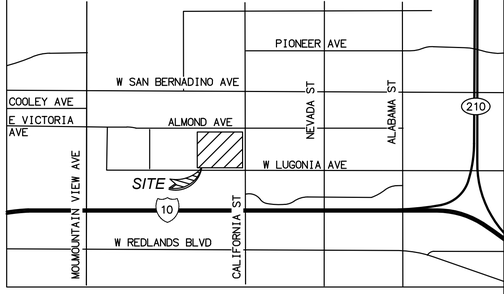
CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals	PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000
ZONE: CR ZONE	



LEGEND

WATER LINE	W
SEWER LINE	SS
FIRE LINE	F
PROP. FIRE HYDRANT	
EX. FIRE HYDRANT	
UTILITY POC	S W F
UNDERGROUND EMERGENCY TANKS	



VICINITY MAP

N.T.S.

WATER GENERAL NOTES

1. MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF REDLANDS MUNICIPAL WATER DIVISION STANDARD SPECIFICATION (LATEST REVISION THEREOF).
2. THE APPROXIMATE LOCATIONS OF EXISTING UNDERGROUND UTILITY LINES ARE SHOWN IN THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA, AND THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK, THE CONTRACTOR AGREES PRIOR TO EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK, AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR TRUNKLINE UTILITY FACILITIES.
3. ALL SERVICE CONNECTIONS TO BE MINIMUM 1-INCH COPPER LATERALS.
4. STANDARD WATER MAIN LOCATION IS 7 FEET OFF CURB FACE.
5. THIS DRAWING IS SCHEMATIC ONLY, DO NOT SCALE.
6. THE CONTRACTOR SHALL MAKE ALL WATER MAIN CONNECTIONS TO EXISTING WATER MAINS, UNLESS OTHERWISE NOTED.
7. EXISTING UTILITIES ARE SHOWN ON DEVELOPMENT PLAN.
8. HYDRO TEST TO XXX P.S.I. MIN 2 HOUR DURATION AT THE LOWEST POINT IN THE WATER MAIN.
9. BUTTERFLY VALVES TO BE DRESSER 450 OR KENNEDY ADAP-TORQ, CLOW STYLE #2810.
10. CONTRACTOR SHALL USE DOUBLE STRAP SERVICE CLAMPS OR H.D. TAPPED COUPLINGS WHEN CONNECTING SERVICE LATERALS.
11. CONTRACTOR SHALL NOTIFY CITY 48 HOURS PRIOR TO SHUTDOWN OF WATER MAINS.
12. INSTALLATION SHALL CONFORM TO MANUFACTURERS SPECIFICATIONS AND LATEST CITY SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.
13. METER BOXES IN THE SIDEWALK SHALL HAVE CAST IRON LIDS.
14. PROVIDE A MINIMUM OF 10 FOOT SEPARATION BETWEEN SEWER AND WATER LATERALS WHERE POSSIBLE.
15. BACKFILL COMPACTION AND RE-SURFACING IN EXISTING STREETS SHALL CONFORM TO STREET DIVISION SPECIFICATIONS (LATEST REVISION THEREOF).
16. ALL VALVES INSTALLED BY THE CONTRACTOR SHALL BE ACCESSIBLE FOR OPERATION WITH COMPLETE VALVE BOX TO GRADE DIRECTLY FOLLOWING CONNECTION TO EXISTING WATER SYSTEM.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE SIZING OF THRUST BLOCKS BASED ON FIELD CONDITIONS. THE SIZE SHOWN ON THE PLANS IS THE MINIMUM SIZE REQUIRED.
18. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED.
19. IF WATER MAINS ARE ABANDONED AS A RESULT OF THIS PROJECT THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RECONNECTION OR REPLACEMENT OF SERVICE LATERALS AS DIRECTED BY THE CITY INSPECTOR. SERVICE LATERALS THAT ARE REPLACED SHALL BE THE SAME SIZE AS EXISTING.
20. INTERIOR WATER SYSTEM INCLUDING FIRE HYDRANTS SHALL BE COMPLETE AND ACCEPTED BY THE CITY BEFORE ANY FRAMING PERMITS WILL BE ISSUED. CONTACT CITY FIRE MARSHALL FOR INTERIOR SYSTEM INSPECTIONS.
21. CONTACT THE MUNICIPAL WATER DIVISION 48 HOURS PRIOR TO ANY WATER SYSTEM CONSTRUCTION.
22. WHERE DESIGNATED ON THE PLANS, THE CONTRACTOR SHALL INSTALL POLY PIGS AND POLY PIG OUTLETS. THE CONTRACTOR SHALL NOTIFY THE CITY 48 HOURS IN ADVANCE TO REQUEST THE CITY TO FLUSH POLY PIGS THROUGH THE MAINS. THE FLUSHING PROCESS SHALL TAKE PLACE PRIOR TO HYDROSTATIC TESTING CHLORINATION AND FINAL FLUSHING OF THE MAIN BY THE CONTRACTOR. FINAL CONNECTIONS SHALL NOT BE MADE PRIOR TO BACTERIA TEST SAMPLES THAT MEET CITY REQUIREMENTS AND AUTHORIZATION FOR TIE-INS BY THE CITY INSPECTOR.
23. A COMPLETE SET OF AS BUILT DRAWINGS SHALL BE SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT PRIOR TO FINAL INSPECTION.
24. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING CITY WATER SYSTEM VALVES.
25. WATER VALVE CANS SHALL BE PER SPEC A-20514 (SLIP CAN TYPE).

SEWER GENERAL NOTES

1. SEWER INSTALLATION IS TO BE IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS AND DETAIL DRAWINGS OF THE CITY OF REDLANDS LATEST REVISION THEREOF.
2. ALL SEWER PIPE ELEVATIONS GIVEN REFER TO THE FLOW LINE INVERT ELEVATIONS.
3. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING UNDERGROUND UTILITY LINES ARE SHOWN ON THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA. THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK THE CONTRACTOR AGREES, PRIOR TO ANY EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR SERVICE UTILITY FACILITIES.
4. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED FOR ALL SEWER PIPE MAY BE REQUIRED IF IN THE OPINION OF THE CITY, THE NATIVE BACKFILL MATERIAL IS DEEMED UNSUITABLE.
5. PVC SEWER IS NOT PERMITTED ON ANY HORIZONTAL OR VERTICAL CURVE.
6. THE CONTRACTOR SHALL AIR TEST THE SEWER SYSTEM IN ACCORDANCE WITH CITY STANDARDS AFTER ALL OTHER UTILITIES HAVE BEEN INSTALLED AND COMPLETED WITHIN THE TRACT OR DEVELOPMENT. IN ADDITION, AFTER FINAL AIR TEST, THE CONTRACTOR SHALL CONNECT THE SEWER LATERALS TO THE HOUSE LATERALS AT THE PROPERTY.
7. SEWER LATERALS SHALL BE CLEARLY MARKED WITH AN "L" CHISELED IN CURB FACE.
8. REQUIRED SEPARATION OF THE WATER AND SEWER MAINS AND LATERALS SHALL BE STRICTLY ADHERED TO. INSTALLATION SHALL COMPLY WITH THE STATE DEPARTMENT OF HEALTH REGULATIONS AND BE A MINIMUM OF 10 FEET SEPARATION.
9. SEWER LATERAL LOCATIONS SHALL NOT BE CHANGED MORE THAN 3 FEET (HORIZONTAL) WITHOUT AUTHORIZATION FROM THE CITY.
10. IF PLASTIC SEWER PIPE IS USED, A MANDREL TEST SHALL BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE OF THE CITY INSPECTOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE MUNICIPAL UTILITIES DEPARTMENT. LATEST REVISIONS EXCEPT THE MANDREL SHALL BE SUPPLIED BY THE PIPE MANUFACTURER APPROVED BY CITY OF REDLANDS AND SHALL BE PULLED THROUGH THE PIPE BY HAND. PVC PIPE-MAXIMUM 15" DIAMETER ALLOWABLE.
11. PRIOR TO PAVING OF STREETS OVER A NEW SEWER MAIN ALL COMPACTION TESTS, AIR TESTS, BALLING AND MANDREL TESTS SHALL BE COMPLETED AND APPROVED BY THE CITY AND A COMPLETE SET OF AS-BUILT DRAWINGS SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION OF AS-BUILT DRAWINGS.
12. PRIOR TO ACCEPTANCE BY THE CITY. NEW SEWER LINE SHALL REMAIN PLUGGED AT OR PHYSICALLY SEPARATED FROM THE DOWNSTREAM MANHOLE AND STREETS SHALL BE PAVED.
13. THE CONTRACTOR SHALL REPLACE EXISTING STRIPING AS NECESSARY. THE CONTRACTOR SHALL OBTAIN AN ENCROACHMENT PERMIT FOR SEWER CONSTRUCTION FROM THE CITY OF REDLANDS PUBLIC WORKS DEPARTMENT PRIOR TO COMMENCEMENT OF WORK.
14. PVC SEWER PIPE AND FITTINGS SHALL CONFORM TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (A.S.T.M.) DESIGNATION D-3034, 15" MAXIMUM SIZE, SDR 35 LATEST REVISION.
15. THE JOINTING OF PVC SEWER PIPE SHALL BE BY USING ELECTROMETRIC GASKET JOINTS. THE CRITICAL SEALING DIMENSIONS OF THE BELL, SPIGOT, AND GASKET SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S STANDARD DIMENSIONS AND TOLERANCES.
16. MANHOLE RIM ELEVATIONS INDICATED HEREON ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL RIMS TO FINAL FINISH GRADE, IN COORDINATION WITH STREET IMPROVEMENTS.
17. ALL SEWER STATIONS ARE CENTERLINE SEWER MAIN UNLESS OTHERWISE INDICATED.
18. DURING THE PERIOD OF CONSTRUCTION THE CONTRACTOR SHALL FURNISH, ERECT, AND MAINTAIN ALL WARNINGS, SIGNS, BARRICADES, AND OTHER SAFETY MEASURES IN CONFORMANCE WITH THE STATE MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES, LATEST EDITION. THE CONTRACTOR SHALL PROVIDE SAFE AND CONTINUOUS PASSAGE FOR PEDESTRIAN AND VEHICULAR TRAFFIC AT ALL TIMES.

UNDERGROUND UTILITY NOTE

THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE GENERATED FROM RECORDS AND/OR UTILITY PROVIDER RECORD MAPS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHERS NOT OF RECORD OR NOT SHOWN ON THESE PLANS. ALL DAMAGES THERETO CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE APPROPRIATE SPECIFICATIONS AND STANDARDS AT THE EXPENSE OF THE CONTRACTOR.

WATER DATA TABLE

NO	BEARING/DELTA	LENGTH	SIZE/TYPE
1	N 90°00'00" E	350.53'	6" PVC (C900 DR18)
2	N 00°00'00" E	36.48'	6" PVC (C900 DR18)

SEWER DATA TABLE

NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE	NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 00°00'00" E	--	139.35'	6" PVC (SDR-35)	5	N 00°00'00" E	--	55.18'	6" PVC (SDR-35)
2	N 90°00'00" E	--	277.70'	6" PVC (SDR-35)	6	N 90°00'00" E	--	181.20'	6" PVC (SDR-35)
3	N 00°00'00" E	--	280.40'	6" PVC (SDR-35)	7	N 00°00'00" E	--	80.64'	6" PVC (SDR-35)
4	N 00°00'00" E	--	18.51'	6" PVC (SDR-35)	8	N 00°00'00" E	--	21.88'	6" PVC (SDR-35)

FIRE DATA TABLE

NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE	NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 00°33'50" W	--	61.61'	10" PVC (C900 DR14)	13	N 90°00'00" E		54.87'	4" PVC (C900 DR14)
2	N 00°00'00" E	--	33.07'	10" PVC (C900 DR14)	14	N 00°00'00" E	--	95.54'	10" PVC (C900 DR14)
3	N 90°00'00" E	--	29.48'	6" PVC (C900 DR14)	15	N 90°00'00" E	--	161.59'	6" PVC (C900 DR14)
4	N 00°00'00" E	--	192.92'	6" PVC (C900 DR14)	16	N 00°00'00" E	--	346.23'	10" PVC (C900 DR14)
5	N 90°00'00" E	--	304.12'	10" PVC (C900 DR14)	17	N 90°00'00" E	--	848.04'	10" PVC (C900 DR14)
6	N 00°00'00" E	--	38.66'	10" PVC (C900 DR14)	18	N 00°00'00" E	--	103.69'	6" PVC (C900 DR14)
7	N 90°00'00" E	--	80.81'	10" PVC (C900 DR14)	19	N 90°00'00" E	--	172.71'	10" PVC (C900 DR14)
8	N 00°00'00" E	--	40.81'	10" PVC (C900 DR14)	20	N 00°00'00" E	--	364.56'	10" PVC (C900 DR14)
9	N 90°00'00" E	--	29.16'	6" PVC (C900 DR14)	21	N 00°00'00" E	--	25.92'	10" PVC (C900 DR14)
10	N 00°00'00" E	--	560.16'	10" PVC (C900 DR14)	22	N 90°00'00" E	--	118.72'	6" PVC (C900 DR14)
11	N 90°00'00" E	--	22.72'	6" PVC (C900 DR14)	23	N 89°33'08" E	--	182.22'	10" PVC (C900 DR14)
12	N 00°00'00" E	--	54.03'	10" PVC (C900 DR14)	24	N 89°33'08" E	--	51.22'	10" PVC (C900 DR14)

SITE PHASING - 2
UTILITY PLAN

SEPTEMBER 09, 2022

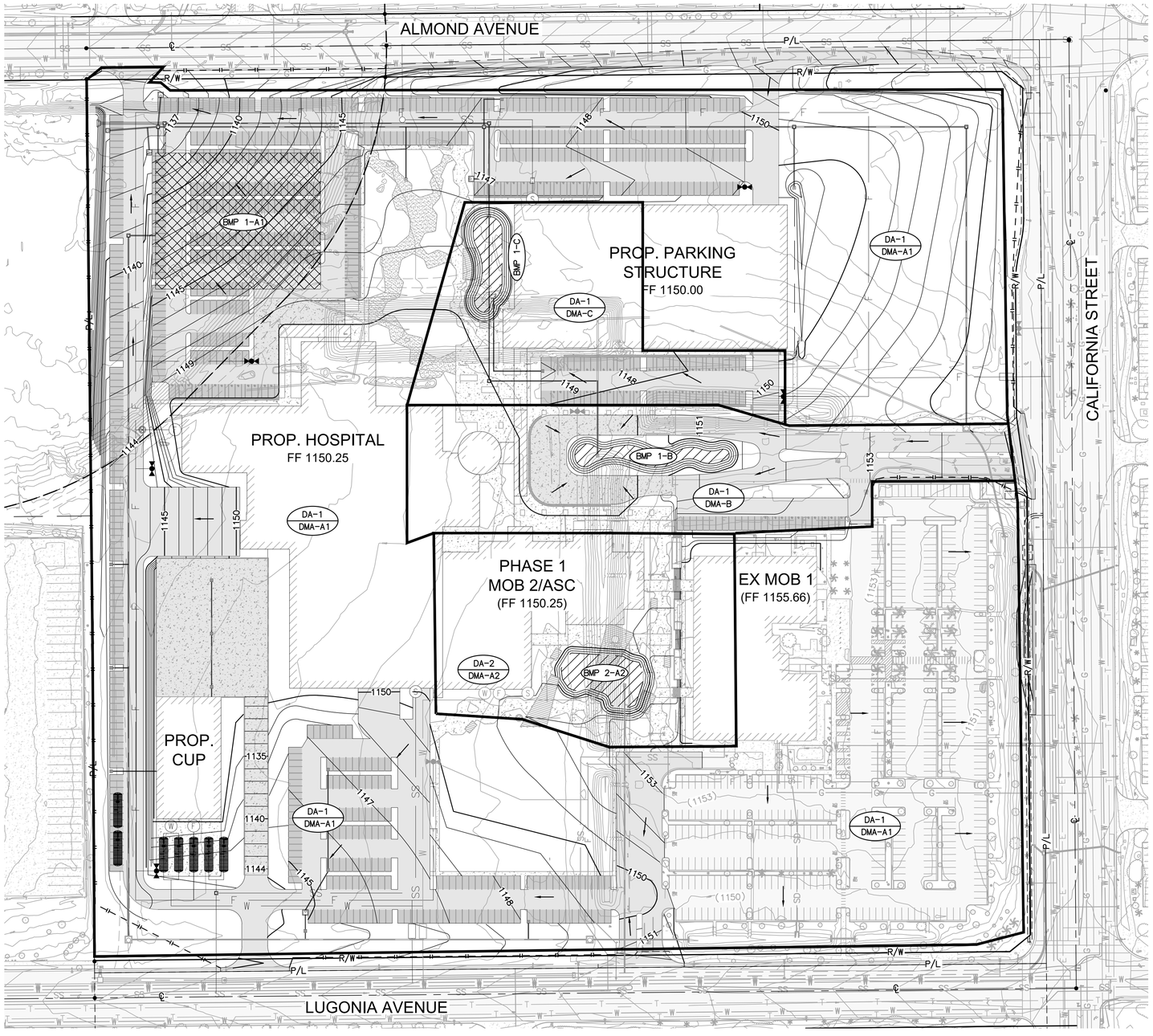
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C3.02**

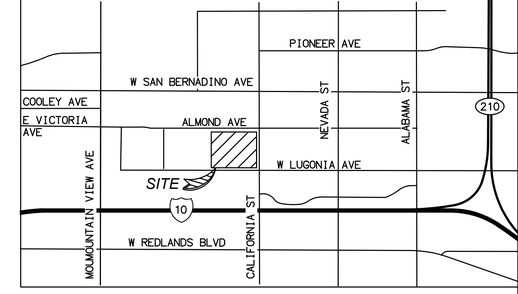
CITY OF REDLANDS

Site Development Plan Number:
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Int., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX
ZONE: CR ZONE
ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



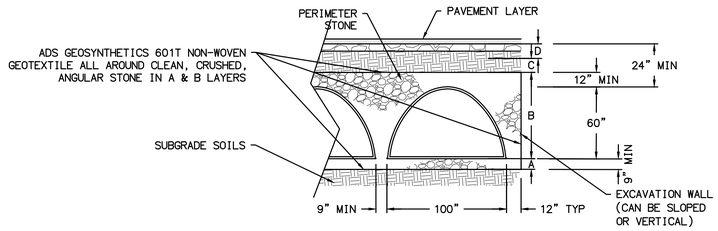
LEGEND

- STORM WATER BASIN
- UNDERGROUND INFILTRATION CHAMBERS
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



VICINITY MAP

N.T.S.

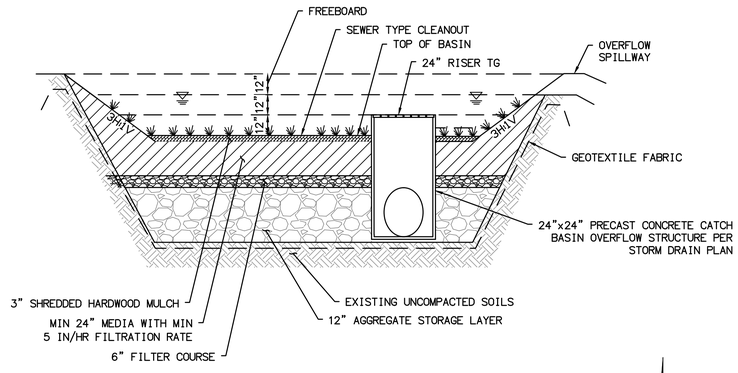


NOTES:

1. SECTION A - FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER
2. SECTION B - EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.
3. SECTION C - INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.
4. SECTION D - FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.

TYPICAL UNDERGROUND ADS STORMWATER CHAMBER INFILTRATION DETAIL

SCALE: NOT TO SCALE



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE

DA	DMA	TOTAL AREA (SF)	IMPERVIOUS RATIO	DMA RUNOFF FACTOR	DESIGN CAPTURE VOLUME (CF)	BMP PROPOSED SURFACE AREA (SF)	VOLUME RETAINED BY BMP (CF)	BMP TYPE
1	A1	1,197,394	85%	0.66	91,866	43,500	92,438	UNDERGROUND INFILTRATION (SIZED FOR ULTIMATE PHASE 4)
1	B	126,200	85%	0.66	9,682	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	109,300	85%	0.66	8,386	4,000	9,300	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
2	A2	152,000	85%	0.66	11,662	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 2
BMP PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

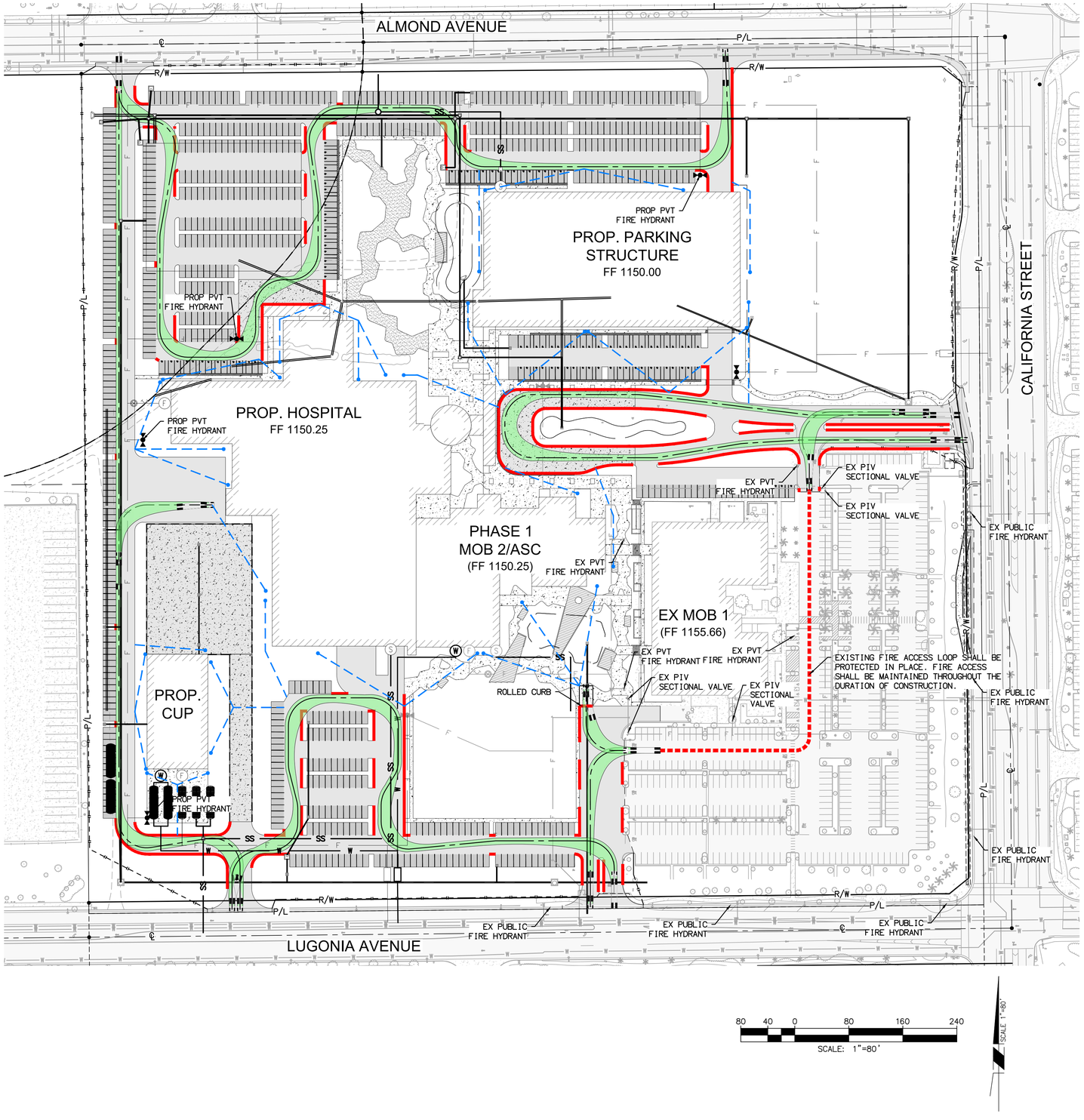
REDLANDS MEDICAL CENTER

Sheet: **C3.03**

CITY OF REDLANDS

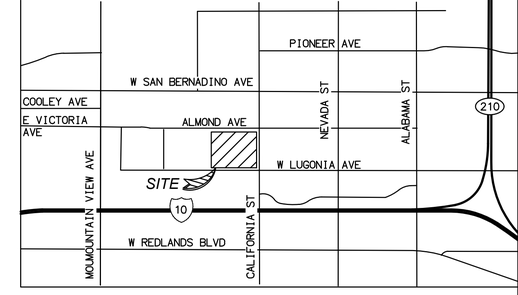
Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
TYPE OF DEVELOPMENT: XXXXX
ZONE: CR ZONE
LOCATION: 1301 California Street, Redlands, CA 92374
ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



FIRE PROTECTION LEGEND

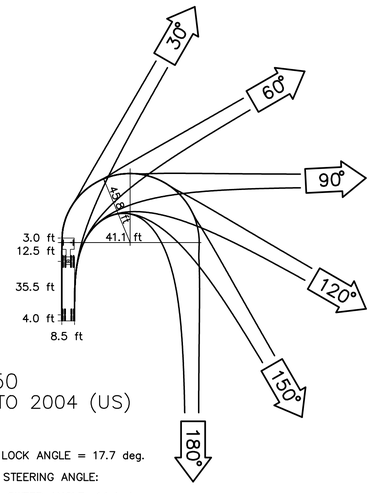
- PROPOSED FIRE HYDRANT
- PROPOSED PIV
- PROPOSED FDC
- PROPOSED FIRE MAIN
- HOSE PULL (150' MAX)
- RED PAINTED CURB
- FIRE TRUCK TURNING MOVEMENT
- EXISTING FIRE HYDRANT
- EXISTING PIV
- EXISTING FDC
- EXISTING FIRE MAIN
- EXISTING FIRE ROUTE



VICINITY MAP
N.T.S.

FIRE NOTES

1. FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION. CFC 501.4
2. STREET OR ROAD SIGNS - TEMPORARY SIGNS SHALL BE INSTALLED AT EACH STREET INTERSECTION WHEN CONSTRUCTION OF NEW ROADWAYS ALLOWS PASSAGE BY VEHICLES. SINGS SHALL BE OF AN APPROVED SIZE, WEATHER RESISTANT AND BE MAINTAINED UNTIL REPLACED BY PERMANENT SIGNS. CFC 505.2
3. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS AND SHALL BE SURFACED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES. CFC 503.2.3
4. POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELL ARE TO BE LOCATED ON THE ADDRESS/ACCESS SIDE OF THE BUILDING.
5. CLEAR SPACE AROUND HYDRANTS - A THREE (3) FOOT CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF FIRE HYDRANTS, EXCEPT AS OTHERWISE REQUIRED OR APPROVED. CFC 507.5.5
6. PHYSICAL PROTECTION - WHERE FIRE HYDRANTS ARE SUBJECT TO IMPACT BY A MOTOR VEHICLE, GUARD POSTS OR OTHER APPROVED MEANS SHALL COMPLY WITH SECTION 312. CFC 507.5.6
7. DEAD ENDS - DEAD END FIRE APPARATUS ACCESS ROADS IN EXCESS OF 150 FEET IN LENGTH SHALL BE PROVIDED WITH AN APPROVED AREA FOR TURNING AROUND FIRE APPARATUS. CFC 503.2.5
8. SECURITY GATES - WHERE SECURITY GATES ARE INSTALLED, THEY SHALL HAVE AN APPROVED MEANS OF EMERGENCY OPERATION. THE SECURITY GATES AND EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM G 2200.
9. VEGETATION SHALL BE SELECTED AND MAINTAINED IN SUCH A MANNER AS TO ALLOW IMMEDIATE ACCESS TO ALL HYDRANTS, VALVES, FIRE DEPARTMENT CONNECTIONS, PULL STATIONS, EXTINGUISHERS, SPRINKLER RISERS, ALARM CONTROL PANELS, RESCUE WINDOWS AND OTHER DEVICES OR AREAS USED FOR FIREFIGHTING PURPOSES. VEGETATION OF BUILDING FEATURES SHALL NO OBSTRUCT ADDRESS NUMBERS OR INHIBIT THE FUNCTIONING OF ALARM BELLS, HORNS OR STROBES.
10. APPROVED DOCUMENTS - CONSTRUCTION DOCUMENTS APPROVED BY THE FIRE CODE OFFICIAL ARE APPROVED WITH THE INTENT THAT SUCH CONSTRUCTION DOCUMENTS COMPLY IN ALL RESPECTS WITH THIS CODE. REVIEW AND APPROVAL BY THE FIRE CODE OFFICIAL SHALL NOT RELIEVE THE APPLICANT OF THE RESPONSIBILITY OF COMPLIANCE WITH THIS CODE. CFC 105.4.4

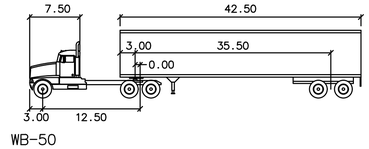


WB-50
AASHTO 2004 (US)
[ft]

STEERING LOCK ANGLE = 17.7 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 14.4 deg.
60 deg. SWEEP ANGLE: 17.1 deg.
90 deg. SWEEP ANGLE: 17.6 deg.
120 deg. SWEEP ANGLE: 17.7 deg.
150 deg. SWEEP ANGLE: 17.7 deg.
180 deg. SWEEP ANGLE: 17.7 deg.



WB-50

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

SITE PHASING - 2
FIRE PROTECTION PLAN

SEPTEMBER 09, 2022

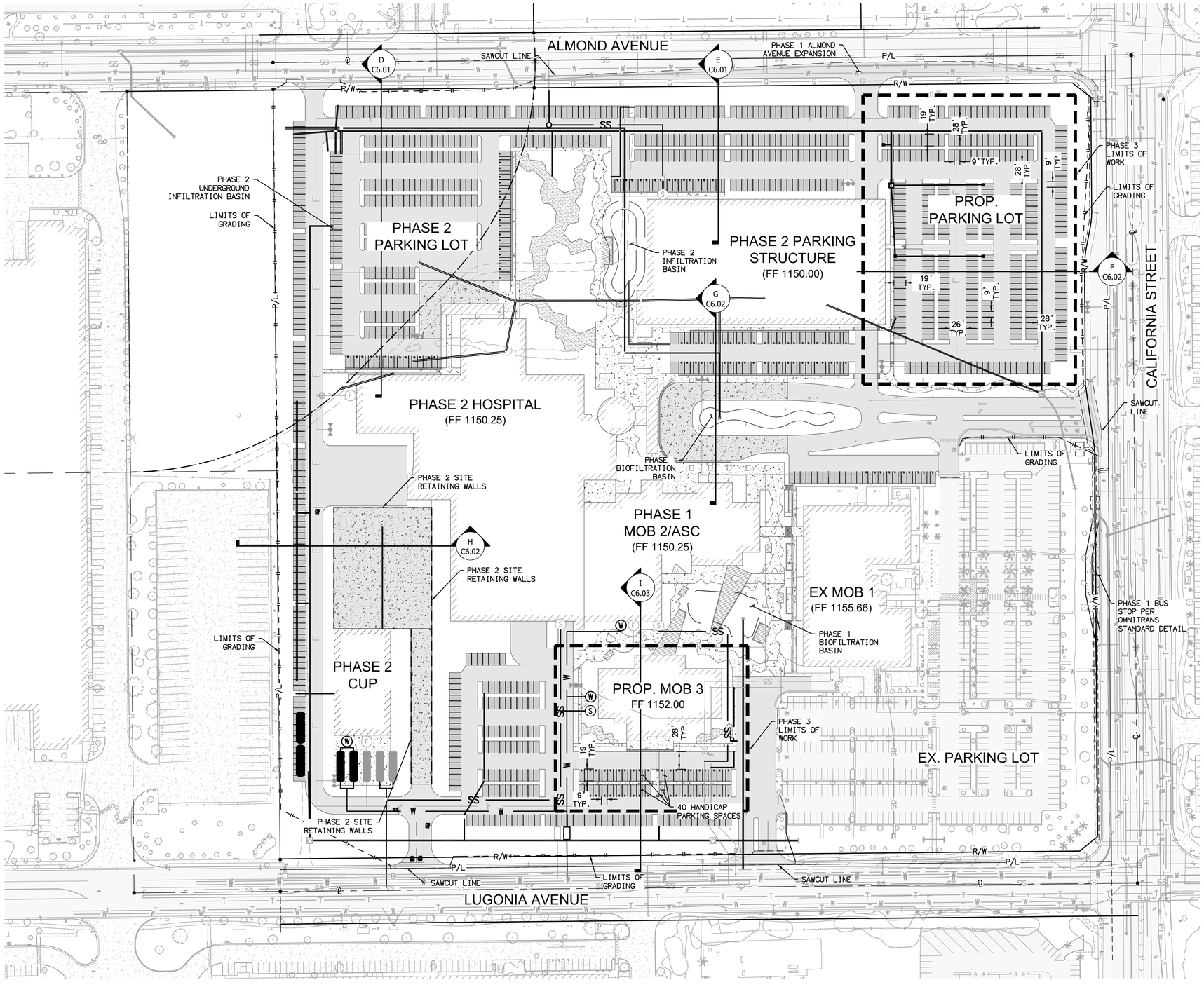
CO ARCHITECTS

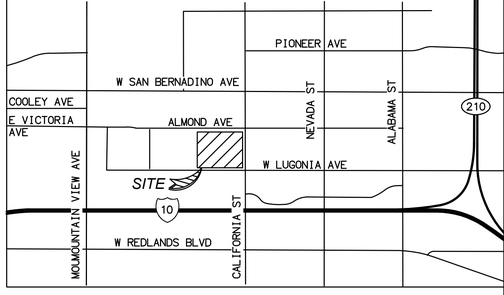
REDLANDS MEDICAL CENTER

Sheet: **C3.04**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000
ZONE: CR ZONE	





VICINITY MAP

N.T.S.

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- CURB AND GUTTER
- AC PAVEMENT
- HEAVY VEHICULAR AC PAVEMENT
- HEAVY VEHICULAR CONCRETE PAVEMENT
- PEDESTRIAN CONCRETE PAVEMENT
- DG PATH
- PROPOSED BUILDING
- TRUNCATED DOMES
- LIMITS OF WORK LINE

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 3
SITE PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C4.00**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
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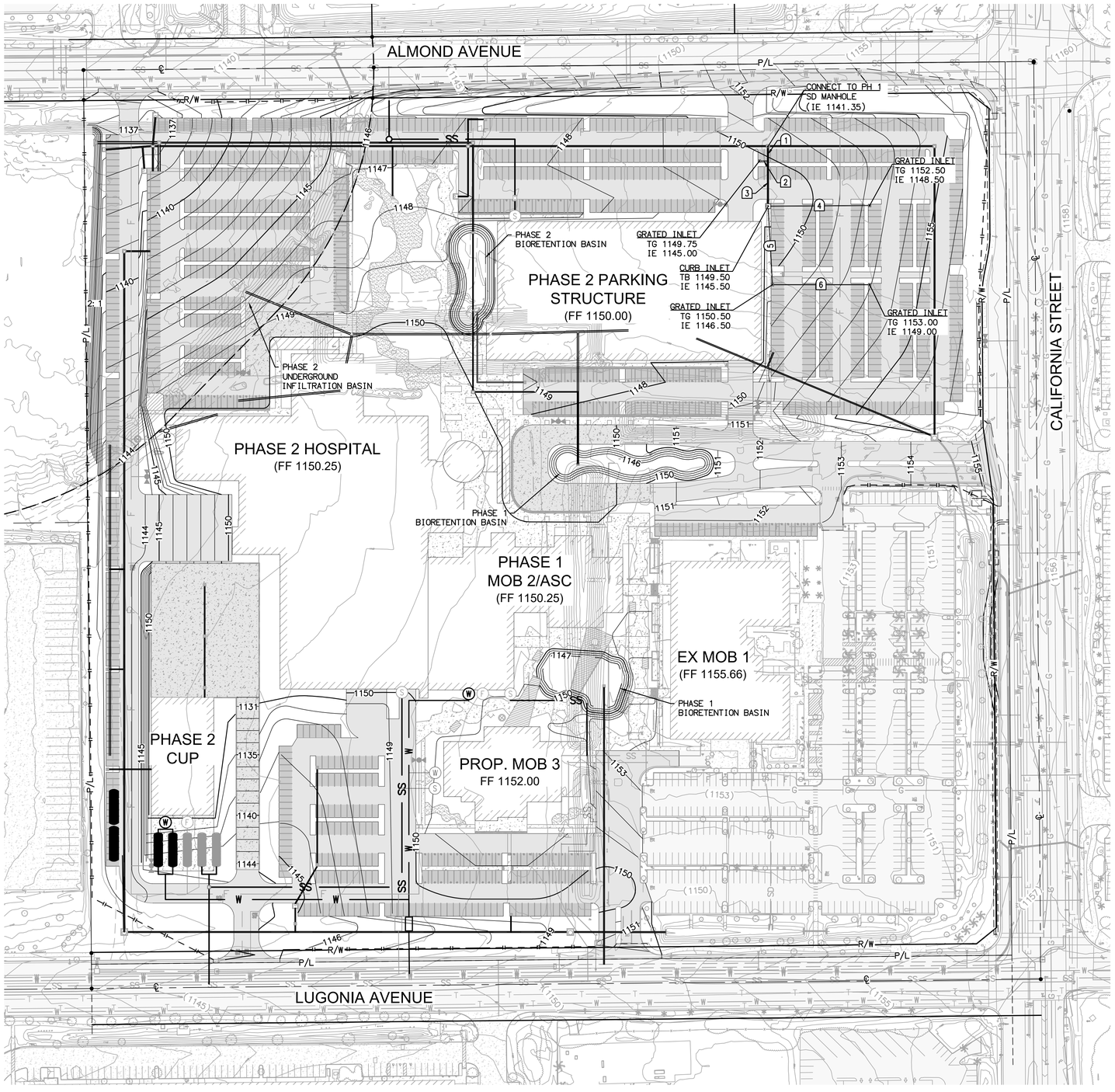

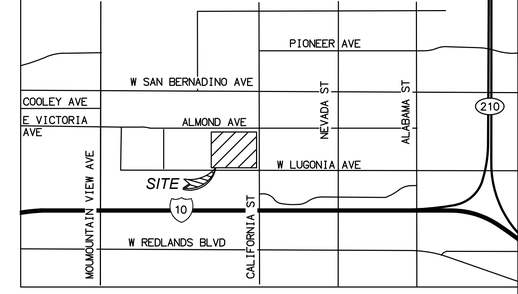

VICINITY MAP

N.T.S.

GRADING GENERAL NOTES

1. ALL GRADING AND ON-SITE CONSTRUCTION SHALL MEET THE MINIMUM REQUIREMENTS OF THE UNIFORM BUILDING CODE, LATEST EDITION, APPENDIX CHAPTER 33 AND THE CALIFORNIA BUILDING CODE, LATEST EDITION. THESE CODES ARE AMENDED IN THE CITY OF REDLANDS MUNICIPAL CODE. IF CONTRADICTIONS ARISE BETWEEN PROVISIONS IN THESE PLANS FROM THOSE IN THE VARIOUS CODES, THE MOST RESTRICTIVE PROVISIONS WILL GOVERN.
2. AFTER THE GRADING PERMIT HAS BEEN ISSUED, THE PROJECT MANAGER SHALL CONVENE AN ON-SITE PRECONSTRUCTION MEETING WITH THE CITY OF REDLANDS INSPECTOR, THE ENGINEER OF RECORD, THE GEOTECHNICAL ENGINEER AND THE GRADING CONTRACTOR. AT THIS MEETING, THE PROJECT SUPERINTENDENT SHALL BE IDENTIFIED AND AN EMERGENCY CONTACT PERSON SHALL BE IDENTIFIED TO THE INSPECTOR.
3. USE BEST MANAGEMENT PRACTICES (BMPS) TO PREVENT AND CONTAIN ILLEGAL DISCHARGES WITHIN THE PROJECT BOUNDARY. THIS WILL BE IN EFFECT FOR THE ENTIRE DURATION OF THE PROJECT CONSTRUCTION TO ITS COMPLETION.
4. BUILDING PERMITS SHALL NOT BE ISSUED UNTIL THE PROJECT SITE HAS BEEN GRADED AND THE ENGINEER OF RECORD HAS CERTIFIED TO THE SATISFACTION OF THE CITY ENGINEER THAT THE SITE HAS BEEN PREPARED ACCORDING TO THE RECOMMENDATIONS OF THE SOILS REPORT(S) AND TO THE SPECIFICATIONS OF THE APPROVED GRADING PLANS. IN ADDITION, A FINAL COMPACTION REPORT SHALL BE SUBMITTED TO BOTH THE INSPECTOR AND THE BUILDING OFFICIAL FOR APPROVAL.
5. A WRITTEN REPORT BY A GEOTECHNICAL ENGINEER IS TO BE FURNISHED TO BOTH THE CITY'S MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT AND BUILDING AND SAFETY DIVISION, TO CERTIFY THAT ALL FILL MATERIAL AND MATERIAL UPON WHICH FILL IS TO BE PLACED IS ADEQUATE TO SUPPORT THE LOADS OF THE PROPOSED DEVELOPMENT. THIS REPORT SHALL INCLUDE SOIL TEST DATA ON ALL FILLS OF TWO FEET OR MORE.
6. PREPARATION OF THE SITE SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE INSTRUCTIONS OF A GEOTECHNICAL ENGINEER AND ALL FILLS WILL BE MADE UNDER HIS DIRECTION.
7. IN NO CASE IS ANY SLOPE TO EXCEED A GRADIENT OF TWO HORIZONTAL TO ONE VERTICAL (2: 1).
8. THE ENGINEER OF RECORD ASSUMES NO LIABILITY FOR THE EXISTENCE AND LOCATIONS OF UNDERGROUND UTILITY LINES, STRUCTURES OR IRRIGATION LINES. THE CONTRACTOR IS TO MAKE AN ON-SITE INSPECTION AND NOTIFY ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATION OF ANY AND ALL UNDERGROUND FACILITIES.
9. THE CONTRACTOR SHALL BE FAMILIAR WITH AND RESPONSIBLE FOR CLEARING THE SITE IN PREPARATION FOR CONSTRUCTION.
10. THE ENGINEER'S ESTIMATE IS 79,000 CY OF EXCAVATION AND 105,000 CY OF EMBANKMENT FOR THE SITE GRADING. THESE ARE RAW QUANTITIES WITHOUT ALLOWANCES FOR LOSS, SHRINKAGE OR COMPACTION.
11. INSTALL FIRE HYDRANTS AS REQUIRED PRIOR TO THE DELIVERY OF ANY BUILDING MATERIAL TO THE SITE.
12. BENCHMARK: ENTER PROJECT SPECIFIC DATA HERE. ELEVATION:
13. ALL SLOPES THREE FEET OR GREATER MUST BE LANDSCAPED AND IRRIGATED PRIOR TO OCCUPANCY.
14. ACREAGE OF THE PROJECT IS: ACRE(S).
15. APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL FOR THE CONSTRUCTION OF ANY WALLS, SIDEWALKS, SLABS, PAVING, ETC. TO BE CONSTRUCTED ON-SITE AS SHOWN HEREON. A SEPARATE PERMIT IS REQUIRED FROM THE BUILDING AND SAFETY DIVISION FOR THE CONSTRUCTION OF THESE ON-SITE ITEMS.
16. ALL EARTHWORK SHALL CONFORM TO THE PRELIMINARY GEOTECHNICAL AND/OR GEOLOGIC INVESTIGATION REPORT FOR _____ PREPARED BY_____, DATED _____ .
17. THE ENGINEER OF RECORD MUST SET GRADE STAKES FOR ALL DRAINAGE DEVICES.
18. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INSPECTIONS PRIOR TO POURING ANY CONCRETE.

LEGEND

- MAJOR CONTOUR (1150)
- MINOR CONTOUR (1151)
- DAYLIGHT LINE
- SAWCUT LINE
- STORM DRAIN
- CURB INLET
- STORM DRAIN MANHOLE
- CATCH BASIN INLET
- CONCRETE HEADWALL
- CONCRETE STRUCTURE INLET

EARTHWORK

CUT: 79,000 CY

FILL: 105,000 CY

NET: 26,000 CY FILL

STORM DRAIN DATA TABLE

NO	BEARING/DELTA	LENGTH	SIZE/TYPE	SLOPE (%)
1	N 00°18'03" W	19.39'	18" HDPE	5.1
2	N 89°41'57" E	10.48'	12" HDPE	25.4
3	N 00°18'03" W	61.86'	12" HDPE	5.1
4	N 89°35'35" E	140.80'	8" PVC	2.1
5	N 03°11'09" W	107.97'	12" HDPE	1.0
6	N 90°00'00" W	136.00'	8" PVC	1.8

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING -3
GRADING PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C4.01**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
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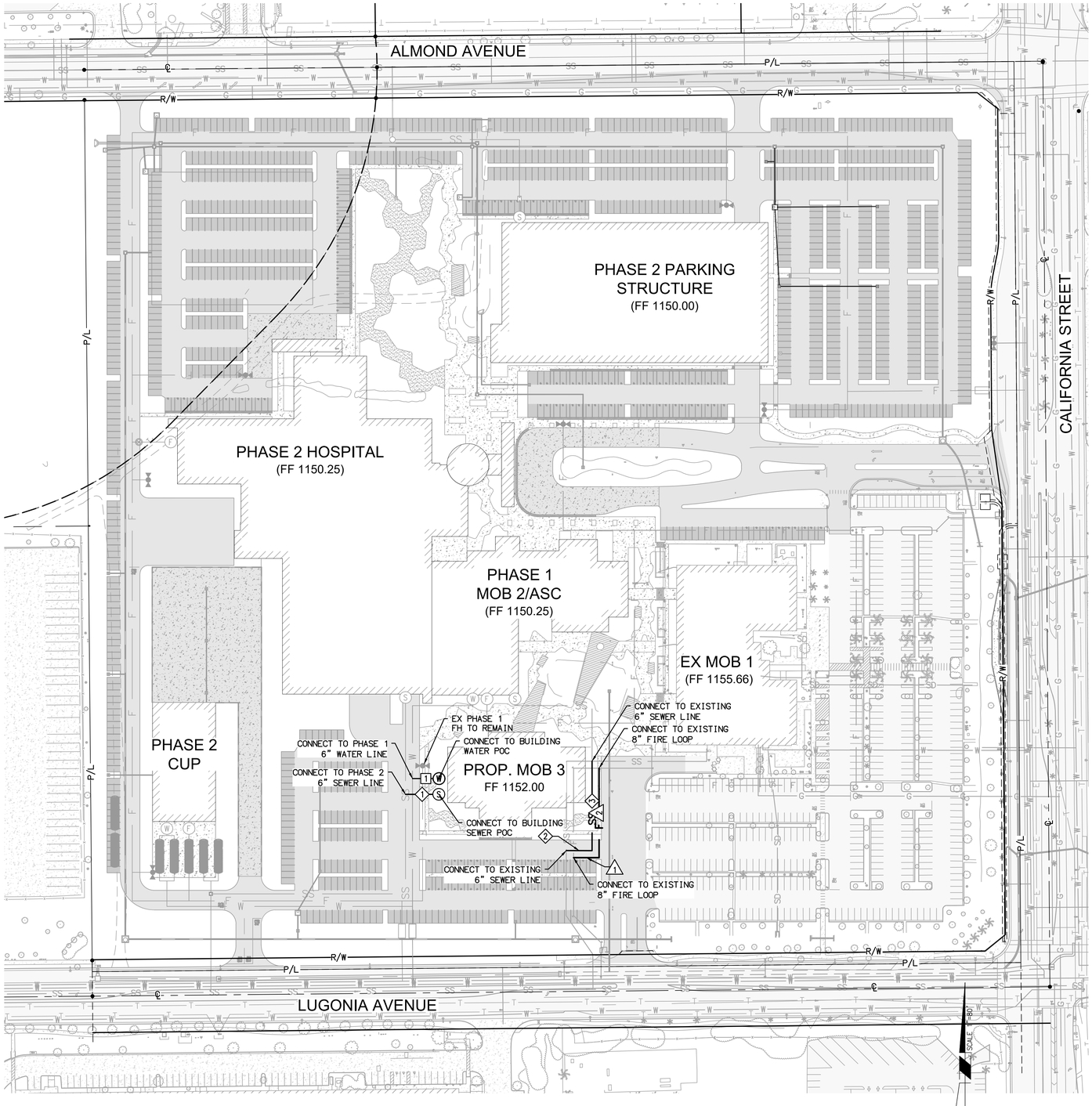


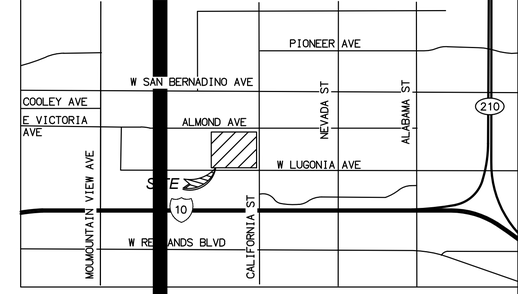
SCALE: 1"=80'

LEGEND

WATER LINE	W
SEWER LINE	SS
FIRE LINE	F
PROP. FIRE HYDRANT	
EX. FIRE HYDRANT	
UTILITY POC	(S) (W) (F)
UNDERGROUND EMERGENCY TANKS	

WATER GENERAL NOTES

1. MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF REDLANDS MUNICIPAL WATER DIVISION STANDARD SPECIFICATION (LATEST REVISION THEREOF).
2. THE APPROXIMATE LOCATIONS OF EXISTING UNDERGROUND UTILITY LINES ARE SHOWN IN THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA, AND THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK, THE CONTRACTOR AGREES PRIOR TO EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK, AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR TRUNKLINE UTILITY FACILITIES.
3. ALL SERVICE CONNECTIONS TO BE MINIMUM 1-INCH COPPER LATERALS.
4. STANDARD WATER MAIN LOCATION IS 7 FEET OFF CURB FACE.
5. THIS DRAWING IS SCHEMATIC ONLY, DO NOT SCALE.
6. THE CONTRACTOR SHALL MAKE ALL WATER MAIN CONNECTIONS TO EXISTING WATER MAINS, UNLESS OTHERWISE NOTED.
7. EXISTING UTILITIES ARE SHOWN ON DEVELOPMENT PLAN.
8. HYDRO TEST TO XXX P.S.I. MIN 2 HOUR DURATION AT THE LOWEST POINT IN THE WATER MAIN.
9. BUTTERFLY VALVES TO BE DRESSER 450 OR KENNEDY ADAP-TORQ, CLOW STYLE #2810.
10. CONTRACTOR SHALL USE DOUBLE STRAP SERVICE CLAMPS OR H.D. TAPPED COUPLINGS WHEN CONNECTING SERVICE LATERALS.
11. CONTRACTOR SHALL NOTIFY CITY 48 HOURS PRIOR TO SHUTDOWN OF WATER MAINS.
12. INSTALLATION SHALL CONFORM TO MANUFACTURERS SPECIFICATIONS AND LATEST CITY SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.
13. METER BOXES IN THE SIDEWALK SHALL HAVE CAST IRON LIDS.
14. PROVIDE A MINIMUM OF 10 FOOT SEPARATION BETWEEN SEWER AND WATER LATERALS WHERE POSSIBLE.
15. BACKFILL COMPACTION AND RE-SURFACING IN EXISTING STREETS SHALL CONFORM TO STREET DIVISION SPECIFICATIONS (LATEST REVISION THEREOF).
16. ALL VALVES INSTALLED BY THE CONTRACTOR SHALL BE ACCESSIBLE FOR OPERATION WITH COMPLETE VALVE BOX TO GRADE DIRECTLY FOLLOWING CONNECTION TO EXISTING WATER SYSTEM.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE SIZING OF THRUST BLOCKS BASED ON FIELD CONDITIONS. THE SIZE SHOWN ON THE PLANS IS THE MINIMUM SIZE REQUIRED.
18. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED.
19. IF WATER MAINS ARE ABANDONED AS A RESULT OF THIS PROJECT THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RECONNECTION OR REPLACEMENT OF SERVICE LATERALS AS DIRECTED BY THE CITY INSPECTOR. SERVICE LATERALS THAT ARE REPLACED SHALL BE THE SAME SIZE AS EXISTING.
20. INTERIOR WATER SYSTEM INCLUDING FIRE HYDRANTS SHALL BE COMPLETE AND ACCEPTED BY THE CITY BEFORE ANY FRAMING PERMITS WILL BE ISSUED. CONTACT CITY FIRE MARSHALL FOR INTERIOR SYSTEM INSPECTIONS.
21. CONTACT THE MUNICIPAL WATER DIVISION 48 HOURS PRIOR TO ANY WATER SYSTEM CONSTRUCTION.
22. WHERE DESIGNATED ON THE PLANS, THE CONTRACTOR SHALL INSTALL POLY PIGS AND POLY PIG OUTLETS. THE CONTRACTOR SHALL NOTIFY THE CITY 48 HOURS IN ADVANCE TO REQUEST THE CITY TO FLUSH POLY PIGS THROUGH THE MAINS. THE FLUSHING PROCESS SHALL TAKE PLACE PRIOR TO HYDROSTATIC TESTING CHLORINATION AND FINAL FLUSHING OF THE MAIN BY THE CONTRACTOR. FINAL CONNECTIONS SHALL NOT BE MADE PRIOR TO BACTERIA TEST SAMPLES THAT MEET CITY REQUIREMENTS AND AUTHORIZATION FOR TIE-INS BY THE CITY INSPECTOR.
23. A COMPLETE SET OF AS BUILT DRAWINGS SHALL BE SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT PRIOR TO FINAL INSPECTION.
24. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING CITY WATER SYSTEM VALVES.
25. WATER VALVE CANS SHALL BE PER SPEC A-20514 (SLIP CAN TYPE).



VICINITY MAP

N.T.S.

SEWER GENERAL NOTES

1. SEWER INSTALLATION IS TO BE IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS AND DETAIL DRAWINGS OF THE CITY OF REDLANDS LATEST REVISION THEREOF.
2. ALL SEWER PIPE ELEVATIONS GIVEN REFER TO THE FLOW LINE INVERT ELEVATIONS.
3. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING UNDERGROUND UTILITY LINES ARE SHOWN ON THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA. THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK THE CONTRACTOR AGREES, PRIOR TO ANY EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR SERVICE UTILITY FACILITIES.
4. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED FOR ALL SEWER PIPE MAY BE REQUIRED IF IN THE OPINION OF THE CITY, THE NATIVE BACKFILL MATERIAL IS DEEMED UNSUITABLE.
5. PVC SEWER IS NOT PERMITTED ON ANY HORIZONTAL OR VERTICAL CURVE.
6. THE CONTRACTOR SHALL AIR TEST THE SEWER SYSTEM IN ACCORDANCE WITH CITY STANDARDS AFTER ALL OTHER UTILITIES HAVE BEEN INSTALLED AND COMPLETED WITHIN THE TRACT OR DEVELOPMENT. IN ADDITION, AFTER FINAL AIR TEST, THE CONTRACTOR SHALL CONNECT THE SEWER LATERALS TO THE HOUSE LATERALS AT THE PROPERTY.
7. SEWER LATERALS SHALL BE CLEARLY MARKED WITH AN "L" CHISELED IN CURB FACE.
8. REQUIRED SEPARATION OF THE WATER AND SEWER MAINS AND LATERALS SHALL BE STRICTLY ADHERED TO. INSTALLATION SHALL COMPLY WITH THE STATE DEPARTMENT OF HEALTH REGULATIONS AND BE A MINIMUM OF 10 FEET SEPARATION.
9. SEWER LATERAL LOCATIONS SHALL NOT BE CHANGED MORE THAN 3 FEET (HORIZONTAL) WITHOUT AUTHORIZATION FROM THE CITY.
10. IF PLASTIC SEWER PIPE IS USED, A MANDREL TEST SHALL BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE OF THE CITY INSPECTOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE MUNICIPAL UTILITIES DEPARTMENT. LATEST REVISIONS EXCEPT THE MANDREL SHALL BE SUPPLIED BY THE PIPE MANUFACTURER APPROVED BY CITY OF REDLANDS AND SHALL BE PULLED THROUGH THE PIPE BY HAND. PVC PIPE-MAXIMUM 15" DIAMETER ALLOWABLE.
11. PRIOR TO PAVING OF STREETS OVER NEW SEWER MAIN ALL COMPACTION TESTS, AIR TESTS, BALLING AND MANDREL TESTS SHALL BE COMPLETED AND APPROVED BY THE CITY AND A COMPLETE SET OF AS-BUILT DRAWINGS SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION OF AS-BUILT DRAWINGS.
12. PRIOR TO ACCEPTANCE BY THE CITY NEW SEWER LINE SHALL REMAIN PLUGGED AT OR PHYSICALLY SEPARATED FROM THE DOWNSTREAM MANHOLE AND STREETS SHALL BE PAVED.
13. THE CONTRACTOR SHALL REPLACE EXISTING STRIPING AS NECESSARY. THE CONTRACTOR SHALL OBTAIN AN ENCROACHMENT PERMIT FOR SEWER CONSTRUCTION FROM THE CITY OF REDLANDS PUBLIC WORKS DEPARTMENT PRIOR TO COMMENCEMENT OF WORK.
14. PVC SEWER PIPE AND FITTINGS SHALL CONFORM TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (A.S.T.M.) DESIGNATION D-3034, 15" MAXIMUM SIZE, SDR 35 LATEST REVISION.
15. THE JOINTING OF PVC SEWER PIPE SHALL BE BY USING ELECTROMETRIC GASKET JOINTS. THE CRITICAL SEALING DIMENSIONS OF THE BELL, SPIGOT, AND GASKET SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S STANDARD DIMENSIONS AND TOLERANCES.
16. MANHOLE RIM ELEVATIONS INDICATED HEREON ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL RIMS TO FINAL FINISH GRADE, IN COORDINATION WITH STREET IMPROVEMENTS.
17. ALL SEWER STATIONS ARE CENTERLINE SEWER MAIN UNLESS OTHERWISE INDICATED.
18. DURING THE PERIOD OF CONSTRUCTION THE CONTRACTOR SHALL FURNISH, ERECT, AND MAINTAIN ALL WARNINGS, SIGNS, BARRICADES AND OTHER SAFETY MEASURES IN CONFORMANCE WITH THE STATE MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES, LATEST EDITION. THE CONTRACTOR SHALL PROVIDE SAFE AND CONTINUOUS PASSAGE FOR PEDESTRIAN AND VEHICULAR TRAFFIC AT ALL TIMES.

UNDERGROUND UTILITY NOTE

THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE GENERATED FROM RECORDS AND/OR UTILITY PROVIDER RECORD MAPS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHERS NOT OF RECORD OR NOT SHOWN ON THESE PLANS. ALL DAMAGES THERETO CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE APPROPRIATE SPECIFICATIONS AND STANDARDS AT THE EXPENSE OF THE CONTRACTOR.

SEWER DATA TABLE

NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 90°00'00" E	--	47.51'	6" PVC (SDR-35)
2	N 89°51'23" W	--	36.82'	6" PVC (SDR-35)

WATER DATA TABLE

NO	BEARING/DELTA	LENGTH	SIZE/TYPE
1	N 90°00'00" E	37.90'	4" PVC (C900 DR18)

FIRE DATA TABLE

NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 90°00'00" E	--	36.43'	8" PVC (C900 DR14)
2	N 00°00'00" E	--	127.78'	8" PVC (C900 DR14)

SITE PHASING - 3
UTILITY PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

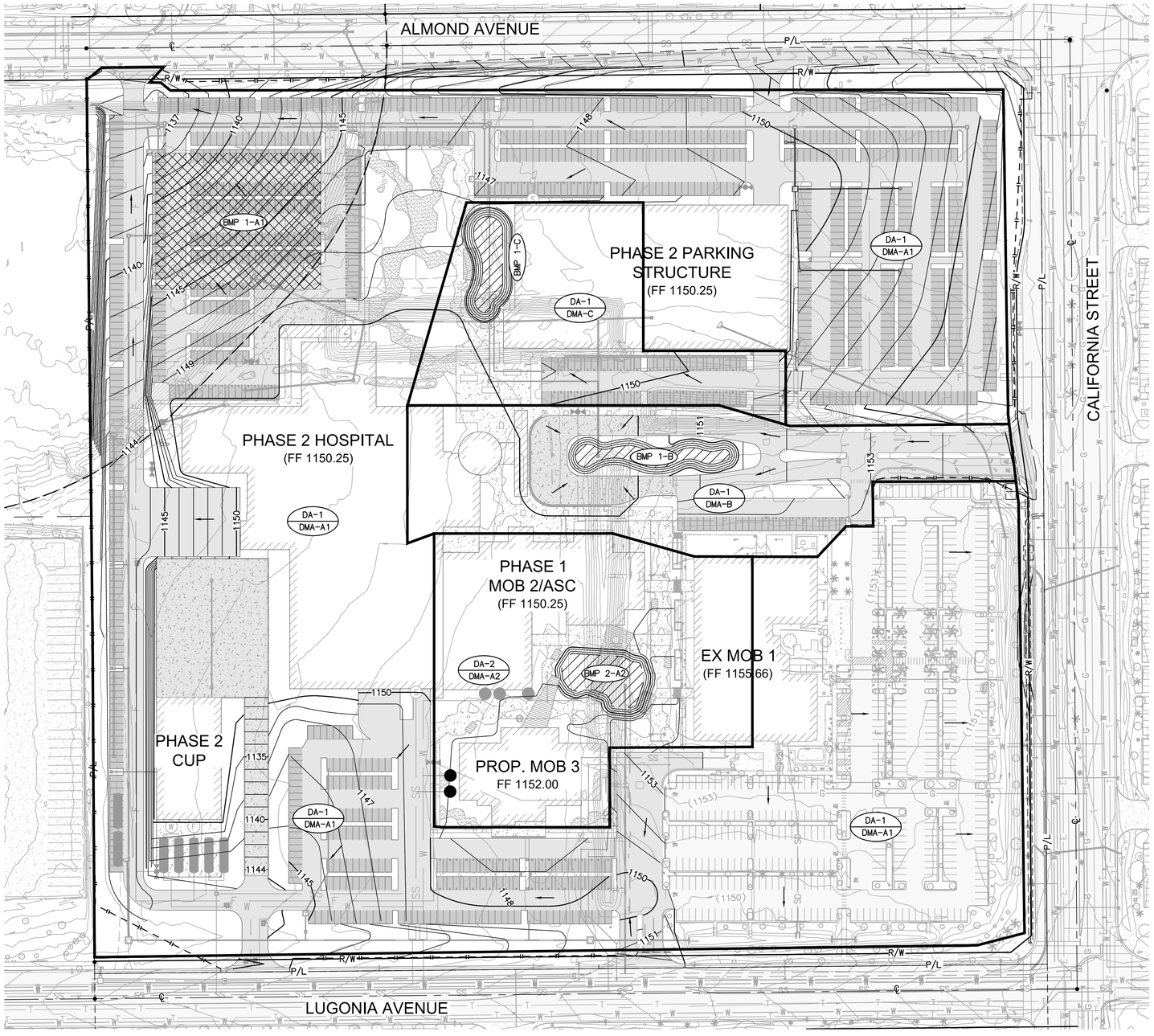
REDLANDS MEDICAL CENTER

Sheet: **C4.02**

CITY OF REDLANDS

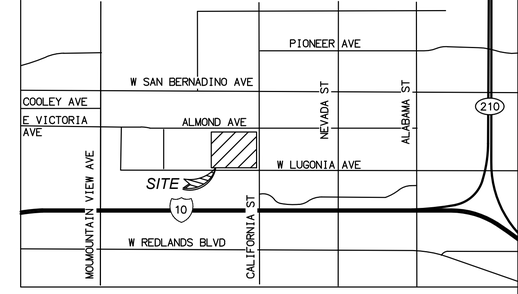
Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
TYPE OF DEVELOPMENT: XXXXX LOCATION: 1301 California Street, Redlands, CA 92374
ZONE: CR ZONE ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



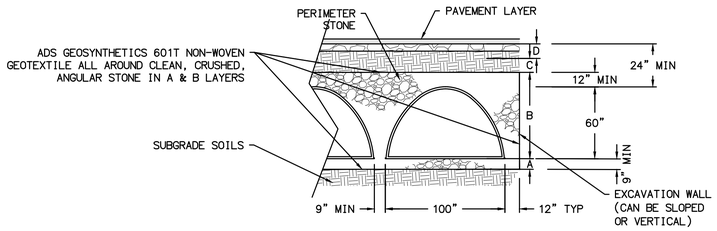
LEGEND

- STORM WATER BASIN
- UNDERGROUND INFILTRATION CHAMBERS
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



VICINITY MAP

N.T.S.

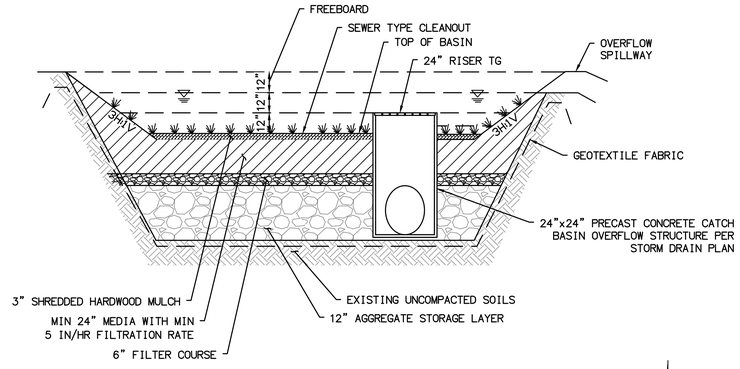


NOTES:

1. SECTION A – FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER
2. SECTION B – EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.
3. SECTION C – INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.
4. SECTION D – FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.

TYPICAL UNDERGROUND ADS STORMWATER CHAMBER INFILTRATION DETAIL

SCALE: NOT TO SCALE



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE

DA	DMA	TOTAL AREA (SF)	IMPERVIOUS RATIO	DMA RUNOFF FACTOR	DESIGN CAPTURE VOLUME (CF)	BMP PROPOSED SURFACE AREA (SF)	VOLUME RETAINED BY BMP (CF)	BMP TYPE
1	A1	1,197,394	85%	0.66	91,866	43,500	92,438	UNDERGROUND INFILTRATION (SIZED FOR ULTIMATE PHASE 4)
1	B	126,200	85%	0.66	9,682	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	109,300	85%	0.66	8,386	4,000	9,300	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
2	A2	152,000	85%	0.66	11,662	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 3
BMP PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C4.03**

CITY OF REDLANDS

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ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)
TYPE OF DEVELOPMENT: XXXXX
ZONE: CR ZONE
LOCATION: 1301 California Street, Redlands, CA 92374
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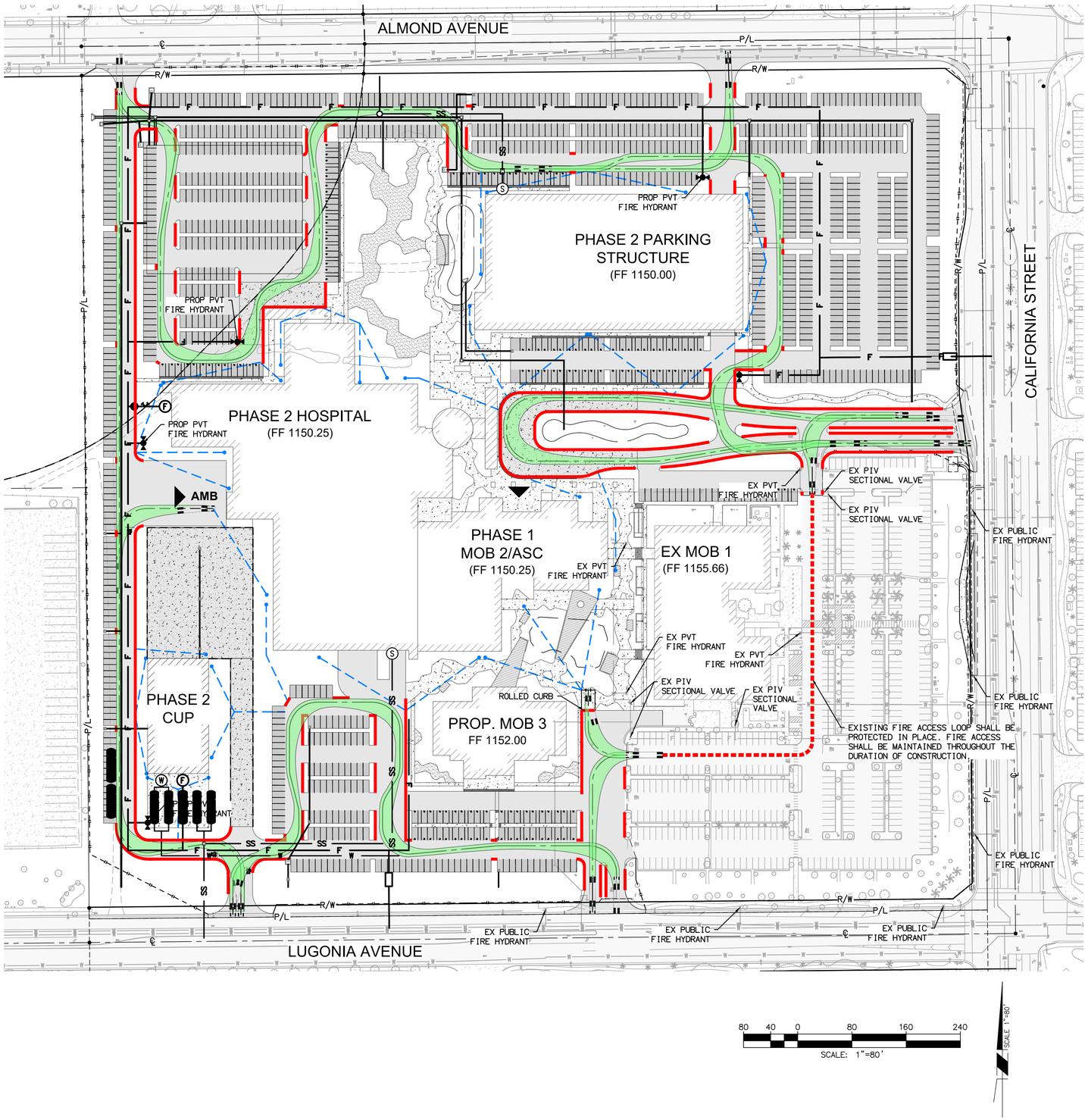
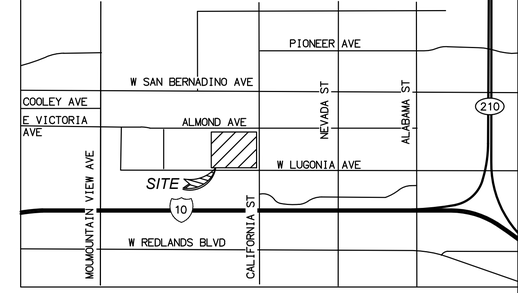


FIRE PROTECTION LEGEND

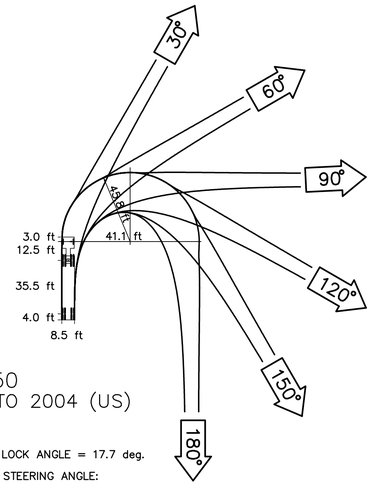
- PROPOSED FIRE HYDRANT
- PROPOSED PIV
- PROPOSED FDC
- PROPOSED FIRE MAIN
- HOSE PULL (150' MAX)
- RED PAINTED CURB
- FIRE TRUCK TURNING MOVEMENT
- EXISTING FIRE HYDRANT
- EXISTING PIV
- EXISTING FDC
- EXISTING FIRE MAIN
- EXISTING FIRE ROUTE



VICINITY MAP
N.T.S.

FIRE NOTES

1. FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION. CFC 501.4
2. STREET OR ROAD SIGNS - TEMPORARY SIGNS SHALL BE INSTALLED AT EACH STREET INTERSECTION WHEN CONSTRUCTION OF NEW ROADWAYS ALLOWS PASSAGE BY VEHICLES. SINGS SHALL BE OF AN APPROVED SIZE, WEATHER RESISTANT AND BE MAINTAINED UNTIL REPLACED BY PERMANENT SIGNS. CFC 505.2
3. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS AND SHALL BE SURFACED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES. CFC 503.2.3
4. POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELL ARE TO BE LOCATED ON THE ADDRESS/ACCESS SIDE OF THE BUILDING.
5. CLEAR SPACE AROUND HYDRANTS - A THREE (3) FOOT CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF FIRE HYDRANTS, EXCEPT AS OTHERWISE REQUIRED OR APPROVED. CFC 507.5.5
6. PHYSICAL PROTECTION - WHERE FIRE HYDRANTS ARE SUBJECT TO IMPACT BY A MOTOR VEHICLE, GUARD POSTS OR OTHER APPROVED MEANS SHALL COMPLY WITH SECTION 312. CFC 507.5.6
7. DEAD ENDS - DEAD END FIRE APPARATUS ACCESS ROADS IN EXCESS OF 150 FEET IN LENGTH SHALL BE PROVIDED WITH AN APPROVED AREA FOR TURNING AROUND FIRE APPARATUS. CFC 503.2.5
8. SECURITY GATES - WHERE SECURITY GATES ARE INSTALLED, THEY SHALL HAVE AN APPROVED MEANS OF EMERGENCY OPERATION. THE SECURITY GATES AND EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM G 2200.
9. VEGETATION SHALL BE SELECTED AND MAINTAINED IN SUCH A MANNER AS TO ALLOW IMMEDIATE ACCESS TO ALL HYDRANTS, VALVES, FIRE DEPARTMENT CONNECTIONS, PULL STATIONS, EXTINGUISHERS, SPRINKLER RISERS, ALARM CONTROL PANELS, RESCUE WINDOWS AND OTHER DEVICES OR AREAS USED FOR FIREFIGHTING PURPOSES. VEGETATION OF BUILDING FEATURES SHALL NO OBSTRUCT ADDRESS NUMBERS OR INHIBIT THE FUNCTIONING OF ALARM BELLS, HORNS OR STROBES.
10. APPROVED DOCUMENTS - CONSTRUCTION DOCUMENTS APPROVED BY THE FIRE CODE OFFICIAL ARE APPROVED WITH THE INTENT THAT SUCH CONSTRUCTION DOCUMENTS COMPLY IN ALL RESPECTS WITH THIS CODE. REVIEW AND APPROVAL BY THE FIRE CODE OFFICIAL SHALL NOT RELIEVE THE APPLICANT OF THE RESPONSIBILITY OF COMPLIANCE WITH THIS CODE. CFC 105.4.4

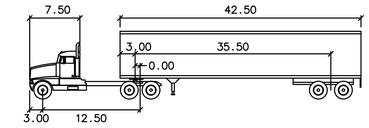


WB-50
AASHTO 2004 (US)
[ft]

STEERING LOCK ANGLE = 17.7 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 14.4 deg.
60 deg. SWEEP ANGLE: 17.1 deg.
90 deg. SWEEP ANGLE: 17.6 deg.
120 deg. SWEEP ANGLE: 17.7 deg.
150 deg. SWEEP ANGLE: 17.7 deg.
180 deg. SWEEP ANGLE: 17.7 deg.



WB-50

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

SITE PHASING - 3
FIRE PROTECTION PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C4.04**

CITY OF REDLANDS

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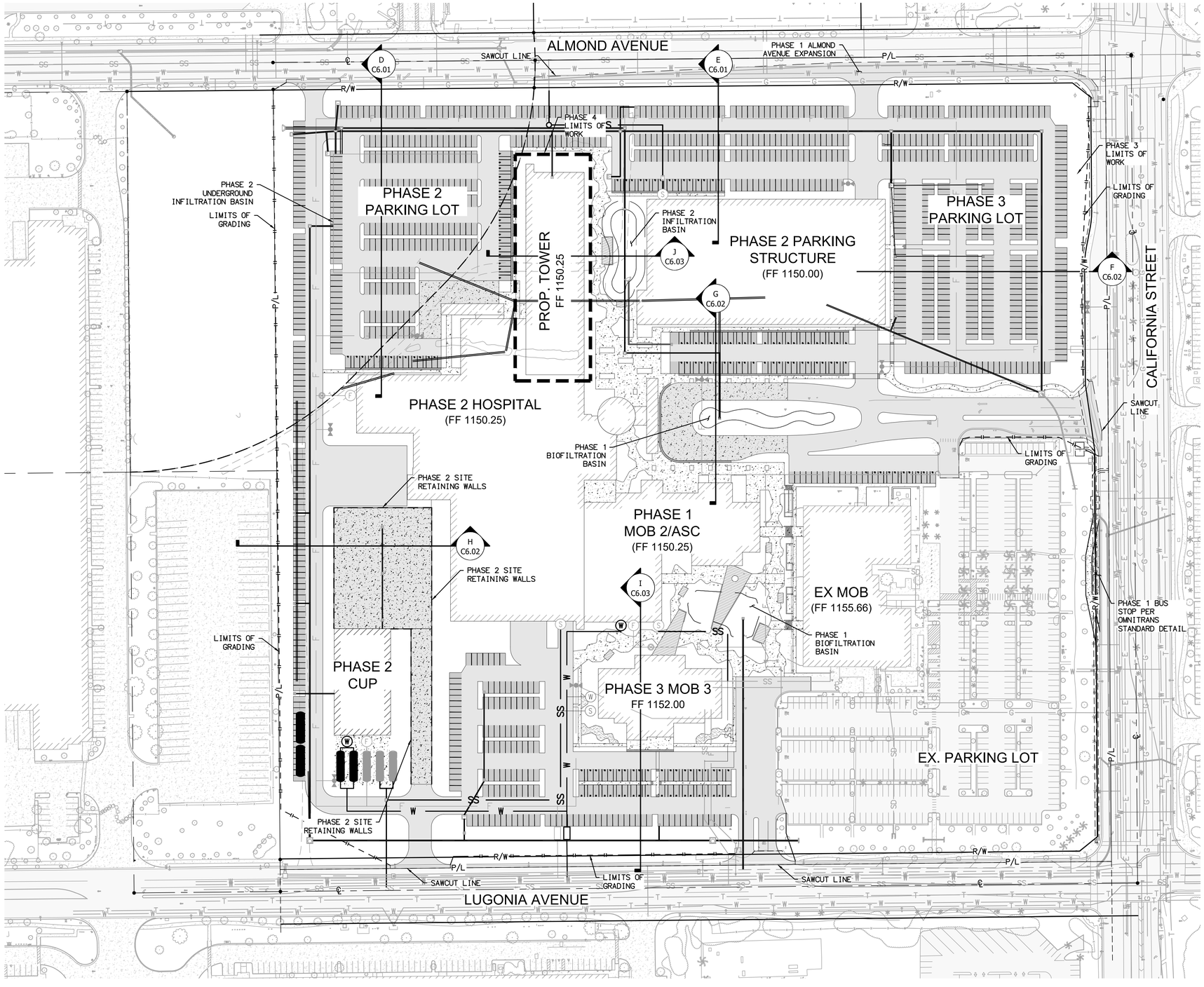
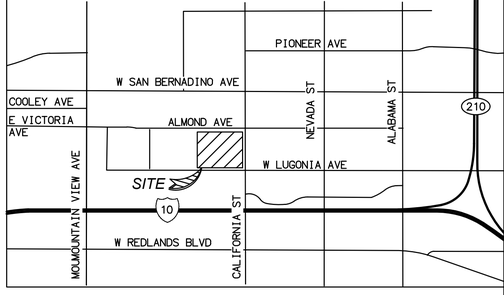


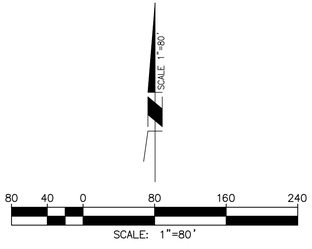


VICINITY MAP

N.T.S.

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- CURB AND GUTTER
- AC PAVEMENT
- HEAVY VEHICULAR AC PAVEMENT
- HEAVY VEHICULAR CONCRETE PAVEMENT
- PEDESTRIAN CONCRETE PAVEMENT
- DG PATH
- PROPOSED BUILDING
- TRUNCATED DOMES
- LIMITS OF WORK LINE



SITE PHASING - 4
SITE PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C5.00**

CITY OF REDLANDS

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OWNER: Kaiser Foundation Hospitals	PHONE: 626.405.6333
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
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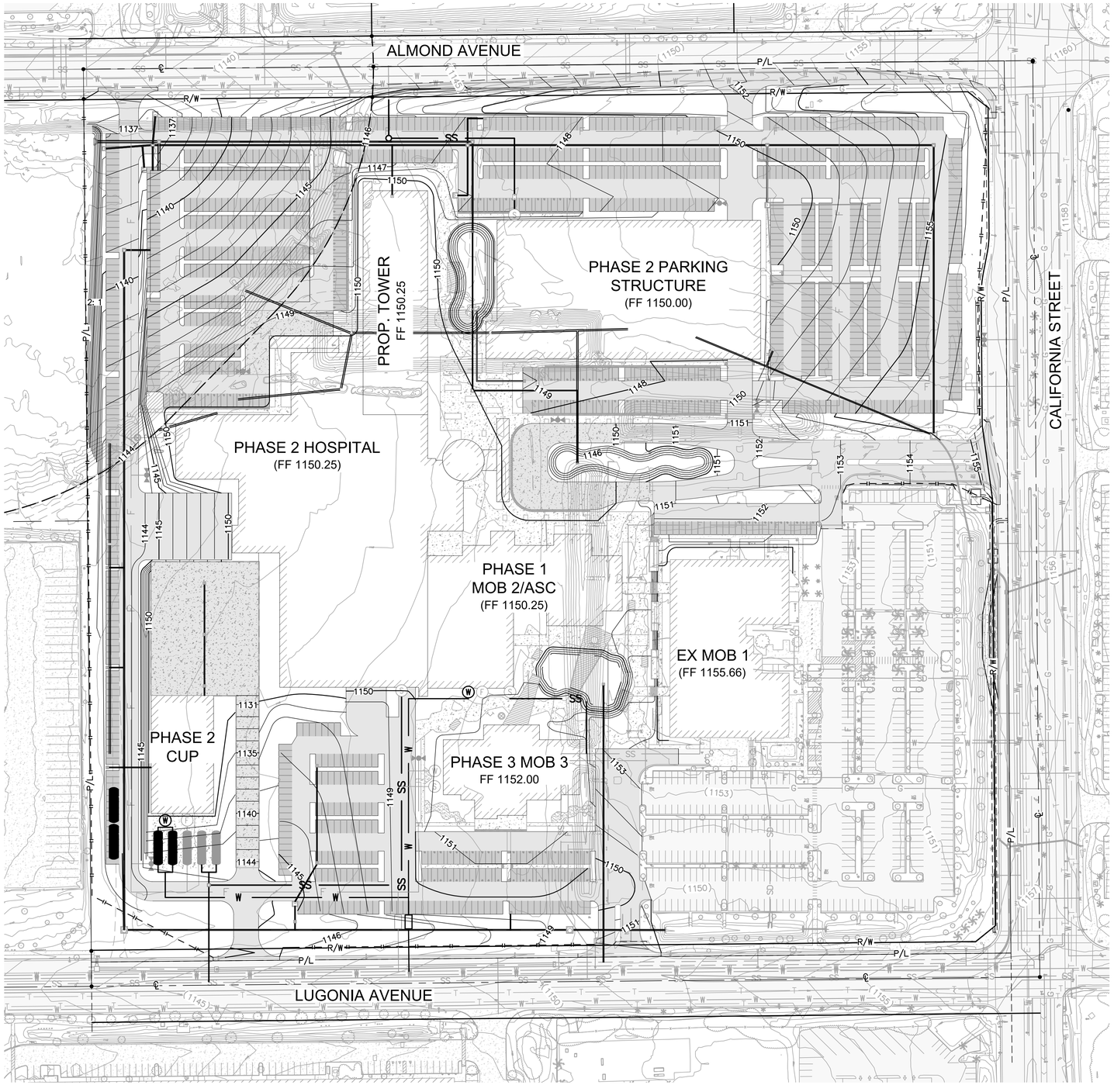

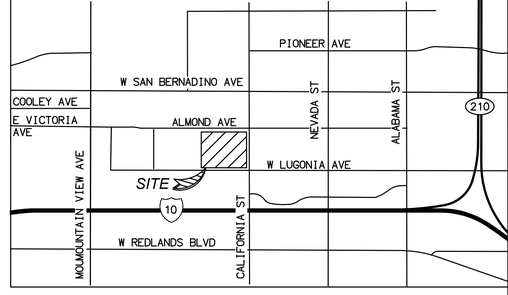

VICINITY MAP

N.T.S.

GRADING GENERAL NOTES

1. ALL GRADING AND ON-SITE CONSTRUCTION SHALL MEET THE MINIMUM REQUIREMENTS OF THE UNIFORM BUILDING CODE, LATEST EDITION, APPENDIX CHAPTER 33 AND THE CALIFORNIA BUILDING CODE, LATEST EDITION. THESE CODES ARE AMENDED IN THE CITY OF REDLANDS MUNICIPAL CODE. IF CONTRADICTIONS ARISE BETWEEN PROVISIONS IN THESE PLANS FROM THOSE IN THE VARIOUS CODES, THE MOST RESTRICTIVE PROVISIONS WILL GOVERN.
2. AFTER THE GRADING PERMIT HAS BEEN ISSUED, THE PROJECT MANAGER SHALL CONVENE AN ON-SITE PRECONSTRUCTION MEETING WITH THE CITY OF REDLANDS INSPECTOR, THE ENGINEER OF RECORD, THE GEOTECHNICAL ENGINEER AND THE GRADING CONTRACTOR. AT THIS MEETING, THE PROJECT SUPERINTENDENT SHALL BE IDENTIFIED AND AN EMERGENCY CONTACT PERSON SHALL BE IDENTIFIED TO THE INSPECTOR.
3. USE BEST MANAGEMENT PRACTICES (BMPS) TO PREVENT AND CONTAIN ILLEGAL DISCHARGES WITHIN THE PROJECT BOUNDARY. THIS WILL BE IN EFFECT FOR THE ENTIRE DURATION OF THE PROJECT CONSTRUCTION TO ITS COMPLETION.
4. BUILDING PERMITS SHALL NOT BE ISSUED UNTIL THE PROJECT SITE HAS BEEN GRADED AND THE ENGINEER OF RECORD HAS CERTIFIED TO THE SATISFACTION OF THE CITY ENGINEER THAT THE SITE HAS BEEN PREPARED ACCORDING TO THE RECOMMENDATIONS OF THE SOILS REPORT(S) AND TO THE SPECIFICATIONS OF THE APPROVED GRADING PLANS. IN ADDITION, A FINAL COMPACTION REPORT SHALL BE SUBMITTED TO BOTH THE INSPECTOR AND THE BUILDING OFFICIAL FOR APPROVAL.
5. A WRITTEN REPORT BY A GEOTECHNICAL ENGINEER IS TO BE FURNISHED TO BOTH THE CITY'S MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT AND BUILDING AND SAFETY DIVISION, TO CERTIFY THAT ALL FILL MATERIAL AND MATERIAL UPON WHICH FILL IS TO BE PLACED IS ADEQUATE TO SUPPORT THE LOADS OF THE PROPOSED DEVELOPMENT. THIS REPORT SHALL INCLUDE SOIL TEST DATA ON ALL FILLS OF TWO FEET OR MORE.
6. PREPARATION OF THE SITE SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE INSTRUCTIONS OF A GEOTECHNICAL ENGINEER AND ALL FILLS WILL BE MADE UNDER HIS DIRECTION.
7. IN NO CASE IS ANY SLOPE TO EXCEED A GRADIENT OF TWO HORIZONTAL TO ONE VERTICAL (2: 1).
8. THE ENGINEER OF RECORD ASSUMES NO LIABILITY FOR THE EXISTENCE AND LOCATIONS OF UNDERGROUND UTILITY LINES, STRUCTURES OR IRRIGATION LINES. THE CONTRACTOR IS TO MAKE AN ON-SITE INSPECTION AND NOTIFY ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATION OF ANY AND ALL UNDERGROUND FACILITIES.
9. THE CONTRACTOR SHALL BE FAMILIAR WITH AND RESPONSIBLE FOR CLEARING THE SITE IN PREPARATION FOR CONSTRUCTION.
10. THE ENGINEER'S ESTIMATE IS 79,000 CY OF EXCAVATION AND 105,000 CY OF EMBANKMENT FOR THE SITE GRADING. THESE ARE RAW QUANTITIES WITHOUT ALLOWANCES FOR LOSS, SHRINKAGE OR COMPACTION.
11. INSTALL FIRE HYDRANTS AS REQUIRED PRIOR TO THE DELIVERY OF ANY BUILDING MATERIAL TO THE SITE.
12. BENCHMARK: ENTER PROJECT SPECIFIC DATA HERE. ELEVATION:
13. ALL SLOPES THREE FEET OR GREATER MUST BE LANDSCAPED AND IRRIGATED PRIOR TO OCCUPANCY.
14. ACREAGE OF THE PROJECT IS: ACRE(S).
15. APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL FOR THE CONSTRUCTION OF ANY WALLS, SIDEWALKS, SLABS, PAVING, ETC. TO BE CONSTRUCTED ON-SITE AS SHOWN HEREON. A SEPARATE PERMIT IS REQUIRED FROM THE BUILDING AND SAFETY DIVISION FOR THE CONSTRUCTION OF THESE ON-SITE ITEMS.
16. ALL EARTHWORK SHALL CONFORM TO THE PRELIMINARY GEOTECHNICAL AND/OR GEOLOGIC INVESTIGATION REPORT FOR _____ PREPARED BY_____, DATED _____ .
17. THE ENGINEER OF RECORD MUST SET GRADE STAKES FOR ALL DRAINAGE DEVICES.
18. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INSPECTIONS PRIOR TO POURING ANY CONCRETE.

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- DAYLIGHT LINE
- SAWCUT LINE
- STORM DRAIN
- CURB INLET
- STORM DRAIN MANHOLE
- CATCH BASIN INLET
- CONCRETE HEADWALL
- CONCRETE STRUCTURE INLET

EARTHWORK

CUT: 79,000 CY

FILL: 105,000 CY

NET: 26,000 CY FILL

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASHING - 4
GRADING PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C5.01**

CITY OF REDLANDS

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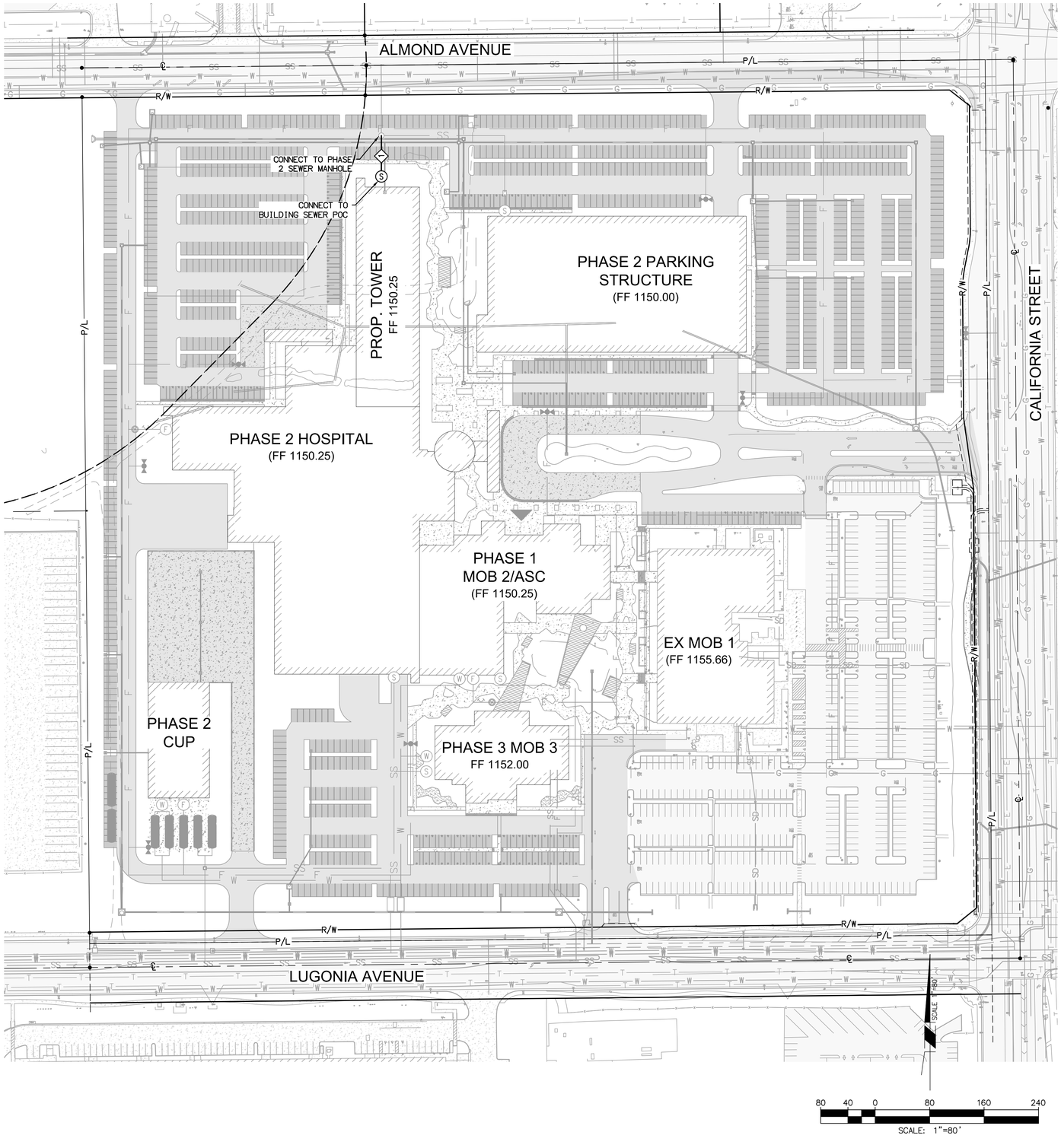
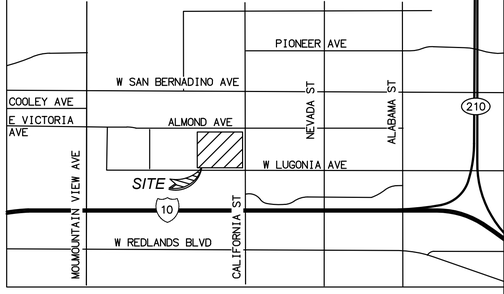


LEGEND

- WATER LINE — W
- SEWER LINE — SS
- FIRE LINE — F
- PROP. FIRE HYDRANT
- EX. FIRE HYDRANT
- UTILITY POC — (S) (W) (F)
- UNDERGROUND EMERGENCY TANKS



VICINITY MAP

N.T.S.

WATER GENERAL NOTES

1. MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF REDLANDS MUNICIPAL WATER DIVISION STANDARD SPECIFICATION (LATEST REVISION THEREOF).
2. THE APPROXIMATE LOCATIONS OF EXISTING UNDERGROUND UTILITY LINES ARE SHOWN IN THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA, AND THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK, THE CONTRACTOR AGREES PRIOR TO EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK, AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR TRUNKLINE UTILITY FACILITIES.
3. ALL SERVICE CONNECTIONS TO BE MINIMUM 1-INCH COPPER LATERALS.
4. STANDARD WATER MAIN LOCATION IS 7 FEET OFF CURB FACE.
5. THIS DRAWING IS SCHEMATIC ONLY, DO NOT SCALE.
6. THE CONTRACTOR SHALL MAKE ALL WATER MAIN CONNECTIONS TO EXISTING WATER MAINS, UNLESS OTHERWISE NOTED.
7. EXISTING UTILITIES ARE SHOWN ON DEVELOPMENT PLAN.
8. HYDRO TEST TO XXX P.S.I. MIN 2 HOUR DURATION AT THE LOWEST POINT IN THE WATER MAIN.
9. BUTTERFLY VALVES TO BE DRESSER 450 OR KENNEDY ADAP-TORQ, CLOW STYLE #2810.
10. CONTRACTOR SHALL USE DOUBLE STRAP SERVICE CLAMPS OR H.D. TAPPED COUPLINGS WHEN CONNECTING SERVICE LATERALS.
11. CONTRACTOR SHALL NOTIFY CITY 48 HOURS PRIOR TO SHUTDOWN OF WATER MAINS.
12. INSTALLATION SHALL CONFORM TO MANUFACTURERS SPECIFICATIONS AND LATEST CITY SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.
13. METER BOXES IN THE SIDEWALK SHALL HAVE CAST IRON LIDS.
14. PROVIDE A MINIMUM OF 10 FOOT SEPARATION BETWEEN SEWER AND WATER LATERALS WHERE POSSIBLE.
15. BACKFILL COMPACTION AND RE-SURFACING IN EXISTING STREETS SHALL CONFORM TO STREET DIVISION SPECIFICATIONS (LATEST REVISION THEREOF).
16. ALL VALVES INSTALLED BY THE CONTRACTOR SHALL BE ACCESSIBLE FOR OPERATION WITH COMPLETE VALVE BOX TO GRADE DIRECTLY FOLLOWING CONNECTION TO EXISTING WATER SYSTEM.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE SIZING OF THRUST BLOCKS BASED ON FIELD CONDITIONS. THE SIZE SHOWN ON THE PLANS IS THE MINIMUM SIZE REQUIRED.
18. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED.
19. IF WATER MAINS ARE ABANDONED AS A RESULT OF THIS PROJECT THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RECONNECTION OR REPLACEMENT OF SERVICE LATERALS AS DIRECTED BY THE CITY INSPECTOR. SERVICE LATERALS THAT ARE REPLACED SHALL BE THE SAME SIZE AS EXISTING.
20. INTERIOR WATER SYSTEM INCLUDING FIRE HYDRANTS SHALL BE COMPLETE AND ACCEPTED BY THE CITY BEFORE ANY FRAMING PERMITS WILL BE ISSUED. CONTACT CITY FIRE MARSHALL FOR INTERIOR SYSTEM INSPECTIONS.
21. CONTACT THE MUNICIPAL WATER DIVISION 48 HOURS PRIOR TO ANY WATER SYSTEM CONSTRUCTION.
22. WHERE DESIGNATED ON THE PLANS, THE CONTRACTOR SHALL INSTALL POLY PIGS AND POLY PIG OUTLETS. THE CONTRACTOR SHALL NOTIFY THE CITY 48 HOURS IN ADVANCE TO REQUEST THE CITY TO FLUSH POLY PIGS THROUGH THE MAINS. THE FLUSHING PROCESS SHALL TAKE PLACE PRIOR TO HYDROSTATIC TESTING CHLORINATION AND FINAL FLUSHING OF THE MAIN BY THE CONTRACTOR. FINAL CONNECTIONS SHALL NOT BE MADE PRIOR TO BACTERIA TEST SAMPLES THAT MEET CITY REQUIREMENTS AND AUTHORIZATION FOR TIE-INS BY THE CITY INSPECTOR.
23. A COMPLETE SET OF AS BUILT DRAWINGS SHALL BE SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT PRIOR TO FINAL INSPECTION.
24. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING CITY WATER SYSTEM VALVES.
25. WATER VALVE CANS SHALL BE PER SPEC A-20514 (SLIP CAN TYPE).

SEWER GENERAL NOTES

1. SEWER INSTALLATION IS TO BE IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS AND DETAIL DRAWINGS OF THE CITY OF REDLANDS LATEST REVISION THEREOF.
2. ALL SEWER PIPE ELEVATIONS GIVEN REFER TO THE FLOW LINE INVERT ELEVATIONS.
3. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING UNDERGROUND UTILITY LINES ARE SHOWN ON THESE PLANS. THE LINES ARE PLOTTED FROM A COMBINATION OF RECORD AND FIELD DATA. THE CITY HAS TRIED WITHIN ITS AVAILABLE RESOURCES TO LOCATE ALL SUCH FACILITIES WITH REASONABLE ACCURACY. BY ENTERING INTO A CONTRACT FOR THIS WORK THE CONTRACTOR AGREES, PRIOR TO ANY EXCAVATION TO NOTIFY ALL UTILITY AND IRRIGATION COMPANIES OPERATING IN THE AREA OF THE WORK AND TO DETERMINE WITH AS MUCH ACCURACY AS IS NEEDED TO PERFORM THIS WORK, THE EXACT LOCATIONS OF ALL UNDERGROUND MAIN OR SERVICE UTILITY FACILITIES.
4. SAND BEDDING AND BACKFILL TO A DEPTH OF 12" ABOVE PIPE IS REQUIRED FOR ALL SEWER PIPE MAY BE REQUIRED IF IN THE OPINION OF THE CITY, THE NATIVE BACKFILL MATERIAL IS DEEMED UNSUITABLE.
5. PVC SEWER IS NOT PERMITTED ON ANY HORIZONTAL OR VERTICAL CURVE.
6. THE CONTRACTOR SHALL AIR TEST THE SEWER SYSTEM IN ACCORDANCE WITH CITY STANDARDS AFTER ALL OTHER UTILITIES HAVE BEEN INSTALLED AND COMPLETED WITHIN THE TRACT OR DEVELOPMENT. IN ADDITION, AFTER FINAL AIR TEST, THE CONTRACTOR SHALL CONNECT THE SEWER LATERALS TO THE HOUSE LATERALS AT THE PROPERTY.
7. SEWER LATERALS SHALL BE CLEARLY MARKED WITH AN "L" CHISELED IN CURB FACE.
8. REQUIRED SEPARATION OF THE WATER AND SEWER MAINS AND LATERALS SHALL BE STRICTLY ADHERED TO. INSTALLATION SHALL COMPLY WITH THE STATE DEPARTMENT OF HEALTH REGULATIONS AND BE A MINIMUM OF 10 FEET SEPARATION.
9. SEWER LATERAL LOCATIONS SHALL NOT BE CHANGED MORE THAN 3 FEET (HORIZONTAL) WITHOUT AUTHORIZATION FROM THE CITY.
10. IF PLASTIC SEWER PIPE IS USED, A MANDREL TEST SHALL BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE OF THE CITY INSPECTOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE MUNICIPAL UTILITIES DEPARTMENT. LATEST REVISIONS EXCEPT THE MANDREL SHALL BE SUPPLIED BY THE PIPE MANUFACTURER APPROVED BY CITY OF REDLANDS AND SHALL BE PULLED THROUGH THE PIPE BY HAND. PVC PIPE-MAXIMUM 15" DIAMETER ALLOWABLE.
11. PRIOR TO PAVING OF STREETS OVER A NEW SEWER MAIN ALL COMPACTION TESTS, AIR TESTS, BALLING AND MANDREL TESTS SHALL BE COMPLETED AND APPROVED BY THE CITY AND A COMPLETE SET OF AS-BUILT DRAWINGS SUBMITTED TO THE MUNICIPAL UTILITIES DEPARTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION OF AS-BUILT DRAWINGS.
12. PRIOR TO ACCEPTANCE BY THE CITY, NEW SEWER LINE SHALL REMAIN PLUGGED AT OR PHYSICALLY SEPARATED FROM THE DOWNSTREAM MANHOLE AND STREETS SHALL BE PAVED.
13. THE CONTRACTOR SHALL REPLACE EXISTING STRIPING AS NECESSARY. THE CONTRACTOR SHALL OBTAIN AN ENCROACHMENT PERMIT FOR SEWER CONSTRUCTION FROM THE CITY OF REDLANDS PUBLIC WORKS DEPARTMENT PRIOR TO COMMENCEMENT OF WORK.
14. PVC SEWER PIPE AND FITTINGS SHALL CONFORM TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (A.S.T.M.) DESIGNATION D-3034, 15" MAXIMUM SIZE, SDR 35 LATEST REVISION.
15. THE JOINTING OF PVC SEWER PIPE SHALL BE BY USING ELECTROMETRIC GASKET JOINTS. THE CRITICAL SEALING DIMENSIONS OF THE BELL, SPIGOT, AND GASKET SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S STANDARD DIMENSIONS AND TOLERANCES.
16. MANHOLE RIM ELEVATIONS INDICATED HEREON ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL RIMS TO FINAL FINISH GRADE, IN COORDINATION WITH STREET IMPROVEMENTS.
17. ALL SEWER STATIONS ARE CENTERLINE SEWER MAIN UNLESS OTHERWISE INDICATED.
18. DURING THE PERIOD OF CONSTRUCTION THE CONTRACTOR SHALL FURNISH, ERECT, AND MAINTAIN ALL WARNINGS, SIGNS, BARRICADES, AND OTHER SAFETY MEASURES IN CONFORMANCE WITH THE STATE MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES, LATEST EDITION. THE CONTRACTOR SHALL PROVIDE SAFE AND CONTINUOUS PASSAGE FOR PEDESTRIAN AND VEHICULAR TRAFFIC AT ALL TIMES.

UNDERGROUND UTILITY NOTE

THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE GENERATED FROM RECORDS AND/OR UTILITY PROVIDER RECORD MAPS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHERS NOT OF RECORD OR NOT SHOWN ON THESE PLANS. ALL DAMAGES THERETO CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE APPROPRIATE SPECIFICATIONS AND STANDARDS AT THE EXPENSE OF THE CONTRACTOR.

SEWER DATA TABLE

NO	BEARING/DELTA	RADIUS	LENGTH	SIZE/TYPE
1	N 00°00'00" E	--	60.16'	6" PVC (SDR-35)

SITE PHASING - 4
UTILITY PLAN

SEPTEMBER 09, 2022

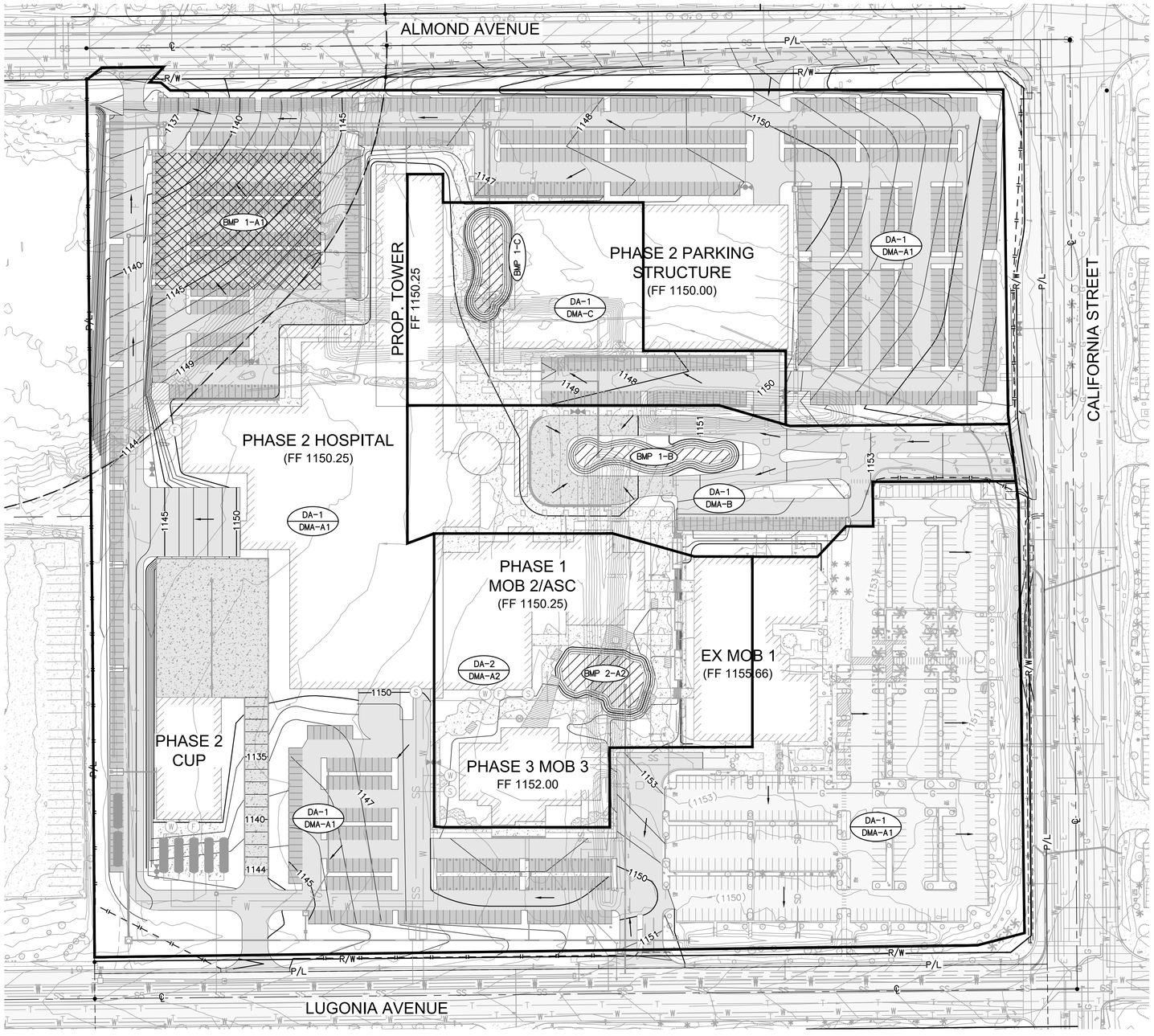
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C5.02**

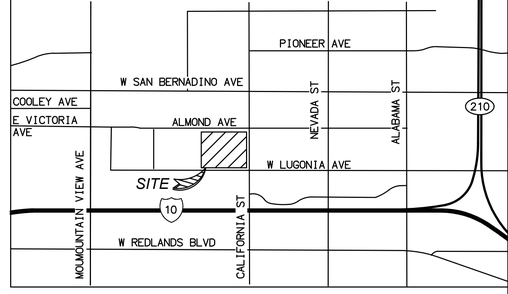
CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



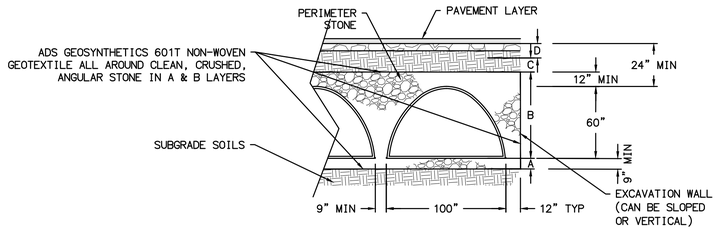
LEGEND

- STORM WATER BASIN
- UNDERGROUND INFILTRATION CHAMBERS
- DRAINAGE BOUNDARY
- FLOW ARROW
- FLOW DIRECTION
- DMA/DA ID (DA 1 / DMA 1)
- BMP ID (BMP 1)



VICINITY MAP

N.T.S.

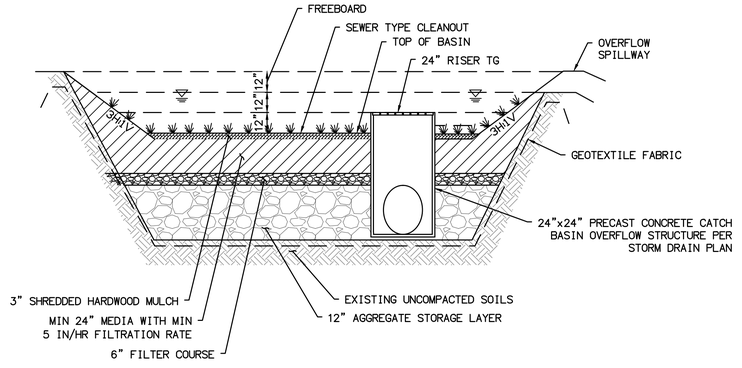


NOTES:

1. SECTION A - FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER
2. SECTION B - EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.
3. SECTION C - INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.
4. SECTION D - FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.

TYPICAL UNDERGROUND ADS STORMWATER CHAMBER INFILTRATION DETAIL

SCALE: NOT TO SCALE



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE

DA	DMA	TOTAL AREA (SF)	IMPERVIOUS RATIO	DMA RUNOFF FACTOR	DESIGN CAPTURE VOLUME (CF)	BMP PROPOSED SURFACE AREA (SF)	VOLUME RETAINED BY BMP (CF)	BMP TYPE
1	A1	1,197,394	85%	0.66	91,866	43,500	92,438	UNDERGROUND INFILTRATION (SIZED FOR ULTIMATE PHASE 4)
1	B	126,200	85%	0.66	9,682	4,200	9,765	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
1	C	109,300	85%	0.66	8,386	4,000	9,300	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)
2	A2	152,000	85%	0.66	11,662	6,035	14,031	BIORETENTION WITH NO UNDERDRAIN (SIZED FOR ULTIMATE PHASE 4)

SCALE 1"=80'

80 40 0 80 160 240

SCALE: 1"=80'

SITE PHASING - 4
BMP PLAN

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C5.03**

CITY OF REDLANDS

Site Development Plan Number:

OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333

ADDRESS: 393 E. Walnut Street Pasadena, CA 91188

ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects PHONE: 323.525.0500 (Architect)

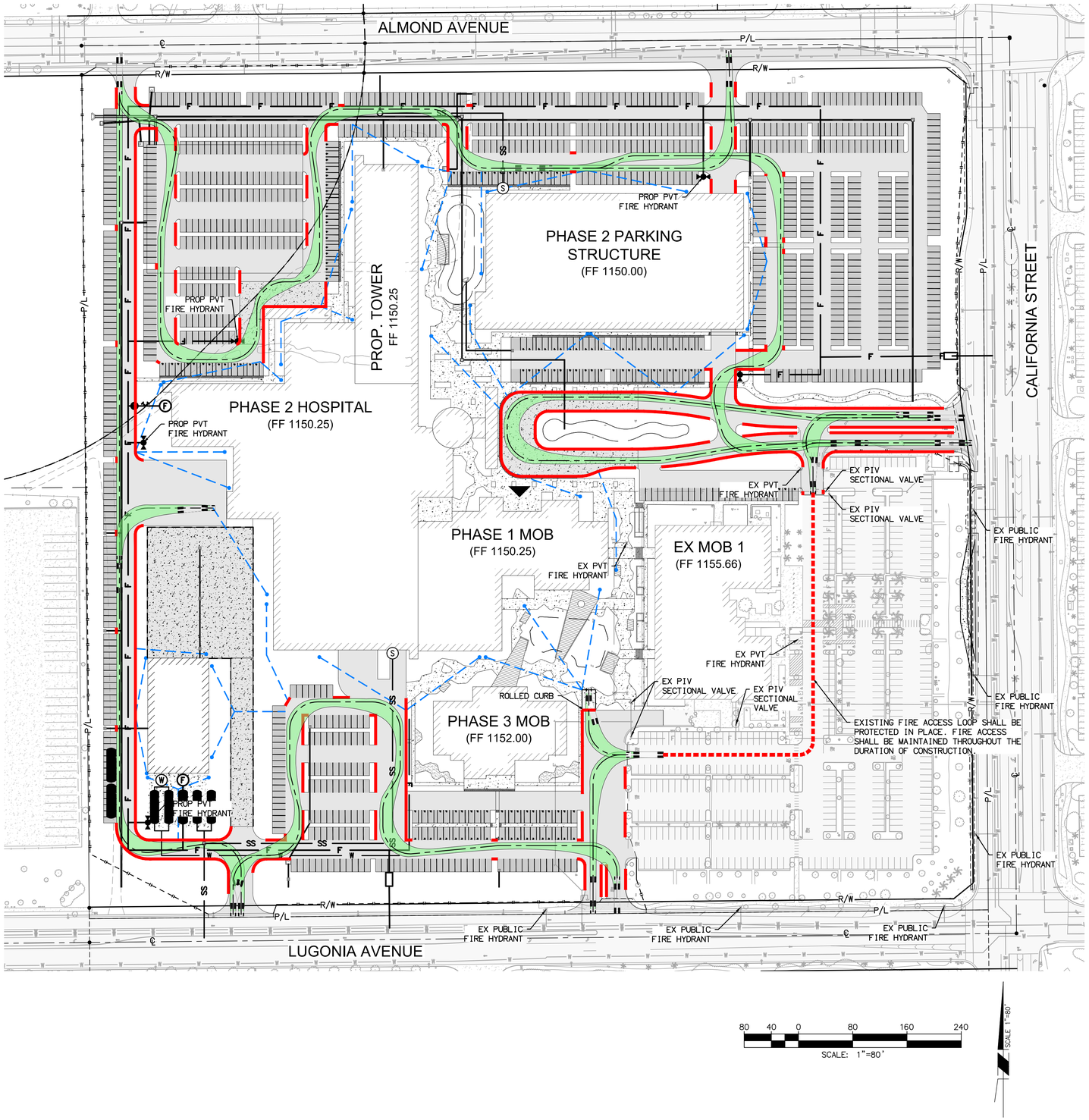
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)

LOCATION: 1301 California Street, Redlands, CA 92374

TYPE OF DEVELOPMENT: XXXXX

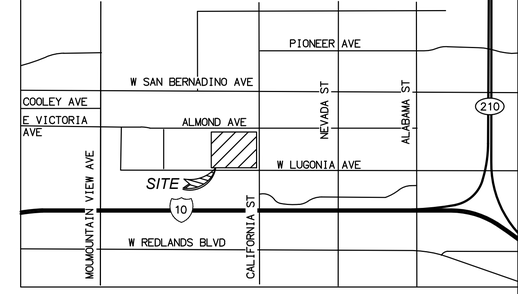
ZONE: CR ZONE

ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



FIRE PROTECTION LEGEND

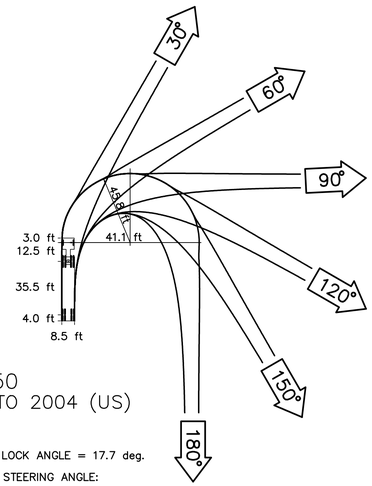
- PROPOSED FIRE HYDRANT
- PROPOSED PIV
- PROPOSED FDC
- PROPOSED FIRE MAIN
- HOSE PULL (150' MAX)
- RED PAINTED CURB
- FIRE TRUCK TURNING MOVEMENT
- EXISTING FIRE HYDRANT
- EXISTING PIV
- EXISTING FDC
- EXISTING FIRE MAIN
- EXISTING FIRE ROUTE



VICINITY MAP
N.T.S.

FIRE NOTES

1. FIRE APPARATUS ACCESS ROADS AND WATER SUPPLIES FOR FIRE PROTECTION, SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO AND DURING TIME OF CONSTRUCTION. CFC 501.4
2. STREET OR ROAD SIGNS - TEMPORARY SIGNS SHALL BE INSTALLED AT EACH STREET INTERSECTION WHEN CONSTRUCTION OF NEW ROADWAYS ALLOWS PASSAGE BY VEHICLES. SINGS SHALL BE OF AN APPROVED SIZE, WEATHER RESISTANT AND BE MAINTAINED UNTIL REPLACED BY PERMANENT SIGNS. CFC 505.2
3. FIRE APPARATUS ACCESS ROADS SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS AND SHALL BE SURFACED SO AS TO PROVIDE ALL WEATHER DRIVING CAPABILITIES. CFC 503.2.3
4. POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELL ARE TO BE LOCATED ON THE ADDRESS/ACCESS SIDE OF THE BUILDING.
5. CLEAR SPACE AROUND HYDRANTS - A THREE (3) FOOT CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF FIRE HYDRANTS, EXCEPT AS OTHERWISE REQUIRED OR APPROVED. CFC 507.5.5
6. PHYSICAL PROTECTION - WHERE FIRE HYDRANTS ARE SUBJECT TO IMPACT BY A MOTOR VEHICLE, GUARD POSTS OR OTHER APPROVED MEANS SHALL COMPLY WITH SECTION 312. CFC 507.5.6
7. DEAD ENDS - DEAD END FIRE APPARATUS ACCESS ROADS IN EXCESS OF 150 FEET IN LENGTH SHALL BE PROVIDED WITH AN APPROVED AREA FOR TURNING AROUND FIRE APPARATUS. CFC 503.2.5
8. SECURITY GATES - WHERE SECURITY GATES ARE INSTALLED, THEY SHALL HAVE AN APPROVED MEANS OF EMERGENCY OPERATION. THE SECURITY GATES AND EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM G 2200.
9. VEGETATION SHALL BE SELECTED AND MAINTAINED IN SUCH A MANNER AS TO ALLOW IMMEDIATE ACCESS TO ALL HYDRANTS, VALVES, FIRE DEPARTMENT CONNECTIONS, PULL STATIONS, EXTINGUISHERS, SPRINKLER RISERS, ALARM CONTROL PANELS, RESCUE WINDOWS AND OTHER DEVICES OR AREAS USED FOR FIREFIGHTING PURPOSES. VEGETATION OF BUILDING FEATURES SHALL NO OBSTRUCT ADDRESS NUMBERS OR INHIBIT THE FUNCTIONING OF ALARM BELLS, HORNS OR STROBES.
10. APPROVED DOCUMENTS - CONSTRUCTION DOCUMENTS APPROVED BY THE FIRE CODE OFFICIAL ARE APPROVED WITH THE INTENT THAT SUCH CONSTRUCTION DOCUMENTS COMPLY IN ALL RESPECTS WITH THIS CODE. REVIEW AND APPROVAL BY THE FIRE CODE OFFICIAL SHALL NOT RELIEVE THE APPLICANT OF THE RESPONSIBILITY OF COMPLIANCE WITH THIS CODE. CFC 105.4.4

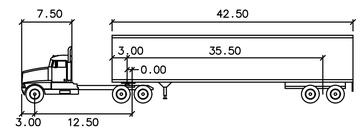


WB-50
AASHTO 2004 (US)
[ft]

STEERING LOCK ANGLE = 17.7 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 14.4 deg.
60 deg. SWEEP ANGLE: 17.1 deg.
90 deg. SWEEP ANGLE: 17.6 deg.
120 deg. SWEEP ANGLE: 17.7 deg.
150 deg. SWEEP ANGLE: 17.7 deg.
180 deg. SWEEP ANGLE: 17.7 deg.



WB-50

feet			
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

SITE PHASING - 4
FIRE PROTECTION PLAN

SEPTEMBER 09, 2022

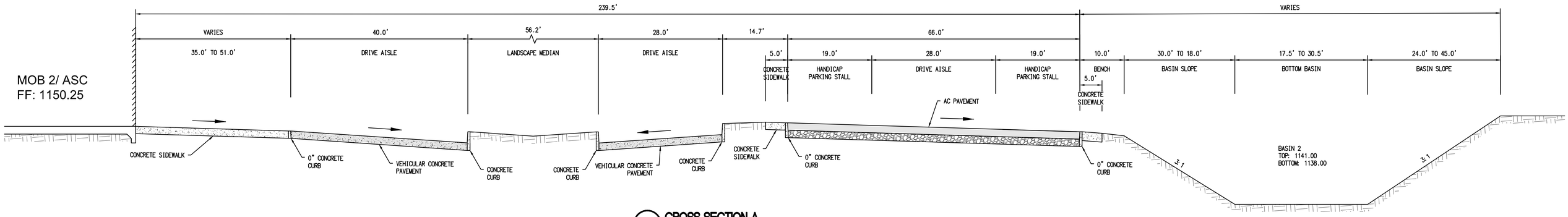
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C5.04**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000
ZONE: CR ZONE	



A **CROSS SECTION A**
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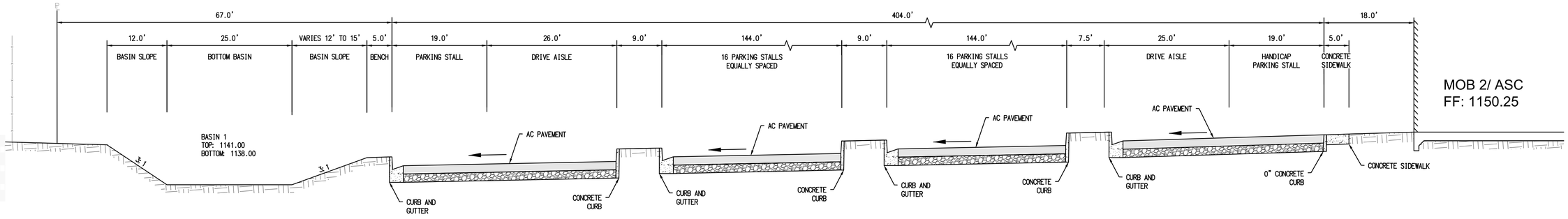

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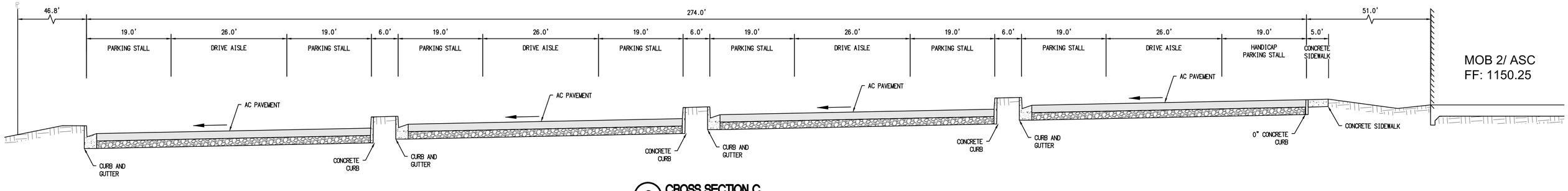


C **CROSS SECTION C**
SCALE: NOT TO SCALE

CROSS SECTIONS

SEPTEMBER 09, 2022

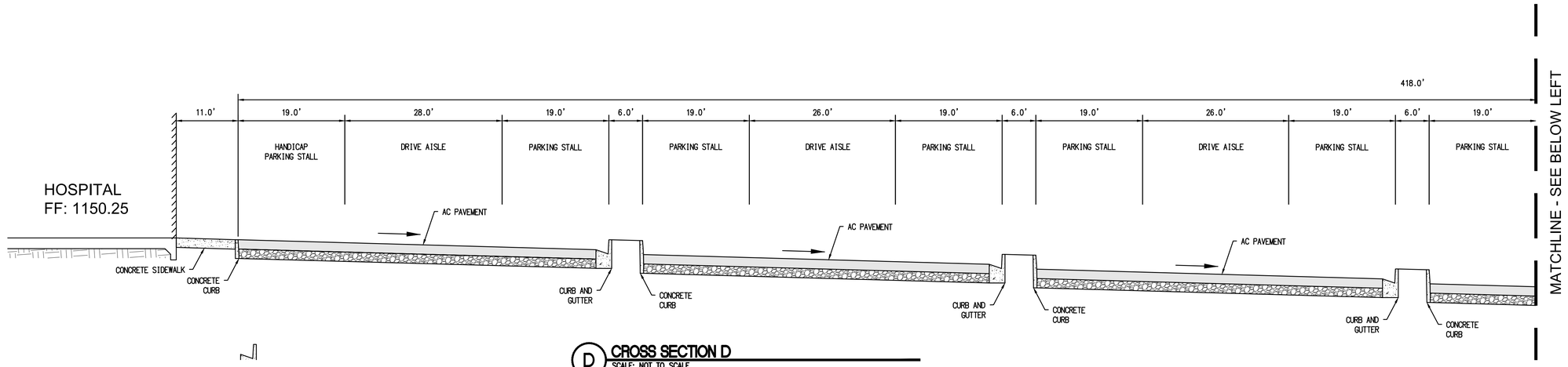
CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C6.00**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000



D CROSS SECTION D

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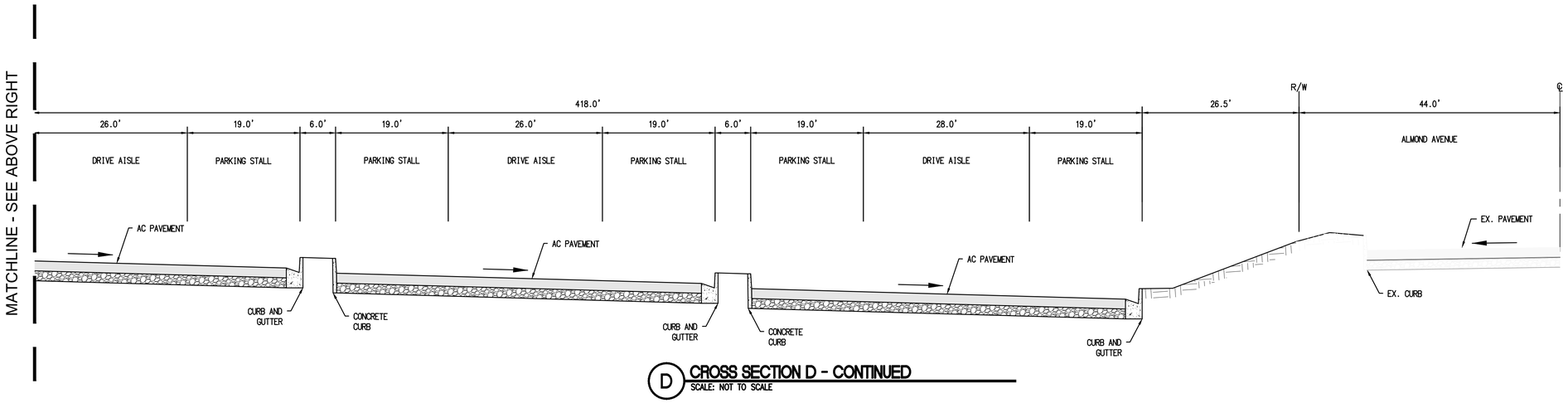

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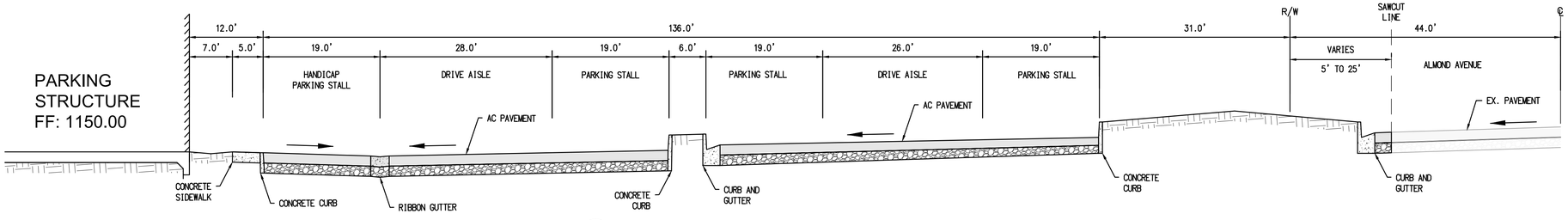

E CROSS SECTION E

SCALE: NOT TO SCALE

CROSS SECTIONS

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C6.01**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
ADDRESS: 393 E. Walnut Street Pasadena, CA 91188	
ARCHITECT, ENGINEER, DESIGNER: CO Architects, Michael Baker Intl., Ridge Landscape Architects	PHONE: 323.525.0500 (Architect)
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TYPE OF DEVELOPMENT: XXXXX	
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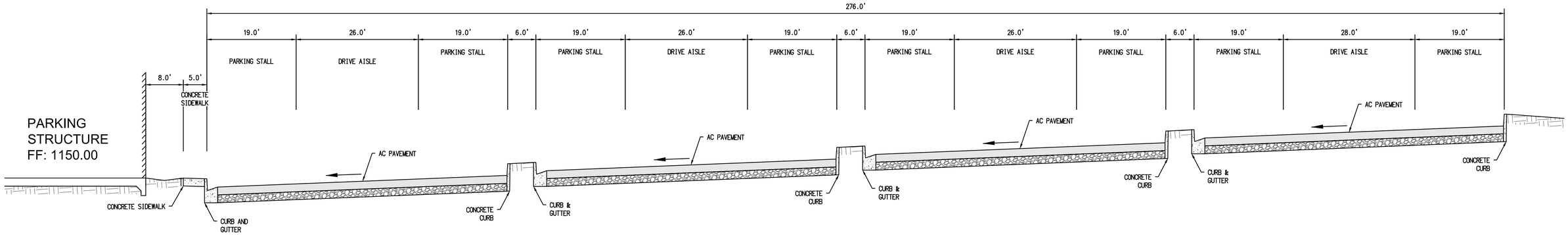

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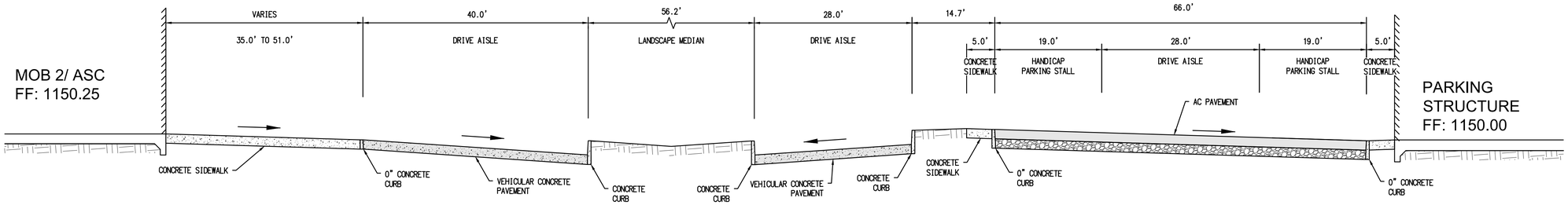

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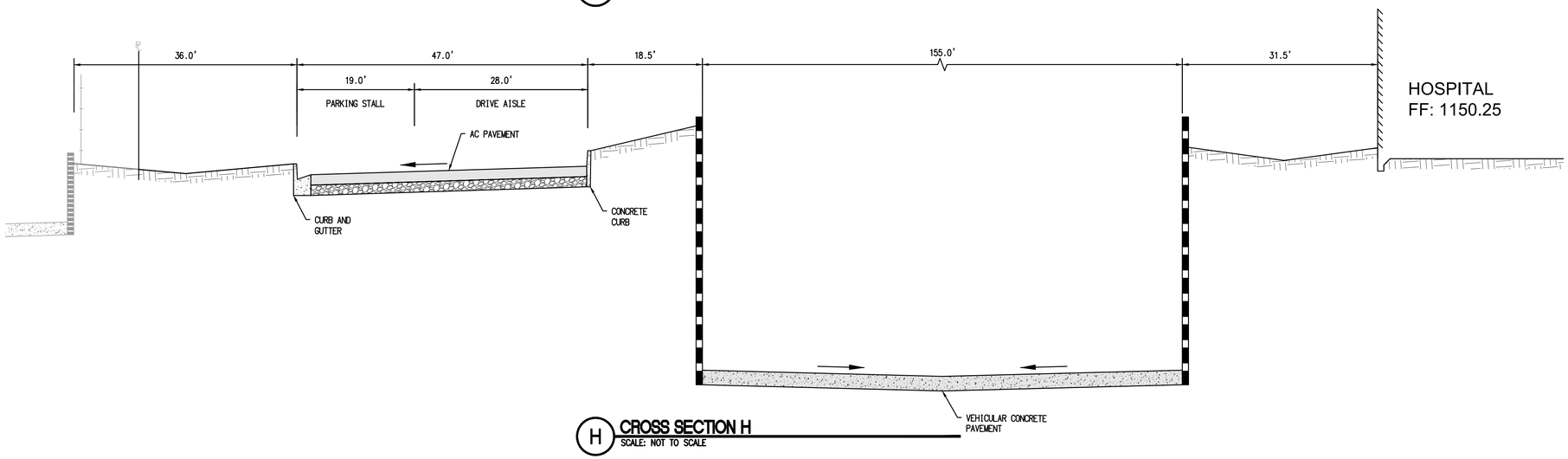

H **CROSS SECTION H**
SCALE: NOT TO SCALE

CROSS SECTIONS

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C6.02**

CITY OF REDLANDS

Site Development Plan Number:	
OWNER: Kaiser Foundation Hospitals PHONE: 626.405.6333	
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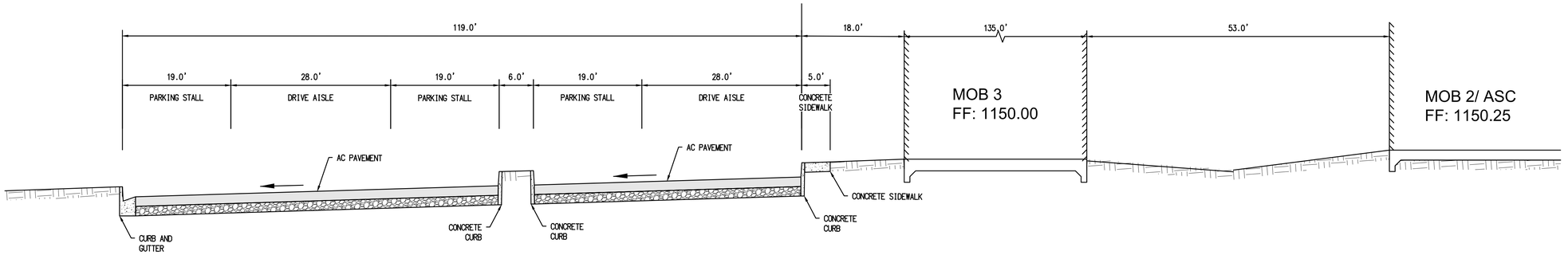
ZONE: CR ZONE	



I CROSS SECTION I

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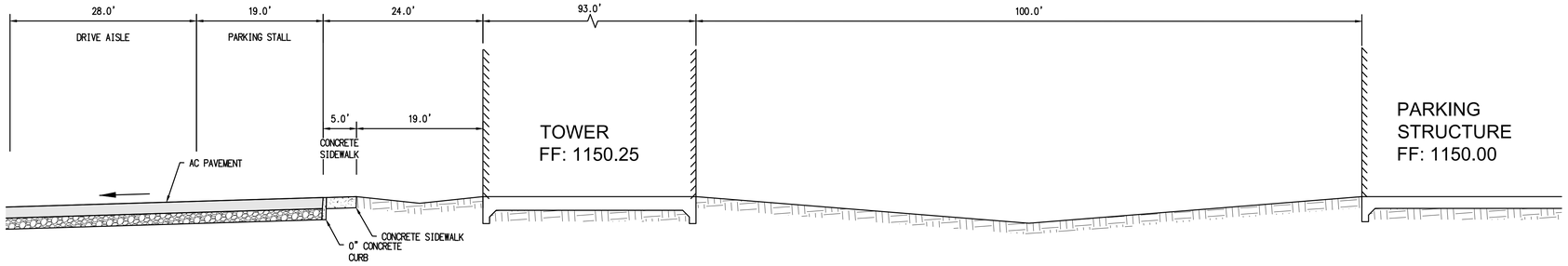

J CROSS SECTION J

SCALE: NOT TO SCALE

CROSS SECTIONS

SEPTEMBER 09, 2022

CO ARCHITECTS

REDLANDS MEDICAL CENTER

Sheet: **C6.03**

CITY OF REDLANDS

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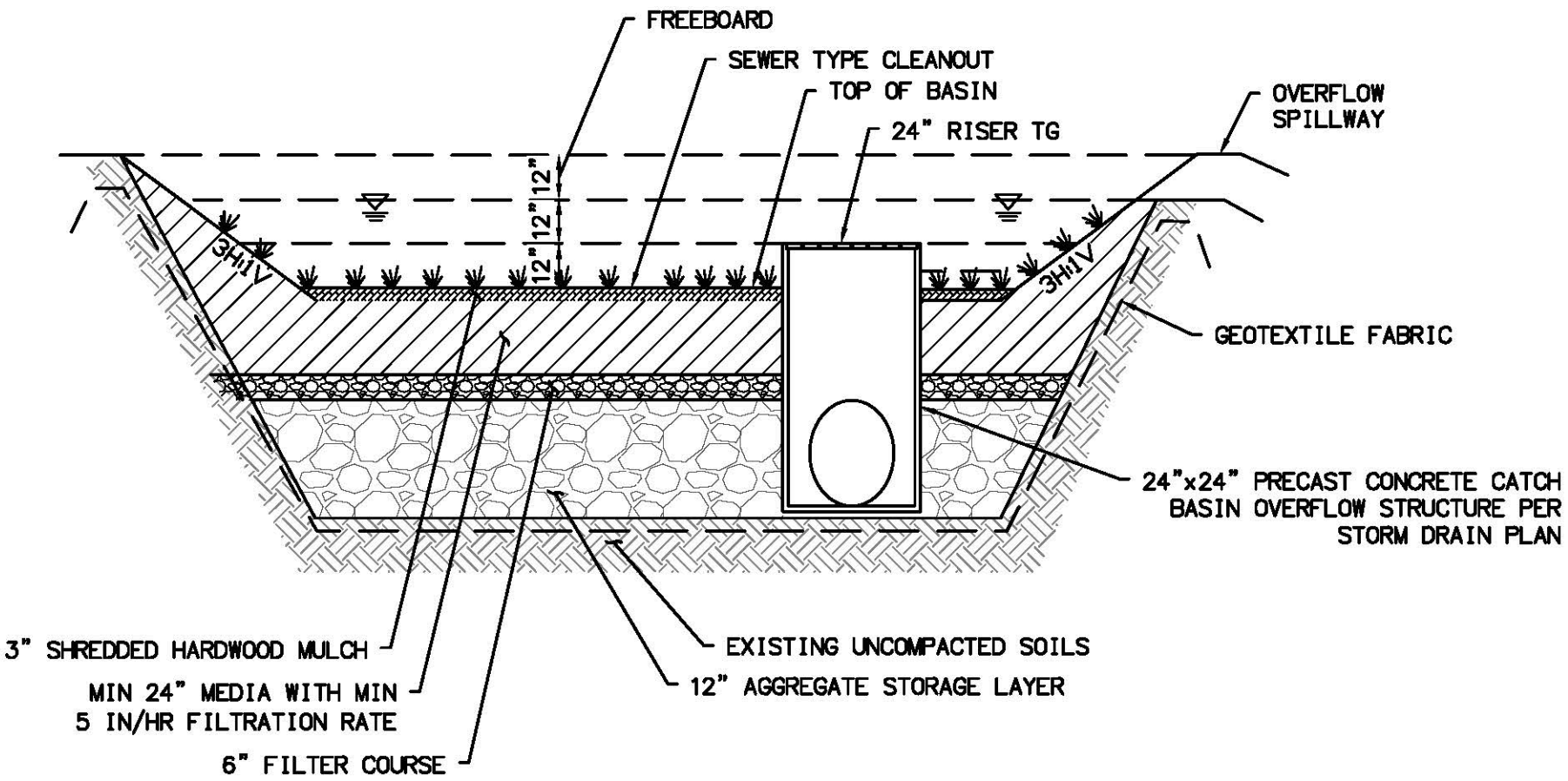
ADDRESS: 5750 Wilshire Boulevard, Suite 550, Los Angeles CA 90036 (Architect)	LOCATION: 1301 California Street, Redlands, CA 92374
TYPE OF DEVELOPMENT: XXXXX	
ZONE: CR ZONE	ACCESSOR'S PARCEL NUMBER: 0167-441-07-0-000

Appendix C

BMP Details



TYPICAL BIO-RETENTION BASIN DETAIL

SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

Alternative for underground infiltration proposed in the northwest corner of the site (Phase 2).

Advanced Drainage Systems, Inc.

SiteASSIST™
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

MC-7200 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-7200.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/IN/IN. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418 AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-7200 CHAMBER SYSTEM

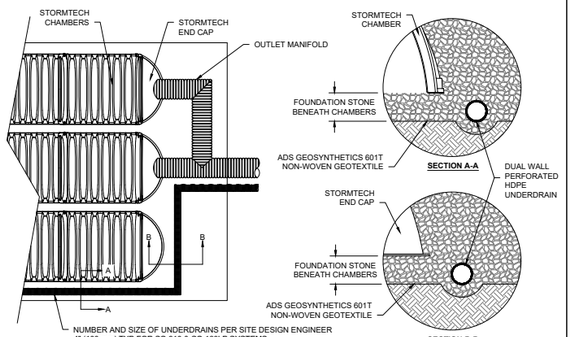
1. STORMTECH MC-7200 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

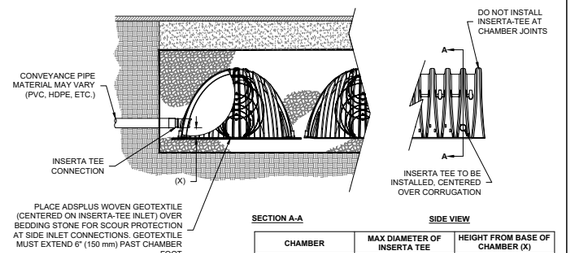
1. STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-7200 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.



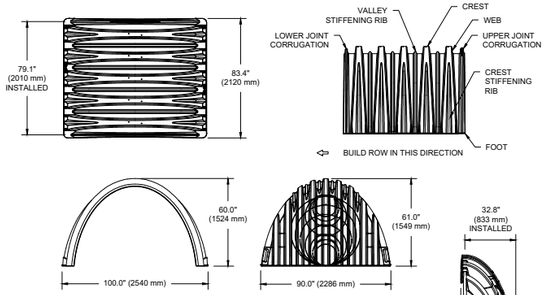
5 UNDERDRAIN DETAIL



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

6 INSERTA-TEE SIDE INLET DETAIL



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

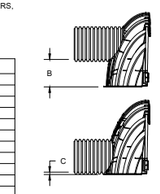
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC7200IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC7200IEPP06B		---	0.86" (22 mm)
MC7200IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC7200IEPP08B		---	1.01" (26 mm)
MC7200IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC7200IEPP10B		---	1.33" (34 mm)
MC7200IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC7200IEPP12B		---	1.55" (39 mm)
MC7200IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC7200IEPP15B		---	1.70" (43 mm)
MC7200IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC7200IEPP18TW			
MC7200IEPP18B		---	1.97" (50 mm)
MC7200IEPP18BW			
MC7200IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC7200IEPP24TW			
MC7200IEPP24B		---	2.26" (57 mm)
MC7200IEPP24BW			
MC7200IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC7200IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC7200IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2 MC-7200 TECHNICAL SPECIFICATIONS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

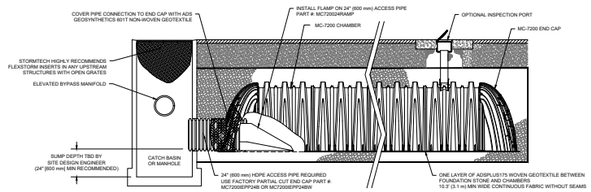
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

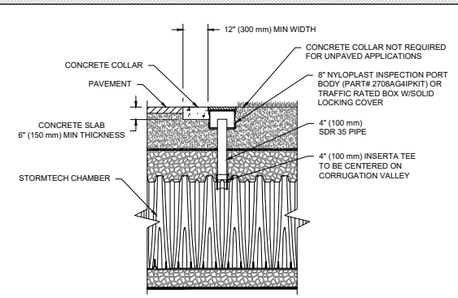
STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

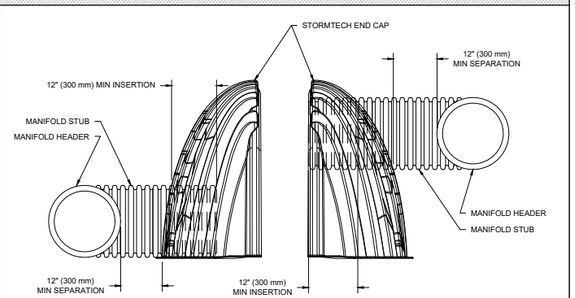


3 MC-7200 ISOLATOR ROW PLUS DETAIL



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

4 4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)



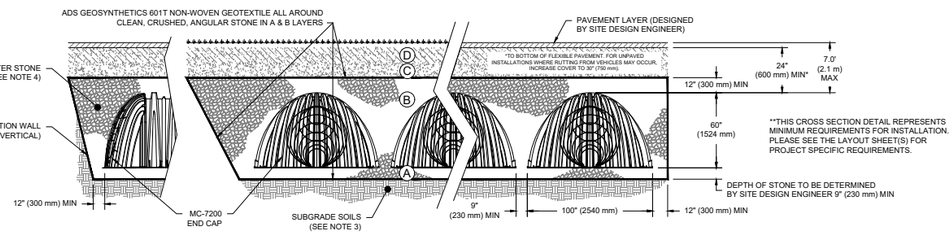
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

7 MC-SERIES END CAP INSERTION DETAIL

ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 MC-7200 CROSS SECTION DETAIL

DRAWN:
REVIEWED:
DATE:
PROJECT NO:
REV:
NOT TO SCALE

MC-7200
STANDARD DETAILS

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

Advanced Drainage Systems, Inc.

SHEET

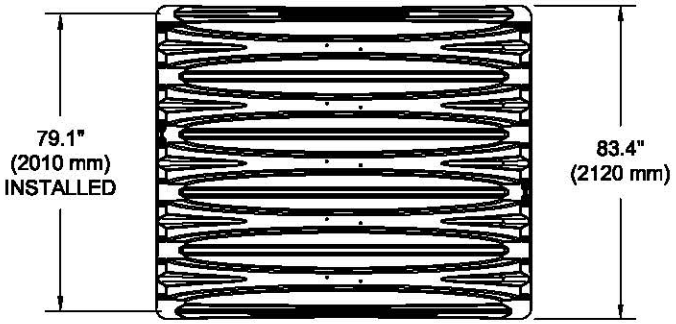
ADVANCED DRAINAGE SYSTEMS, INC. ("ADS") HAS PREPARED THIS DETAIL BASED ON REFERENCED STANDARDS. ADS HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICES FOR THIS PROJECT. NOR HAS ADS INDEPENDENTLY VERIFIED THE INFORMATION SUPPLIED. THE INSTALLATION DETAILS PROVIDED HEREIN ARE GENERAL RECOMMENDATIONS AND ARE NOT SPECIFIC FOR THIS PROJECT. UNLESS THE PLANS ARE SIGNED AND SEALED BY THE SITE DESIGN ENGINEER, THE SITE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION AND SEALING THE DOCUMENT. IT IS THE SITE DESIGN ENGINEER'S RESPONSIBILITY TO ENSURE THE DETAILS PROVIDED HEREIN MEETS OR EXCEEDS THE APPLICABLE NATIONAL, STATE, OR LOCAL REQUIREMENTS AND TO ENSURE THAT THE DETAILS PROVIDED HEREIN ARE ACCEPTABLE FOR THIS PROJECT.

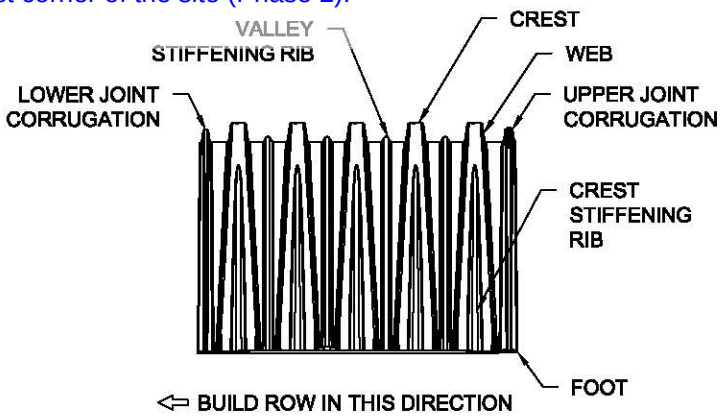
NOT FOR CONSTRUCTION

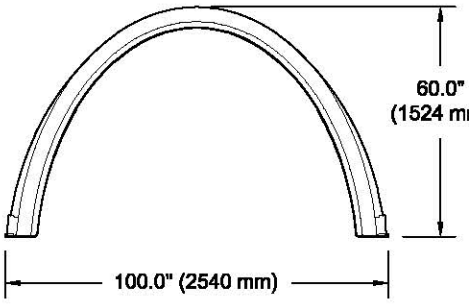
MC-7200 TECHNICAL SPECIFICATION

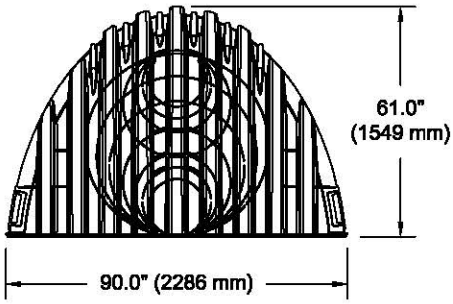
NTS

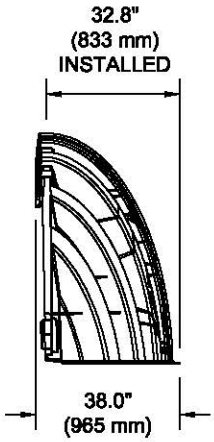
Alternative for underground infiltration proposed in the northwest corner of the site (Phase 2).











NOMINAL CHAMBER SPECIFICATIONS

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MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
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SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
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MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
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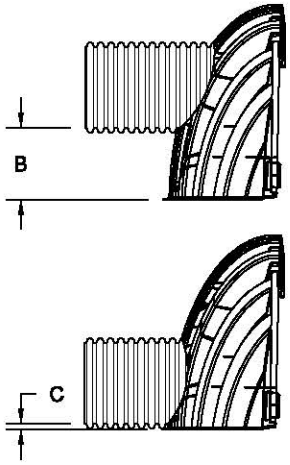
*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC7200IEPP06T	6" (150 mm)	42.54" (1081 mm)	—
MC7200IEPP06B		—	0.86" (22 mm)
MC7200IEPP08T	8" (200 mm)	40.50" (1029 mm)	—
MC7200IEPP08B		—	1.01" (26 mm)
MC7200IEPP10T	10" (250 mm)	38.37" (975 mm)	—
MC7200IEPP10B		—	1.33" (34 mm)
MC7200IEPP12T	12" (300 mm)	35.69" (907 mm)	—
MC7200IEPP12B		—	1.55" (39 mm)
MC7200IEPP15T	15" (375 mm)	32.72" (831 mm)	—
MC7200IEPP15B		—	1.70" (43 mm)
MC7200IEPP18T	18" (450 mm)	29.36" (746 mm)	—
MC7200IEPP18TW			
MC7200IEPP18B		—	1.97" (50 mm)
MC7200IEPP18BW			
MC7200IEPP24T	24" (600 mm)	23.05" (585 mm)	—
MC7200IEPP24TW			
MC7200IEPP24B		—	2.26" (57 mm)
MC7200IEPP24BW			
MC7200IEPP30BW	30" (750 mm)	—	2.95" (75 mm)
MC7200IEPP36BW	36" (900 mm)	—	3.25" (83 mm)
MC7200IEPP42BW	42" (1050 mm)	—	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

NOT FOR CONSTRUCTION

Alternative for underground infiltration proposed in the northwest corner of the site (Phase 2).

STORMWATER MANAGEMENT

IS YOUR STORMWATER SYSTEM TAKING UP TOO MUCH SPACE?

Reduce the size with the R-Tank System, an efficient and versatile underground stormwater storage system. This system will reduce your underground stormwater storage system footprint to resolve a utility conflict or free up space for a future expansion.

It will also provide additional options for vehicular loading and cover depths, and deliver greater installation versatility.

DOES YOUR PROJECT REQUIRE A UNIQUE SOLUTION DUE TO DEPTH OR TRAFFIC LOADS?

With five different module configurations, R-Tank provides system height options from 2" to over 7' deep. It also delivers support for HS-20 and HS-25 traffic, with cover depths from 6" to over 16'.

With an unlimited array of system footprints and configurations, R-Tank solves tough stormwater problems by adapting to the needs of your site - whether your're designing a project at the beach with minimal depth over a water table or a deep system in the hills.

R TANK®

R-TANK®

BENEFITS

HIGH CAPACITY
- 95% void internal area

STRENGTH
- Easily supports traffic loading from parking lots and roads
- Module options for HS-20 and HS-25 rating with cover depths from 6 inches to 16 feet

DESIGN & CONSTRUCTION VERSATILITY
- Modules can be combined into various shapes efficiently and effectively use space
- Varied height from 2 inches to 7 feet

INCREASED INFILTRATION AND EXILFILTRATION
- Outer shell is 90% open
- Increases groundwater recharge, reducing post-construction discharge volumes

EASY TO TRANSPORT
- Can be supplied unassembled for reduced delivery costs

LIGHTWEIGHT AND QUICK TO INSTALL
- Installed by hand; no cranes required
- Reduces site access delays

RECYCLED CONTENT
- Manufactured with recycled polypropylene

R-TANK LD

- Light Duty module (30 psi)
- Ideal for applications in green space
- Not rated for vehicular traffic
- 12” Minimum cover, 36” maximum cover
- Four internal plates

R-TANK HD

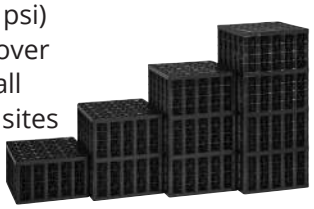
- Heavy Duty module (33.4 psi)
- Standard module for HS-20 traffic applications
- 20” Minimum cover,
- 84” Maximum cover
- Five internal plates

R-TANK SD

- Super Duty module (42.9 psi)
- Higher safety factors for shallow traffic applications and deeper cover
- 18” Minimum cover,
- 120” Maximum cover
- Five internal plates

R-TANK UD

- Ultra Duty module (134.2 psi)
- Traffic loads with 12” of cover
- Available from 14” – 66” tall
- Ideal for high water table sites



R-TANK XD

- Extreme Duty module (240.2 psi)
- Traffic loads with 6” cover
- 16.5’ maximum cover
- Available from 2” - 10’ tall
- 90% void

DESIGN CONSIDERATIONS

Many factors will influence the design of the R-Tank® system. While this list is not intended to be all-inclusive, the following design considerations are worth highlighting:

1. PRE-TREATMENT

Removing pollutants from runoff before they enter an underground detention system is the smart way to design & build a system. Trash Guard Plus® (see page 6) is a great tool for this. Be sure the system you select will remove, heavy sediments, gross pollutants (trash) and biodegradable debris.

2. BACKFILL MATERIALS

Backfill materials should be stone (<1.5" in diameter) or soil (GW, GP SW or SP per the Unified Soil Classification System). Material must be free from lumps, debris and sharp objects that could cut the geotextile. See the R-Tank® narrative specification section 2.03 for additional information.

3. RUNOFF REDUCTION

Most designs incorporate an outlet to drain the system at a controlled rate and/or an overflow to prevent flooding in extreme events. Any infiltration that can be achieved on the site should also be taken advantage of. Consider raising the invert of your outlet or creating a sump to capture and infiltrate the water quality volume whenever possible.

4. WATER TABLE

While installing R-Tank® below the water table is manageable, a stable base must be created to account for the system's ability to drain water out or limit its ability to enter the system. If a liner is used to prevent ground water from entering, measures must be taken to prevent the system from floating.

5. CONSTRUCTION LOADS

Construction loads are often the heaviest loads the system will experience. Care must be taken during backfilling and compaction (see specification section 3.05), and post-installation construction traffic should be routed around the system (Install Guide step 12).

6. LATERAL LOADS

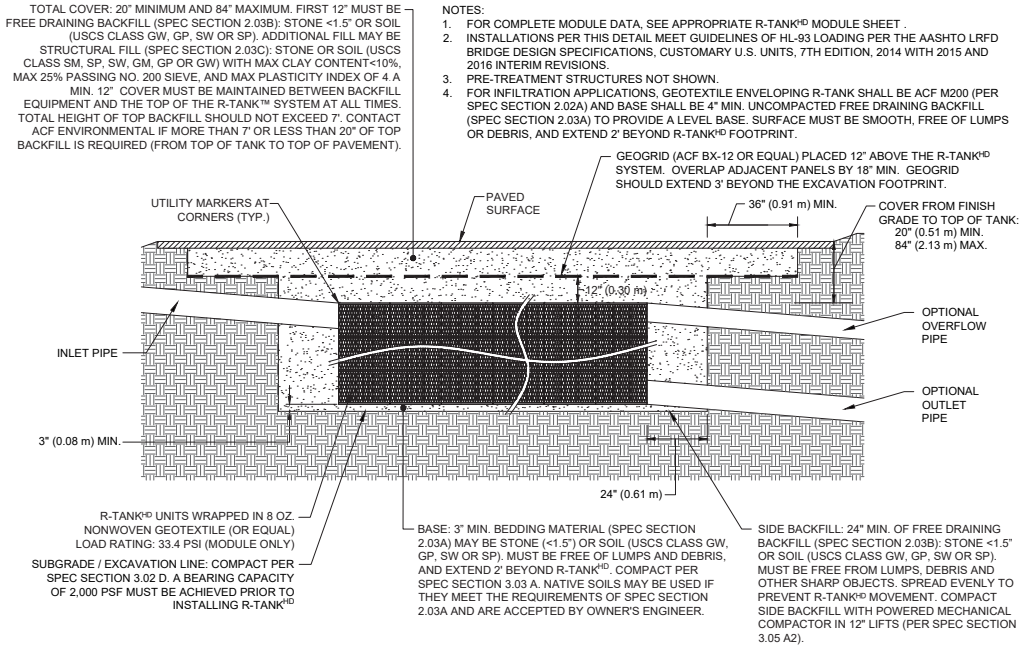
As systems get deeper, the loads acting on the sides of the tank increase. While vertical loads often control the design, lateral loads should also be considered.

7. R-TANK MODULES

Selecting the right module for your application is critical. See page 3 and the specs on the back of this brochure, for details. Our team is also here to help!

8. LOAD MODELING

A safety factor of >1.75 is required when designing an R-Tank System using the AASHTO LRFD Bridge Design Specifications. It is also necessary to run your own loading model with specific site requirements. Example models can be found in our Tech Note on loading capabilities, and minimum cover requirements can be found in the specs on the back of this brochure.



LOW IMPACT DESIGN & GREEN INFRASTRUCTURE

As much of the nation's Gray Infrastructure continues to decay, new concepts for rebuilding it are emerging through Green Infrastructure (GI) and Low Impact Development (LID). This type of reconstruction moves beyond traditional systems that do one thing well, to systems that accomplish multiple objectives simultaneously.

ACF Environmental has several technologies that dovetail with the goals of LID and GI and can play a significant role in the redevelopment process.

R-TANK®

SPACE EFFICIENT SUBSURFACE STORAGE

Pipe and stone are used in traditional systems to move and store runoff. R-Tank accomplishes the same purpose with several additional benefits.

- Stores and moves runoff
- Moves water slowly, increasing time of concentration
- Open system encourages infiltration
- Fully accessible for maintenance
- Stores 138% more water than stone
- Maximizes storage potential of GI practices
- Easily handles traffic loads
- Ships flat to reduce site disturbance

PERMEABLE PAVEMENTS

RUNOFF REDUCTION TECHNIQUES

Traditional pavements move vehicles efficiently, but are easily damaged by stormwater. ACF Environmental specializes in permeable pavements that handle traffic loads, while providing surface infiltration rates 10x higher than traditional pervious pavements, helping reduce the expense of long-term maintenance.

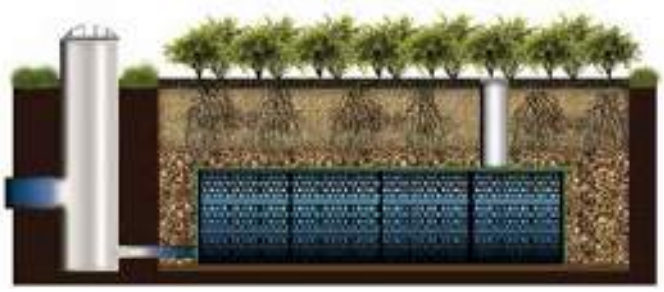
- Handles all vehicular loads
- Drains ten times faster than competing pervious pavements
- Reduces long-term maintenance costs
- Encourages infiltration
- Pair with R-Tank® to maximize water storage and transport

FOCALPOINT

VEGETATED/ BIOLOGICAL TREATMENT SYSTEM

Traditional landscaping adds aesthetic value to projects, but has more potential. Many developers turn to bioretention, but are forced to surrender massive land areas and dedicate significant future funds to maintenance. FocalPoint reduces the space requirements and maintenance costs of bioretention by up to 90% while providing similar pollutant removal.

- Adds aesthetic value to properties
- Cleans runoff to improve water quality
- Reduces space requirements and maintenance costs of traditional bioretention systems
- Encourages infiltration to reduce volume of water discharged
- Pairs with R-Tank® to maximize water storage and transport



R-Tank maximizes the storage capabilities of bioretention and permeable pavement systems.

MAINTENANCE

DESIGNING AN R-TANK SYSTEM WITH LONGEVITY & MAINTENANCE IN MIND IS A THREE-STEP PROCESS:

1. PREVENT

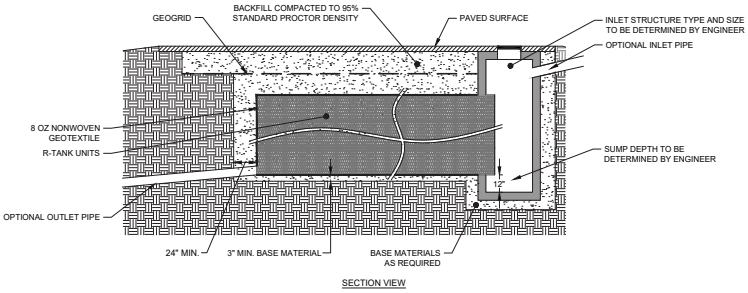
Keep debris and sediment out of the system by pre-treating runoff with the Trash Guard Plus® unit (see below). For a more centralized approach, you could consider having the R-Tank units penetrate the connecting structure, which allows the use of the R-Tank® as its own trash screen. This works best with a structure that includes a sump (see Inlet Connection drawing below).

2. ISOLATE

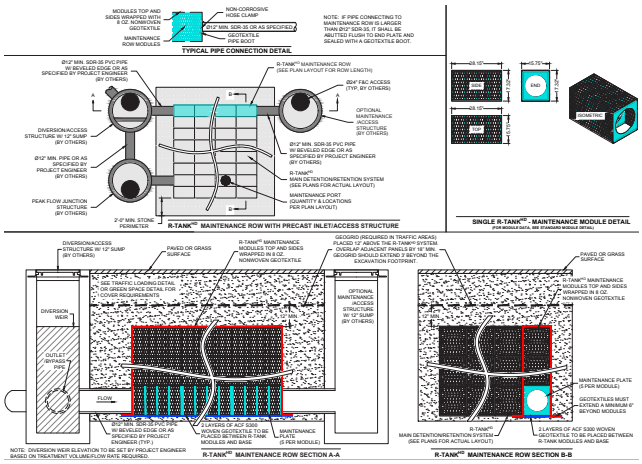
Trap solid pollutants inside the maintenance row (see Maintenance Row drawing below) where they can be easily removed, using the Maintenance Modules (available in LD, HD, and UD only). These modules are wrapped in geotextile to retain solids and are fully accessible by conventional jet-vac systems to remove captured pollutants.

3. PROTECT

Ensure a long system life by including maintenance ports to remove any pollutants that evade the pre-treatment system and maintenance row. Maintenance ports should be specified within 10’ of inlet and outlet connections, and roughly 50’ on center (see detail on page 7).



INLET CONNECTION



MAINTENANCE ROW

MAINTENANCE PREVENTION

TRASH GUARD PLUS ®

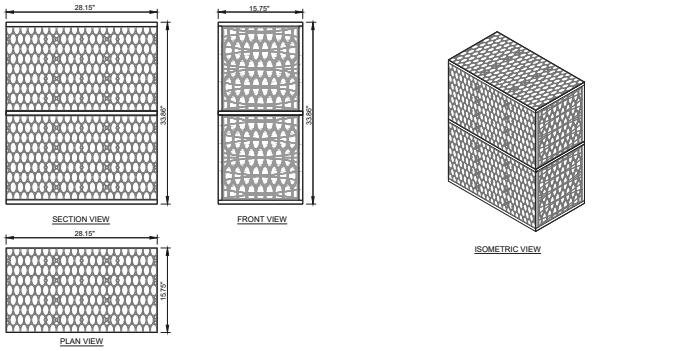
Trash Guard Plus® is a patented stormwater pretreatment device that captures debris, sediment and floatables. Easy to install and maintain, it is a fraction of the cost of other pretreatment devices.

BENEFITS

- Simple retrofit to existing catch basins
- Installs without heavy equipment
- Quick and easy assembly
- Adjusts to irregular catch basin bottoms and/or walls
- Eliminates stormwater trash at public parks, beaches, and waterways
- Removes harmful nutrients and regulated metals

TYPICAL DESIGN

MODULE DRAWING - DOUBLE



MODULE DATA

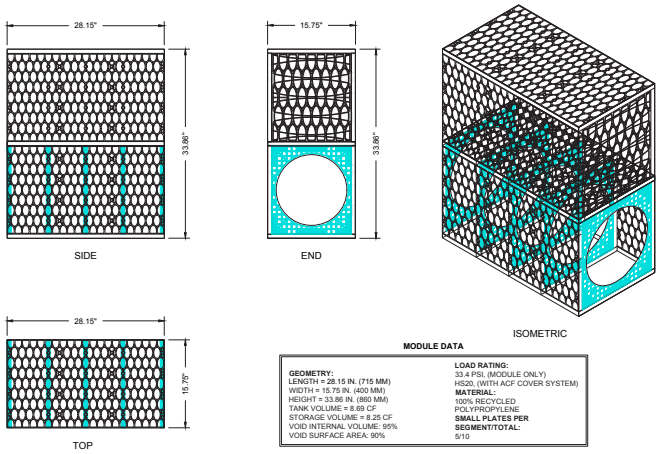
GEOMETRY: LENGTH = 28.15 IN. (715 MM)
WIDTH = 15.75 IN. (400 MM)
HEIGHT = 33.86 IN. (860 MM)
TANK VOLUME = 8.69 CF
STORAGE VOLUME = 8.25 CF
VOID INTERNAL VOLUME: 95%
VOID SURFACE AREA: 90%

LOAD RATING: 33.4 PSI, (MODULE ONLY)
HS25, (WITH ACF COVER SYSTEM)

MATERIAL: 100% RECYCLED POLYPROPYLENE

SMALL PLATES PER SEGMENT/TOTAL: 5/10

MAINTENANCE MODULE - DOUBLE

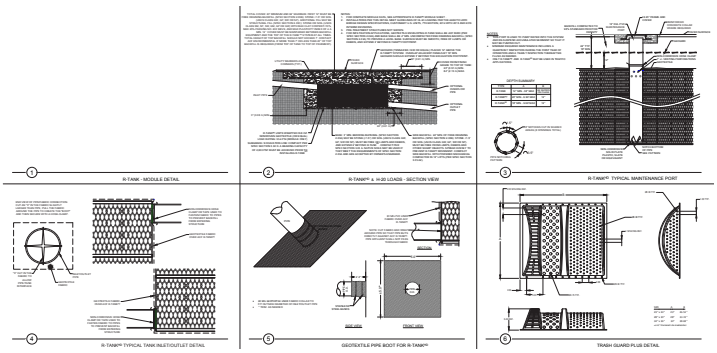


MODULE DATA

GEOMETRY:
LENGTH = 28.15 IN. (715 MM)
WIDTH = 15.75 IN. (400 MM)
HEIGHT = 33.86 IN. (860 MM)
TANK VOLUME = 8.69 CF
STORAGE VOLUME = 8.25 CF
VOID INTERNAL VOLUME: 95%
VOID SURFACE AREA: 90%

LOAD RATING:
33.4 PSI, (MODULE ONLY)
HS20, (WITH ACF COVER SYSTEM)
MATERIAL:
100% RECYCLED POLYPROPYLENE
SMALL PLATES PER SEGMENT/TOTAL:
5/10

COMPOSITE DETAILS

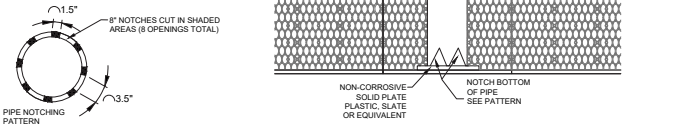


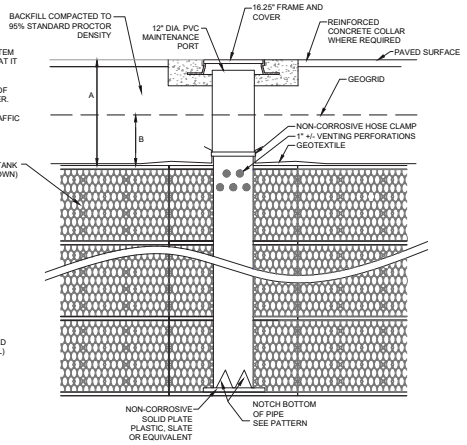
MAINTENANCE PORT

NOTES
- THIS PORT IS USED TO PUMP WATER INTO THE SYSTEM AND RE-SUSPEND ACCUMULATED SEDIMENT SO THAT IT MAY BE PUMPED OUT.
- MINIMUM REQUIRED MAINTENANCE INCLUDES A QUARTERLY INSPECTION DURING THE FIRST YEAR OF OPERATION AND A YEARLY INSPECTION THEREAFTER. FLUSH AS NEEDED.
- ONLY R-TANK^{HD} AND R-TANK^{SD} MAY BE USED IN TRAFFIC APPLICATIONS.

DEPTH SUMMARY

TYPE	A	B
R-TANK	12" MIN - 36" MAX	AS SHOWN ON PLANS
R-TANK^{HD}	20" MIN - 6.99' MAX	12"
R-TANK^{SD}	18" MIN - 9.99' MAX	12"





SELECTING THE RIGHT R-TANK MODULE

Cover Depth (inches)*	LD	HD	SD	UD	XD
Min. 6"	Green Space - No Traffic	Green Space - No Traffic	Green Space - No Traffic	Green Space - No Traffic	HS-20
12"	Green Space - No Traffic	Green Space - No Traffic	Green Space - No Traffic	HS-20**	HS-20
14"	Green Space - No Traffic	Green Space - No Traffic	Green Space - No Traffic	HS-20	HS-20
18"	Green Space - No Traffic	Green Space - No Traffic	HS-20	HS-20	HS-20
20"	Green Space - No Traffic	HS-20	HS-20	HS-20	HS-20
24"	Green Space - No Traffic	HS-20	HS-20	HS-20	HS-20
36"	Green Space - No Traffic	HS-20	HS-20	HS-20	HS-20
48"		HS-20	HS-20	HS-20	HS-20
60"		HS-20	HS-20	HS-20	HS-20
72"		HS-20	HS-20		HS-20
84"			HS-20		HS-20
120"			HS-20		HS-20
160"					HS-20
Max. 200"					HS-20

HS-20 designation based on AASHTO LRFD Bridge Design Spec for single lane traffic. HS-25 loading is available. Call ACF for details.
*Cover depth is measured from top of module to finished grade or top of pavement
**The UD module requires STONE backfill (not soil) on sides at this depth

R-TANK SPECIFICATIONS

LD HD

DIMENSIONS & CAPACITY

Module (Segments)	Width (inch)	Length (inch)	Height (in/ft)	Volume (cf)	Capacity (cf)	Weight* (lbs)
Mini	15.75	28.15	9.45”/0.79’	2.42	2.30	10.1/10.9
Single(1)	15.75	28.15	17.32”/1.44’	4.44	4.22	15.7/17.3
Single + Mini(1.5)	15.75	28.15	25.98”/2.17’	6.67	6.33	23.6/25.9
Double (2)	15.75	28.15	33.86”/2.82’	8.69	8.25	29.1/32.3
Double + Mini(2.5)	15.75	28.15	42.52”/3.54’	10.91	10.36	37.0/41.0
Triple (3)	15.75	28.15	50.39”/4.20’	12.93	12.28	42.5/47.4
Triple + Mini(3.5)	15.75	28.15	59.06”/4.92’	15.15	14.39	50.4/56.0
Quad(4)	15.75	28.15	66.93”/5.58’	17.17	16.31	55.9/62.4
Quad + Mini(4.5)	15.75	28.15	75.59”/6.30’	19.39	18.42	63.8/71.0
Pent(5)	15.75	28.15	83.46”/6.96’	21.41	20.34	69.3/77.4

*Weights shown are for LD/HD modules.

SD

DIMENSIONS & CAPACITY

Module (Segments)	Width (inch)	Length (inch)	Height (in/ft)	Volume (cf)	Capacity (cf)	Weight (lbs)
Single (1)	15.75	28.15	9.45”/0.79’	2.42	2.30	10.95
Double (2)	15.75	28.15	18.12”/1.51’	4.64	4.41	19.58
Triple (3)	15.75	28.15	26.79”/2.23’	6.86	6.52	28.21
Quad (4)	15.75	28.15	35.46”/2.96’	9.08	8.63	36.84
Pent (5)	15.75	28.15	44.13”/3.68’	11.30	10.74	45.47
Hex (6)	15.75	28.15	52.80”/4.40’	13.52	12.84	54.10
Septa (7)	15.75	28.15	61.47”/5.12’	15.74	14.95	62.73
Octo (8)	15.75	28.15	70.14”/5.85’	17.96	17.06	71.36
Nono (9)	15.75	28.15	78.81”/6.57’	20.18	19.17	79.99
Decka (10)	15.75	28.15	87.48”/7.29’	22.40	21.28	88.62

UD

DIMENSIONS & CAPACITY

Module (Segments)	Width (inch)	Length (inch)	Height (in/ft)	Volume (cf)	Capacity (cf)	Weight (lbs)
Single (1)	23.62	23.62	14.17”/1.18’	4.57	4.35	21.2
Double (2)	23.62	23.62	27.17”/2.26’	8.77	8.33	39.0
Triple (3)	23.62	23.62	40.16”/3.35’	12.97	12.32	56.8
Quad (4)	23.62	23.62	53.15”/4.43’	17.16	16.30	74.6
Pent (5)	23.62	23.62	66.14”/5.5’	21.35	20.29	92.4

XD

DIMENSIONS & CAPACITY

Module (Segments)	Width (inch)	Length (inch)	Height (inch)	Volume (cf)	Capacity (cf)	Weight (lbs)
Single (1)	19.68	23.62	1.97	0.53	0.48	4
Double (2)	19.68	23.62	3.94	1.06	0.95	8
Triple (3)	19.68	23.62	5.91	1.59	1.43	12
Quad (4)	19.68	23.62	7.87	2.12	1.91	16
Pent (5)	19.68	23.62	9.84	2.65	2.38	20

Note: XD modules may be stacked up to 10’ tall (60 layers).

SPECIFICATIONS

Item	Description	LD	HD	SD	UD	XD
		Value	**Value**	**Value**	**Value**	**Value**
Void Area	Volume available for water storage	95%	95%	95%	95%	90%
Surface Area Void	% of exterior available for infiltration	90%	90%	90%	90%	90%
Compressive Strength	ASTM D 2412/ ASTM F 2318	30.0 psi	33.4 psi	42.9 psi	134.2 psi	240.2 psi
Unit Weight	Weight of plastic per cubic foot of tank	3.29 lbs/cf	3.62 lbs/cf	3.96 lbs/cf	4.33 lbs/cf	7.55 lbs/cf
Rib Thickness	Thickness of load-bearing members	0.18”	0.18”	0.18”	-	-
Service Temperature	Safe temperature range for use	-14 - 167º F	-14 - 167º F	-14 - 167º F	-14 - 167º F	-14 - 167º F
Recycled Content	Use of recycled polypropylene	100%	100%	100%	100%	100%
Minimum Cover	Cover required for HS-20 loading	Not traffic rated	20”	18”	12” - 14”	6”
	Cover required for HS-25 loading	Not traffic rated	24”	18”	15” - 17”	6”
Maximum Cover	Maximum allowable cover depth	36”	6.99’	9.99’	5.0’	16.7’

R-TANK & HS-20 LOADS

The R-Tank system is capable of easily supporting AASHTO HS-20 and HS-25 loads with safety factors of 1.75 or higher. The system has been used in a variety of applications around the world with tremendous success. Read on and we'll explain how the R-Tank handles heavy loads, and why it will work under HS-20 loads for your project.

Bearing Capacity

The R-Tank's ultimate design load comes from the results of a compression test performed according to ASTM D 2412 & ASTM F 2418, which are the industry standard tests for loading of underground detention systems. Testing was performed by TRI Environmental, and their report along with a technical note about the test methodology is available to supplement this document.

R-Tank has been chosen for tough applications all over the world.

Typical Load Calculation

The AASHTO HS-20 Standard uses a 32,000 lbs axle as the design load (two axles at 25,000 lbs each at depths greater than 38"). To conservatively model the R-Tank's performance under these types of traffic loads, several steps are taken and additional factors considered:

- The axle load is distributed to two sets of dual wheels, each 10" x 20" at 80 psi
- The tire contact area is transferred down through the cover layers at a conservative 1:2 angle (33%) to determine the Area of Applied Load on the top of the R-Tank
- An impact factor is added to account for the movement of the load
- Weight of cover material in a saturated condition is added (130 lbs/cf)

Unconfined Compression Test

With these factors in place, the HS-20 load can be modeled and the resulting safety factor determined. The table on page 2 shows how the R-Tank performs at various depths of cover, and it suggests which module should be used. Since most projects are designed for HS-20 loads in parking lots, this table is ideal for most installations.

If you are designing for HS-25 loads, or if you are considering applications with multiple HS-20 loads regularly travelling in multiple parallel lanes (for example, active roadways or shipping terminals), tables for these specific circumstances are available.

R-TANK & HS-20 LOADS

Third Party Verification

Modeling product performance using engineering equations to ensure a successful project is important. But what really matters is product performance in the field. That's why we've done real-world testing with third party agencies who have installed the R-Tank and subjected it to brutal testing.

One test involved installing 18" of sand cover over an R-Tank^{LD} module (an R-Tank^{SD} should have been used at this depth) without geogrid, and driving a 31 ton dump truck over the system. Even in these harsh conditions, the R-Tank has supported the loads, passing every field test that's been done.

R-Tank field testing.

Real World Performance

Your project REQUIRES a proven system. With thousands of installations around the world, R-Tank has proven itself again and again as one of the strongest systems available for underground detention/retention. Specify R-Tank and you can be confident your system will support the traffic loads above. Call ACF today to discuss your project's requirements.

Truck (31 tons) backing over R-Tank.

HS-20 & LRFD Design Tandem Loading - Single Lane Traffic

Item	Cover Depth (inches) 6	12	18	20	30	38	48	60	72	84	96	108	120	144
Axle Load (lbs)	32,000	32,000	32,000	32,000	32,000	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*	25,000*
Wheel Load (lbs)	16,000	16,000	16,000	16,000	16,000	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
Tire Contact Area (10" x 20" = 200 inch^2)	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Area of Applied Load at 33% Angle of Repose (inch^2)	416	704	1,064	1,200	2,000	2,784	3,944	5,600	7,544	9,776	12,296	15,104	18,200	25,256
Unfactored Wheel Loading Applied to R-Tank (psi)	38.46	22.73	15.04	13.33	8.00	8.98	6.34	8.93	6.63	5.11	4.07	3.31	2.75	1.98
Factored Wheel Loading Applied to R-Tank** (psi)	50.36	29.29	19.07	16.82	9.82	10.77	7.38	10.03	7.17	5.33	4.07	3.31	2.75	1.98
Cover Material Pressure at 130 lbs/cf (psi)	0.45	0.90	1.35	1.50	2.26	2.86	3.61	4.51	5.42	6.32	7.22	8.13	9.03	10.83
Total Load Applied to R-Tank (psi)	**50.81**	**30.19**	**20.42**	**18.32**	**12.07**	**13.63**	**11.00**	**14.55**	**12.59**	**11.64**	**11.29**	**11.44**	**11.78**	**12.81**
Ultimate Bearing Capacity of R-Tank Unit (psi)	240.20	134.20	42.90	33.40	33.40	33.40	33.40	33.40	33.40	42.90	42.90	42.90	240.20	240.20
Safety Factor***	**4.73**	**4.44**	**2.10**	**1.82**	**2.77**	**3.04**	**3.04**	**2.30**	**2.65**	**3.68**	**3.80**	**3.75**	**20.40**	**18.75**

- R-Tank^{HD}
- R-Tank^{SD}
- R-Tank^{UD}
- R-Tank^{XD}

* *LRFD Tandem Loading controls at depths of 38" or more.*

** *Includes Dynamic Loading Allowance in Accordance with AASHTO LRFD.*

*** *In leiu of Live and Dead Load factors, a minimum "Safety Factor" of 1.75 is maintained.*

ACF ENVIRONMENTAL
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R-TANK OPERATION, INSPECTION & MAINTENANCE

Operation

Your ACF R-Tank System has been designed to function in conjunction with the engineered drainage system on your site, the existing municipal infrastructure, and/or the existing soils and geography of the receiving watershed. Unless your site included certain unique and rare features, the operation of your R-Tank System will be driven by naturally occurring systems and will function autonomously. However, upholding a proper schedule of Inspection & Maintenance is critical to ensuring continued functionality and optimum performance of the system.

Inspection

Both the R-Tank and all stormwater pre-treatment features incorporated into your site must be inspected regularly. Inspection frequency for your system must be determined based on the contributing drainage area, but should never exceed one year between inspections (six months during the first year of operation).

Inspections may be required more frequently for pre-treatment systems. You should refer to the manufacturer requirements for the proper inspection schedule.

With the right equipment your inspection and measurements can be accomplished from the surface without physically entering any confined spaces. If your inspection does require confined space entry, you MUST follow all local/regional requirements as well as OSHA standards.

R-Tank Systems may incorporate Inspection Ports, Maintenance Ports, and/or adjoining manholes. Each of these features are easily accessed by removing the lid at the surface. With the cover removed, a visual inspection can be performed to identify sediment deposits within the structure. Using a flashlight, ALL access points should be examined to complete a thorough inspection.

Inspection Ports
Usually located centrally in the R-Tank System, these perforated columns are designed to give the user a base-line sediment depth across the system floor.

Maintenance Ports
Usually located near the inlet and outlet connections, you'll likely find deeper deposits of heavier sediments when compared to the Inspection Ports.

Manholes
Most systems will include at least two manholes - one at the inlet and another at the outlet. There may be more than one location where stormwater enters the system, which would result in additional manholes to inspect.

Bear in mind that these manholes often include a sump below the invert of the pipe connecting to the R-Tank. These sumps are designed to capture sediment before it reaches the R-Tank, and they should be kept clean to ensure they function properly. However, existence of sediment in the sump does NOT necessarily mean sediment has accumulated in the R-Tank.

After inspecting the bottom of the structure, use a mirror on a pole (or some other device) to check for sediment or debris in the pipe connecting to the R-Tank.

R-TANK OPERATION INSPECTION & MAINTENANCE

If sediment or debris is observed in any of these structures, you should determine the depth of the material. This is typically accomplished with a stadia rod, but you should determine the best way to obtain the measurement.

All observations and measurements should be recorded on an Inspection Log kept on file. We've included a form you can use at the end of this guideline.

Maintenance

The R-Tank System should be back-flushed once sediment accumulation has reached 6" or 15% of the total system height. Use the chart below as a guideline to determine the point at which maintenance is required on your system.

R-Tank Unit	Height	Max Sediment Dept
Mini	9.5"	1.5"
Single	17"	3"
Double	34"	5"
Triple	50"	6"
Quad	67"	6"
Pent	84"	6"

Before any maintenance is performed on your system, be sure to plug the outlet pipe to prevent contamination of the adjacent systems.

To back-flush the R-Tank, water is pumped into the system through the Maintenance Ports as rapidly as possible. Water should be pumped into ALL Maintenance Ports. The turbulent action of the water moving through the R-Tank will suspend sediments which may then be pumped out.

If your system includes an Outlet Structure, this will be the ideal location to pump contaminated water out of the system. However, removal of back-flush water may be accomplished through the Maintenance Ports, as well.

For systems with large footprints that would require extensive volumes of water to properly flush the system, you should consider performing your maintenance within 24 hours of a rain event. Stormwater entering the system will aid in the suspension of sediments and reduce the volume of water required to properly flush the system.

Once removed, sediment-laden water may be captured for disposal or pumped through a Dirtbag™ (if permitted by the locality).

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Step-By-Step Inspection & Maintenance Routine

1) **Inspection**
    a. Inspection Port
        i. Remove Cap
        ii. Use flashlight to detect sediment deposits
        iii. If present, measure sediment depth with stadia rod
        iv. Record results on Maintenance Log
        v. Replace Cap
    b. Maintenance Port/s
        i. Remove Cap
        ii. Use flashlight to detect sediment deposits
        iii. If present, measure sediment depth with stadia rod
        iv. Record results on Maintenance Log
        v. Replace Cap
        vi. Repeat for ALL Maintenance Ports
    c. Adjacent Manholes
        i. Remove Cover
        ii. Use flashlight to detect sediment deposits
        iii. If present, measure sediment depth with stadia rod, accounting for depth of sump (if present)
        iv. Inspect pipes connecting to R-Tank
        v. Record results on Maintenance Log
        vi. Replace Cover
        vii. Repeat for ALL Manholes that connect to the R-Tank

2) **Maintenance**
    a. Plug system outlet to prevent discharge of back-flush water
    b. Determine best location to pump out back-flush water
    c. Remove Cap from Maintenance Port
    d. Pump water as rapidly as possible (without over-topping port) into system until at least 1”
    of water covers system bottom
    e. Replace Cap
    f. Repeat at ALL Maintenance Ports
    g. Pump out back-flush water to complete back-flushing
    h. Vacuum all adjacent structures and any other structures or stormwater pre-treatment systems that require attention
    i. Sediment-laden water may be captured for disposal or pumped through a Dirtbag™.
    j. Replace any remaining Caps or Covers
    k. Record the back-flushing event in your Maintenance Log with any relevant specifics

R-Tank Maintenance Log

Site Name:_____

Location:_____

System Owner:_____

Company Responsible for Maintenance:_____

Contact:_____

Phone Number:_____

Date	Location	Depth to Bottom	Depth to Sediment	Sediment Depth	Observations/Notes	Initials

For more information about our products, contact Inside Sales at 800.448.3636 or email at info@acfenv.com

Appendix D

DCV and HCOC Calculations

Design Capture Volume Calculations
Phase 1

There are two (2) Drainage Areas (DA-1 and DA-2) for the Site
There are five (5) DMA's within DA-1
There is one (1) DMA's within DA-2

Total Area =	1,441,806	sf
	33.10	ac
DA-1 Total Area =	1,324,630	sf
	30.41	ac
DA-1 Total DCV =	77,194	cf
DA-2 Total Area =	117,176	sf
	2.69	ac
DA-2 Total DCV =	8,990	cf

- Step 1 – Compute the area, in square feet, for each Project Site DA
- Step 2 – Compute the DA runoff coefficient as a function of DA imperviousness (i), using the following regression equation (ASCE and WEF, 1998):

$$C = 0.858 * i^3 - 0.78 * i^2 + 0.774 * i + 0.04$$

- Step 3 – Identify the 2-year, 1-hour rainfall depth for the DA from the NOAA Atlas 14 isohyet map. The following webpage can be used to extract interpolated point rainfall from NOAA Atlas 14 isohyets:

http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

- Step 4 – Compute the P6 mean storm rainfall depth in inches for the DA by multiplying the 2 year, 1-hr rainfall depth by the appropriate coefficient (a_1) for the San Bernardino County climatic region (Valley = 1.4807, Mountain = 1.909, or Desert = 1.2371):

$$P_6 = P_{2yr,1hr} * a_1$$

- Step 5 – Calculate the design capture volume (DCV), in cubic feet, as a function of the total DA, in square feet; the runoff coefficient (C), the P6 rainfall depth, in inches; and the regression constant to account for drawdown time (a_2 = 1.582 for 24-hr drawdown, or 1.963 for 48-hr drawdown). Drawdown time is the maximum amount of time that runoff can be stored in a BMP to ensure sufficient capacity to treat subsequent storm events. The following equation computes the DCV:

$$DCV = DA * C * a_2 * P_6 / 12$$

Phase 1

Drainage Area		DMA-A1	
Area of DMA	A	627,670	sf
Area of DMA	A	**14.41**	ac
Imperviousness Ratio	i	70%	%
DA Runoff Coefficient	C	**0.49**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**35,967**	cf

Drainage Area		DMA-B	
DA-1 Drains to Almond Avenue			
Area of DMA	A	114,563	sf
Area of DMA	A	**2.63**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**8,790**	cf

Drainage Area		DMA-C	
DA-1 Drains to Almond Avenue			
Area of DMA	A	138,521	sf
Area of DMA	A	**3.18**	ac
Imperviousness Ratio	i	0%	%
DA Runoff Coefficient	C	**0.04**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**643**	cf

Phase 1

Drainage Area		DMA-D	
DA-1 Drains to Almond Avenue			
Area of DMA	A	31,363	sf
Area of DMA	A	**0.72**	ac
Imperviousness Ratio	i	0%	%
DA Runoff Coefficient	C	**0.04**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**146**	cf

Drainage Area		DMA-E	
DA-1 Drains to Almond Avenue			
Area of DMA	A	412,513	sf
Area of DMA	A	**9.47**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**31,649**	cf

Drainage Area		DMA-A2	
DA-2 Drains to Lugonia Avenue			
Area of DMA	A	117,176	sf
Area of DMA	A	**2.69**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**8,990**	cf

BMP Sizing Calculations

Phase 1

Note: DMA's C and D in DA-1 contain zero existing or proposed impervious and do not com-mingle with un-mitigated flow from other DMA's within DA-1

Bioretention with no underdrain	$V_{ret} = (P_{design} / 12 * SA_{inf} * T_{fill}) + (SA_{ponded} * d_{ponded}) + (SA_{soil} * d_{soil} * n_{soil}) + (SA_{gravel} * d_{gravel} * n_{gravel})$ where $d_{ponded} < T_{drawdown} * P_{design} / 12$	P_{design} = design percolation rate (in/hr), field measured infiltration divided by safety factor $SA_{inf,ponded,soil,gravel}$ = surface area (ft^2) of bioretention bottom, soil and gravel layers, and surface ponding $T_{drawdown}$ = drawdown time for stored runoff (hrs), default is 48 hours T_{fill} = duration of storm when infiltration is occurring as basin is filling (hrs), default is 3 hours $d_{ponded,gravel}$ = depth (ft) of ponding and gravel layers n_{gravel} = porosity of gravel layer	Riverside County LID BMP Manual[2] Orange County TGD for Project WQMPs Appendix XIV[1]

BMP	DMA-A1	
DA-1		
Pdesign	0.50	in/hr
SAinf	22,232	sf
SAponded	22,232	sf
SAsoil	22,232	sf
SAgravel	22,232	sf
Tdrawdown	48	hours
Tfill	3	hours
dponded	1.0	ft
dgravel	1.0	ft
dsoil	2.0	ft
ngravel	0.40	
nsoil	0.40	
Vret	**51,689**	cf
DCV	35,967	cf

BMP	DMA-B	
DA-1		
Pdesign	0.50	in/hr
SAinf	4,200	sf
SAponded	4,200	sf
SAsoil	4,200	sf
SAgravel	4,200	sf
Tdrawdown	48	hours
Tfill	3	hours
dponded	1.0	ft
dgravel	1.0	ft
dsoil	2.0	ft
ngravel	0.40	
nsoil	0.40	
Vret	**9,765**	cf
DCV	8,790	cf

Phase 1

BMP	DMA-E	
DA-1		
P_{design}	0.50	in/hr
SA_{inf}	14,000	sf
SA_{ponded}	14,000	sf
SA_{soil}	14,000	sf
SA_{gravel}	14,000	sf
$T_{drawdown}$	48	hours
T_{fill}	3	hours
d_{ponded}	1.0	ft
d_{gravel}	1.0	ft
d_{soil}	2.0	ft
n_{gravel}	0.40	
n_{soil}	0.40	
V_{ret}	**32,550**	cf
DCV	31,649	cf

BMP	DMA-A2	
DA-2		
P_{design}	0.50	in/hr
SA_{inf}	6,035	sf
SA_{ponded}	6,035	sf
SA_{soil}	6,035	sf
SA_{gravel}	6,035	sf
$T_{drawdown}$	48	hours
T_{fill}	3	hours
d_{ponded}	1.0	ft
d_{gravel}	1.0	ft
d_{soil}	2.0	ft
n_{gravel}	0.40	
n_{soil}	0.40	
V_{ret}	**14,031**	cf
DCV	8,990	cf

Runoff Volume Calculations (2-year, 24-hour)

Phase 1

Refer to San Bernardino Hydrology Manual for Curve Numbers (Figure C-3)
Project Site Hydrologic Soil Type A
EX developed portion of the site assumed 85% impervious and 15% commercial landscape; remaining portion assumed open brush
PR entire site developed at 85% impevious and 15% commercial landscape

Phase 1

Total DA-1			
Total Area	A	1,324,630	sf
Total Area	A	30.41	ac
2-YR, 24-HR Rainfall Depth	$P_{2yr,24hr}$	2.07	in
Rootop Curve Number	CN	98	AMC-II
Pavement Curve Number	CN	98	AMC-II
Urban Cover Comm. Landscape	CN	32	AMC-II
Open Brush w/Good Cover	CN	41	AMC-II
Existing Area @ CN 98	A	292,825	sf
Existing Area @ CN 32	A	51,675	sf
Existing Area @ CN 41	A	980,130	sf
EX. Area-Weighted CN	CN_{EX}	53	
Storage Capacity	S	8.78	
Initial Abstraction	Ia	1.76	
EX. Runoff Volume	**VOL_{EX}**	**1,198**	cf
Proposed Area @ CN 98	A	887,502	sf
Proposed Area @ CN 32	A	437,128	sf
Proposed Area @ CN 41	A	0	sf
PR. Area-Weighted CN	CN_{PR}	76	
Storage Capacity	S	3.12	
Initial Abstraction	Ia	0.62	
PR. Runoff Volume	**VOL_{PR}**	**50,551**	**cf**

Required Volume Reduction	**VOL_{HCOC}**	**46,826**	**cf**

Total Site DCV =	DCV	77,194	cf

Provided Volume Retention	**VOLprov**	**94,004**	**cf**

Phase 1

Total DA-2			
Total Area	A	117,176	sf
Total Area	A	2.69	ac
2-YR, 24-HR Rainfall Depth	$P_{2yr,24hr}$	2.07	in
Rootop Curve Number	CN	98	AMC-II
Pavement Curve Number	CN	98	AMC-II
Urban Cover Comm. Landscape	CN	32	AMC-II
Open Brush w/Good Cover	CN	41	AMC-II
Existing Area @ CN 98	A	0	sf
Existing Area @ CN 32	A	0	sf
Existing Area @ CN 41	A	117,176	sf
EX. Area-Weighted CN	CN_{EX}	41	
Storage Capacity	S	14.39	
Initial Abstraction	Ia	2.88	
EX. Runoff Volume	**VOL_{EX}**	**469**	cf
Proposed Area @ CN 98	A	99,600	sf
Proposed Area @ CN 32	A	17,576	sf
Proposed Area @ CN 41	A	0	sf
PR. Area-Weighted CN	CN_{PR}	88	
Storage Capacity	S	1.35	
Initial Abstraction	Ia	0.27	
PR. Runoff Volume	**VOL_{PR}**	**10,040**	**cf**

Required Volume Reduction	**VOL_{HCOC}**	**9,069**	**cf**

Total Site DCV =	DCV	8,990	cf

Provided Volume Retention	**VOLprov**	**14,031**	**cf**

Design Capture Volume Calculations
Phase 2 (Sized for Ultimate Condition)

There are two (2) Drainage Areas (DA-1 and DA-2) for the Site
There are three (3) DMA's within DA-1
There is one (1) DMA's within DA-2

Total Area (sf) =	1,584,894
Total Area (ac) =	36.38
DA-1 Total Area (sf) =	1,432,894
DA-1 Total Area (ac) =	32.89
DA-1 Total DCV (cf)	109,935
DA-2 Total Area (sf) =	152,000
DA-2 Total Area (ac) =	3.49
DA-2 Total DCV (cf)	11,662

- Step 1 – Compute the area, in square feet, for each Project Site DA
- Step 2 – Compute the DA runoff coefficient as a function of DA imperviousness (i), using the following regression equation (ASCE and WEF, 1998):

$$C = 0.858 * i^3 - 0.78 * i^2 + 0.774 * i + 0.04$$

- Step 3 – Identify the 2-year, 1-hour rainfall depth for the DA from the NOAA Atlas 14 isohyet map. The following webpage can be used to extract interpolated point rainfall from NOAA Atlas 14 isohyets:

http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

- Step 4 – Compute the P6 mean storm rainfall depth in inches for the DA by multiplying the 2 year, 1-hr rainfall depth by the appropriate coefficient (a_1) for the San Bernardino County climatic region (Valley = 1.4807, Mountain = 1.909, or Desert = 1.2371):

$$P_6 = P_{2yr,1hr} * a_1$$

- Step 5 – Calculate the design capture volume (DCV), in cubic feet, as a function of the total DA, in square feet; the runoff coefficient (C), the P6 rainfall depth, in inches; and the regression constant to account for drawdown time (a_2 = 1.582 for 24-hr drawdown, or 1.963 for 48-hr drawdown). Drawdown time is the maximum amount of time that runoff can be stored in a BMP to ensure sufficient capacity to treat subsequent storm events. The following equation computes the DCV:

$$DCV = DA * C * a_2 * P_6 / 12$$

Phase 2/Ultimate Condition

Drainage Area		DMA-A1	
DA-1 Drains to Almond Avenue			
Area of DMA	A	1,197,394	sf
Area of DMA	A	**27.49**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**91,866**	cf

Drainage Area		DMA-B	
DA-1 Drains to Almond Avenue			
Area of DMA	A	126,200	sf
Area of DMA	A	**2.90**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**9,682**	cf

Phase 2/Ultimate Condition

Drainage Area		DMA-C	
DA-1 Drains to Almond Avenue			
Area of DMA	A	109,300	sf
Area of DMA	A	**2.51**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**8,386**	cf

Drainage Area		DMA-A2	
DA-2 Drains to Lugonia Avenue			
Area of DMA	A	152,000	sf
Area of DMA	A	**3.49**	ac
Imperviousness Ratio	i	85%	%
DA Runoff Coefficient	C	**0.66**	
2-YR, 1-HR Rainfall Depth	$P_{2yr,1hr}$	0.48	in
Coefficient(Valley, Mountain, Desert)	a_1	1.48	
Mean Storm Rainfall Depth	P_6	**0.71**	in
Drawdown Time(24-hr, 48-hr)	a_2	1.96	
Design Capture Volume	DCV	**11,662**	cf

BMP Sizing Calculations

Phase 2 (Sized for Ultimate Condition)

Phase 2/Ultimate Condition

Drywell / Permeable pavement / Underground infiltration	$V_{ret} = (P_{design} / 12 * SA_{inf} * T_{fill}) + (SA_{resevoir} * d_{resevoir} * n_{aggregate})$ where $d_{resevoir} < T_{drawdown} * P_{design} / 12$	P_{design} = design percolation rate (in/hr), field measured infiltration divided by safety factor $SA_{inf,reservoir}$ = surface area (ft^2) of reservoir for drywell or permeable pavement, include weep holes for drywell SA_{inf} $T_{drawdown}$ = drawdown time for stored runoff (hrs), default is 48 hours T_{fill} = duration of storm when infiltration is occurring as basin is filling (hrs), default is 3 hours $d_{reservoir}$ = depth (ft) of drywell $n_{aggregate}$ = porosity of aggregate , if none then 1.0	Riverside County LID BMP Manual[2] Orange County TGD for Project WQMPs Appendix XIV[1]

BMP	DMA-A1	
DA-1		
Pdesign	0.50	in/hr
SAinf	44,500	sf
SAreservoir	44,500	sf
Tfill	3	hours
dreservoir	2.0	ft
naggregate	1.0	
Vret	**94,563**	cf
DCV	91,866	cf

Phase 2/Ultimate Condition

Bioretention with no underdrain	$V_{ret} = (P_{design} / 12 * SA_{inf} * T_{fill}) + (SA_{ponded} * d_{ponded}) + (SA_{soil} * d_{soil} * n_{soil}) + (SA_{gravel} * d_{gravel} * n_{gravel})$ where $d_{ponded} < T_{drawdown} * P_{design} / 12$	P_{design} = design percolation rate (in/hr), field measured infiltration divided by safety factor $SA_{inf,ponded,soil,gravel}$ = surface area (ft^2) of bioretention bottom, soil and gravel layers, and surface ponding $T_{drawdown}$ = drawdown time for stored runoff (hrs), default is 48 hours T_{fill} = duration of storm when infiltration is occurring as basin is filling (hrs), default is 3 hours $d_{ponded,gravel}$ = depth (ft) of ponding and gravel layers n_{gravel} = porosity of gravel layer	Riverside County LID BMP Manual[2] Orange County TGD for Project WQMPs Appendix XIV[1]

BMP	DMA-B	
DA-1		
Pdesign	0.50	in/hr
SAinf	4,200	sf
SAponded	4,200	sf
SAsoil	4,200	sf
SAgravel	4,200	sf
Tdrawdown	48	hours
Tfill	3	hours
dponded	1.0	ft
dgravel	1.0	ft
dsoil	2.0	ft
ngravel	0.40	
nsoil	0.40	
Vret	**9,765**	cf
DCV	9,682	cf

BMP	DMA-C	
DA-1		
Pdesign	0.50	in/hr
SAinf	4,000	sf
SAponded	4,000	sf
SAsoil	4,000	sf
SAgravel	4,000	sf
Tdrawdown	48	hours
Tfill	3	hours
dponded	1.0	ft
dgravel	1.0	ft
dsoil	2.0	ft
ngravel	0.40	
nsoil	0.40	
Vret	**9,300**	cf
DCV	8,386	cf

Phase 2/Ultimate Condition

BMP	DMA-A2	
DA-2		
P_{design}	0.50	in/hr
SA_{inf}	6,035	sf
SA_{ponded}	6,035	sf
SA_{soil}	6,035	sf
SA_{gravel}	6,035	sf
$T_{drawdown}$	48	hours
T_{fill}	3	hours
d_{ponded}	1.0	ft
d_{gravel}	1.0	ft
d_{soil}	2.0	ft
n_{gravel}	0.40	
n_{soil}	0.40	
V_{ret}	**14,031**	cf
DCV	11,662	cf

Runoff Volume Calculations (2-year, 24-hour)

Phase 2/Ultimate Condition

Refer to San Bernardino Hydrology Manual for Curve Numbers (Figure C-3)
Project Site Hydrologic Soil Type A
EX developed portion of the site assumed 85% impervious and 15% commercial landscape; remaining portion assumed open brush
PR entire site developed at 85% impevious and 15% commercial landscape

Total DA-1			
Total Area	A	1,432,894	sf
Total Area	A	32.89	ac
2-YR, 24-HR Rainfall Depth	$P_{2yr,24hr}$	2.07	in
Rootop Curve Number	CN	98	AMC-II
Pavement Curve Number	CN	98	AMC-II
Urban Cover Comm. Landscape	CN	32	AMC-II
Open Brush w/Good Cover	CN	41	AMC-II
Existing Area @ CN 98	A	292,825	sf
Existing Area @ CN 32	A	51,675	sf
Existing Area @ CN 41	A	1,249,605	sf
EX. Area-Weighted CN	CN_{EX}	57	
Storage Capacity	S	7.56	
Initial Abstraction	Ia	1.51	
EX. Runoff Volume	**VOL_{EX}**	**4,567**	cf
Proposed Area @ CN 98	A	1,217,960	sf
Proposed Area @ CN 32	A	214,934	sf
Proposed Area @ CN 41	A	0	sf
PR. Area-Weighted CN	CN_{PR}	88	
Storage Capacity	S	1.35	
Initial Abstraction	Ia	0.27	
PR. Runoff Volume	**VOL_{PR}**	**122,776**	**cf**

Required Volume Reduction	**VOL_{HCOC}**	**112,070**	**cf**

Total Site DCV =	DCV	109,935	cf

Provided Volume Retention	**VOLprov**	**113,628**	**cf**

Phase 2/Ultimate Condition

Total DA-2			
Total Area	A	152,000	sf
Total Area	A	3.49	ac
2-YR, 24-HR Rainfall Depth	$P_{2yr,24hr}$	2.07	in
Rootop Curve Number	CN	98	AMC-II
Pavement Curve Number	CN	98	AMC-II
Urban Cover Comm. Landscape	CN	32	AMC-II
Open Brush w/Good Cover	CN	41	AMC-II
Existing Area @ CN 98	A	0	sf
Existing Area @ CN 32	A	0	sf
Existing Area @ CN 41	A	152,000	sf
EX. Area-Weighted CN	CN_{EX}	41	
Storage Capacity	S	14.39	
Initial Abstraction	Ia	2.88	
EX. Runoff Volume	**VOL_{EX}**	**609**	cf
Proposed Area @ CN 98	A	129,200	sf
Proposed Area @ CN 32	A	22,800	sf
Proposed Area @ CN 41	A	0	sf
PR. Area-Weighted CN	CN_{PR}	88	
Storage Capacity	S	1.35	
Initial Abstraction	Ia	0.27	
PR. Runoff Volume	**VOL_{PR}**	**13,024**	**cf**

Required Volume Reduction	**VOL_{HCOC}**	**11,764**	**cf**

Total Site DCV =	DCV	11,662	cf

Provided Volume Retention	**VOLprov**	**14,031**	**cf**

NOAA Atlas 14, Volume 6, Version 2
Location name: Redlands, California, USA*
Latitude: 34.0718°, Longitude: -117.2296°
Elevation: 1150.22 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.099 (0.082-0.120)	0.128 (0.107-0.156)	0.168 (0.139-0.205)	0.200 (0.165-0.246)	0.246 (0.195-0.312)	0.281 (0.218-0.365)	0.317 (0.240-0.422)	0.355 (0.262-0.487)	0.407 (0.288-0.583)	0.449 (0.306-0.665)
10-min	0.141 (0.118-0.171)	0.184 (0.153-0.223)	0.241 (0.199-0.293)	0.287 (0.236-0.353)	0.352 (0.280-0.448)	0.402 (0.313-0.523)	0.454 (0.345-0.606)	0.509 (0.375-0.698)	0.584 (0.412-0.836)	0.643 (0.438-0.954)
15-min	0.171 (0.142-0.207)	0.222 (0.185-0.270)	0.291 (0.241-0.355)	0.348 (0.286-0.427)	0.426 (0.338-0.541)	0.487 (0.378-0.632)	0.550 (0.417-0.732)	0.615 (0.453-0.844)	0.706 (0.498-1.01)	0.778 (0.530-1.15)
30-min	0.253 (0.211-0.307)	0.329 (0.274-0.400)	0.431 (0.357-0.525)	0.515 (0.423-0.632)	0.630 (0.501-0.802)	0.721 (0.560-0.937)	0.814 (0.617-1.08)	0.911 (0.671-1.25)	1.05 (0.738-1.50)	1.15 (0.785-1.71)
60-min	0.370 (0.308-0.450)	0.482 (0.401-0.586)	0.631 (0.523-0.769)	0.754 (0.620-0.926)	0.923 (0.733-1.17)	1.06 (0.821-1.37)	1.19 (0.904-1.59)	1.34 (0.983-1.83)	1.53 (1.08-2.19)	1.69 (1.15-2.50)
2-hr	0.531 (0.442-0.645)	0.682 (0.567-0.828)	0.881 (0.730-1.07)	1.04 (0.858-1.28)	1.27 (1.01-1.61)	1.44 (1.12-1.87)	1.62 (1.23-2.16)	1.81 (1.33-2.48)	2.06 (1.45-2.95)	2.26 (1.54-3.35)
3-hr	0.653 (0.544-0.793)	0.834 (0.693-1.01)	1.07 (0.889-1.31)	1.27 (1.04-1.56)	1.53 (1.22-1.95)	1.74 (1.35-2.26)	1.95 (1.48-2.60)	2.17 (1.60-2.98)	2.47 (1.74-3.54)	2.70 (1.84-4.01)
6-hr	0.911 (0.758-1.11)	1.16 (0.963-1.41)	1.49 (1.23-1.81)	1.75 (1.44-2.15)	2.11 (1.68-2.69)	2.39 (1.86-3.11)	2.68 (2.03-3.57)	2.97 (2.19-4.08)	3.37 (2.38-4.82)	3.68 (2.51-5.46)
12-hr	1.20 (1.00-1.46)	1.54 (1.28-1.87)	1.98 (1.64-2.41)	2.33 (1.92-2.87)	2.82 (2.24-3.58)	3.19 (2.48-4.14)	3.56 (2.70-4.75)	3.95 (2.91-5.42)	4.47 (3.16-6.40)	4.88 (3.33-7.23)
24-hr	1.61 (1.42-1.85)	2.07 (1.83-2.39)	2.69 (2.37-3.11)	3.18 (2.78-3.71)	3.85 (3.26-4.64)	4.37 (3.63-5.37)	4.89 (3.96-6.16)	5.43 (4.28-7.03)	6.15 (4.65-8.29)	6.71 (4.91-9.36)
2-day	1.96 (1.74-2.26)	2.57 (2.28-2.97)	3.38 (2.98-3.91)	4.04 (3.53-4.71)	4.93 (4.18-5.94)	5.62 (4.66-6.91)	6.32 (5.12-7.97)	7.05 (5.56-9.13)	8.04 (6.08-10.8)	8.80 (6.44-12.3)
3-day	2.11 (1.87-2.43)	2.81 (2.48-3.24)	3.73 (3.29-4.31)	4.49 (3.93-5.23)	5.53 (4.68-6.66)	6.34 (5.26-7.80)	7.17 (5.81-9.04)	8.04 (6.34-10.4)	9.23 (6.98-12.4)	10.2 (7.43-14.2)
4-day	2.25 (1.99-2.59)	3.02 (2.67-3.49)	4.05 (3.57-4.68)	4.90 (4.28-5.71)	6.07 (5.14-7.31)	6.98 (5.80-8.59)	7.93 (6.42-9.99)	8.91 (7.03-11.5)	10.3 (7.77-13.9)	11.3 (8.30-15.8)
7-day	2.59 (2.30-2.99)	3.53 (3.13-4.08)	4.79 (4.22-5.54)	5.83 (5.10-6.80)	7.28 (6.16-8.77)	8.41 (6.98-10.3)	9.58 (7.76-12.1)	10.8 (8.52-14.0)	12.5 (9.46-16.9)	13.8 (10.1-19.3)
10-day	2.82 (2.49-3.25)	3.87 (3.42-4.47)	5.28 (4.66-6.11)	6.46 (5.65-7.53)	8.09 (6.85-9.75)	9.38 (7.78-11.5)	10.7 (8.67-13.5)	12.1 (9.54-15.7)	14.0 (10.6-18.9)	15.6 (11.4-21.7)
20-day	3.46 (3.07-3.99)	4.82 (4.26-5.56)	6.64 (5.86-7.68)	8.16 (7.14-9.52)	10.3 (8.72-12.4)	12.0 (9.94-14.7)	13.7 (11.1-17.3)	15.6 (12.3-20.2)	18.2 (13.7-24.5)	20.2 (14.8-28.2)
30-day	4.09 (3.62-4.71)	5.69 (5.03-6.56)	7.85 (6.92-9.08)	9.66 (8.46-11.3)	12.2 (10.3-14.7)	14.2 (11.8-17.5)	16.4 (13.3-20.6)	18.6 (14.7-24.1)	21.7 (16.4-29.3)	24.2 (17.7-33.8)
45-day	4.92 (4.36-5.67)	6.79 (6.01-7.83)	9.33 (8.23-10.8)	11.5 (10.0-13.4)	14.5 (12.3-17.5)	16.9 (14.0-20.8)	19.5 (15.8-24.5)	22.1 (17.5-28.7)	25.9 (19.6-34.9)	28.9 (21.2-40.4)
60-day	5.78 (5.12-6.66)	7.89 (6.98-9.10)	10.8 (9.50-12.5)	13.2 (11.6-15.4)	16.6 (14.1-20.1)	19.4 (16.1-23.9)	22.3 (18.1-28.1)	25.4 (20.0-32.9)	29.7 (22.5-40.1)	33.2 (24.3-46.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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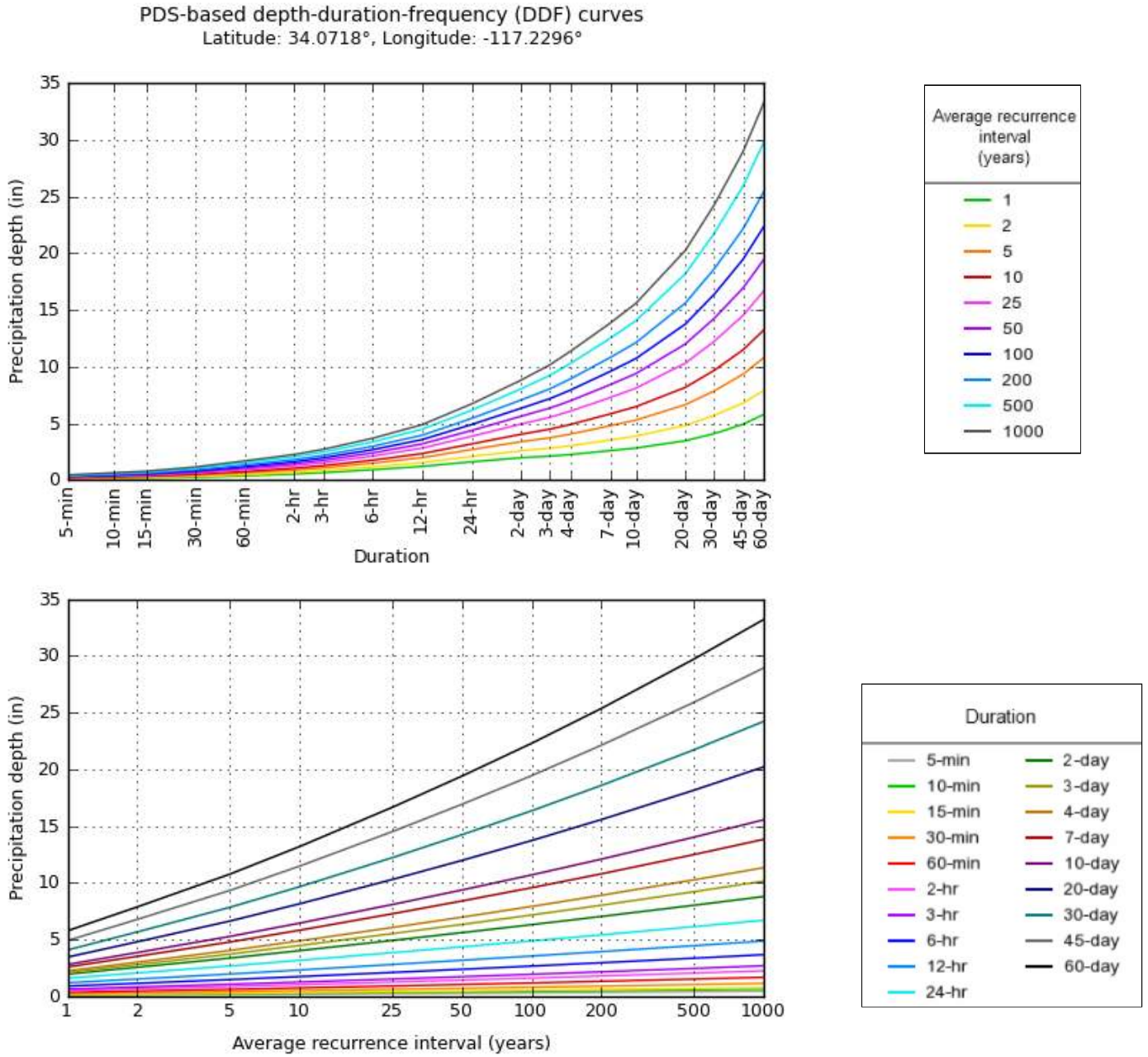
PF graphical



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Created (GMT): Mon Aug 15 17:21:06 2022

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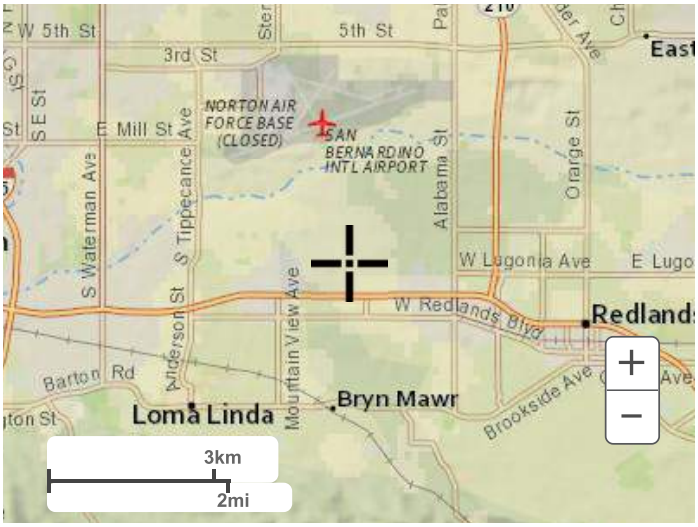
Maps & aerials

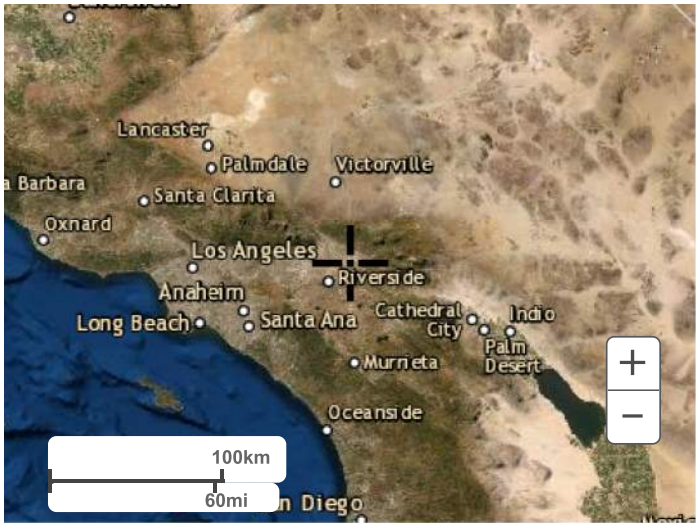
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix E

Soils Information

A project-specific Geotechnical Investigation is forthcoming and is expected to, in part, confirm the feasibility of infiltration at the site. A design infiltration rate of 0.5 in/hr has been used for BMP design and will be confirmed.

Hydrologic Soil Group—San Bernardino County Southwestern Part, California

A project-specific Geotechnical Investigation is forthcoming and is expected to, in part, confirm the feasibility of infiltration at the site. A design infiltration rate of 0.5 in/hr has been used for BMP design and will be confirmed.

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 13, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 11, 2020—Nov 15, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

A project-specific Geotechnical Investigation is forthcoming and is expected to, in part, confirm the feasibility of infiltration at the site. A design infiltration rate of 0.5 in/hr has been used for BMP design and will be confirmed.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HbA	Hanford sandy loam, 0 to 2 percent slopes	A	44.5	100.0%
Totals for Area of Interest			**44.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix F

CASQA Information

Spill Prevention, Control & Cleanup SC-11

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

CASQA California Stormwater Quality Association

- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- If consistent illegal dumping is observed at the facility:
  - Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - Landscaping and beautification efforts may also discourage illegal dumping.
  - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.
- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.
- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.
- Routine maintenance:
  - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
  - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
  - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

  - Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:

  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Training

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off" of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Trash Storage Areas SD-32

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Maintenance Bays & Docks SD-31

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

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- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.
- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.
- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.
- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.
- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

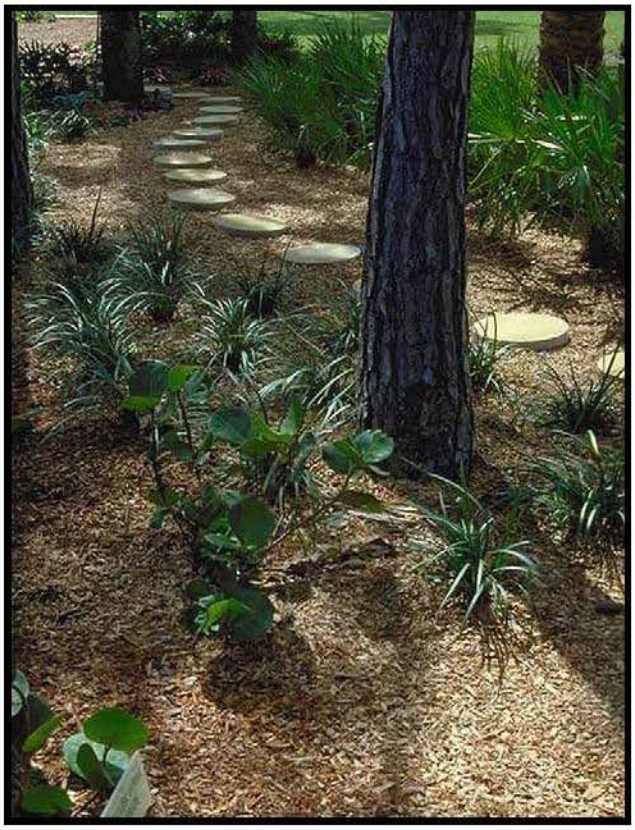
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Site Design & Landscape Planning SD-10



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Landscape Maintenance SC-73

Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

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- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

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The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

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SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
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The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Bioretention/Flow-through Planter TC-32

Maintenance Concerns, Objectives, and Goals

- Clogged Soil or Outlet Structures
- Invasive Species
- Vegetation/Landscape Maintenance
- Erosion
- Channelization of Flow
- Aesthetics

General Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through a sand bed and is subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Inspection/Maintenance Considerations

Bioretention requires frequent landscaping maintenance, including measures to ensure that the area is functioning properly, as well as maintenance of the landscaping on the practice. In many cases, bioretention areas initially require intense maintenance, but less maintenance is needed over time. In many cases, maintenance tasks can be completed by a landscaping contractor, who may already be hired at the site. In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■
☑	Oxygen Demanding	■

Legend ***(Removal Effectiveness)***

- ● Low
- ▲ Medium
- ■ High

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Inspection Activities	Suggested Frequency
■ Inspect soil and repair eroded areas.	Monthly
■ Inspect for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the strips are ready for winter. However, additional inspection after periods of heavy runoff is desirable.	Semi-annual inspection
■ Inspect to ensure grass is well established. If not, either prepare soil and reseed or replace with alternative species. Install erosion control blanket. ■ Check for debris and litter, and areas of sediment accumulation. ■ Inspect health of trees and shrubs.	
Maintenance Activities	**Suggested Frequency**
■ Water plants daily for 2 weeks.	At project completion
■ Remove litter and debris.	Monthly
■ Remove sediment. ■ Remulch void areas. ■ Treat diseased trees and shrubs. ■ Mow turf areas. ■ Repair erosion at inflow points. ■ Repair outflow structures. ■ Unclog underdrain. ■ Regulate soil pH regulation.	As needed
■ Remove and replace dead and diseased vegetation.	Semi-annual
■ Add mulch. ■ Replace tree stakes and wires.	Annual
■ Mulch should be replaced every 2 to 3 years or when bare spots appear. Remulch prior to the wet season.	Every 2-3 years, or as needed

Additional Information

Landscaping is critical to the function and aesthetic value of bioretention areas. It is preferable to plant the area with native vegetation, or plants that provide habitat value, where possible. Another important design feature is to select species that can withstand the hydrologic regime they will experience. At the bottom of the bioretention facility, plants that tolerate both wet and dry conditions are preferable. At the edges, which will remain primarily dry, upland species will be the most resilient. It is best to select a combination of trees, shrubs, and herbaceous materials.

References

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

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U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

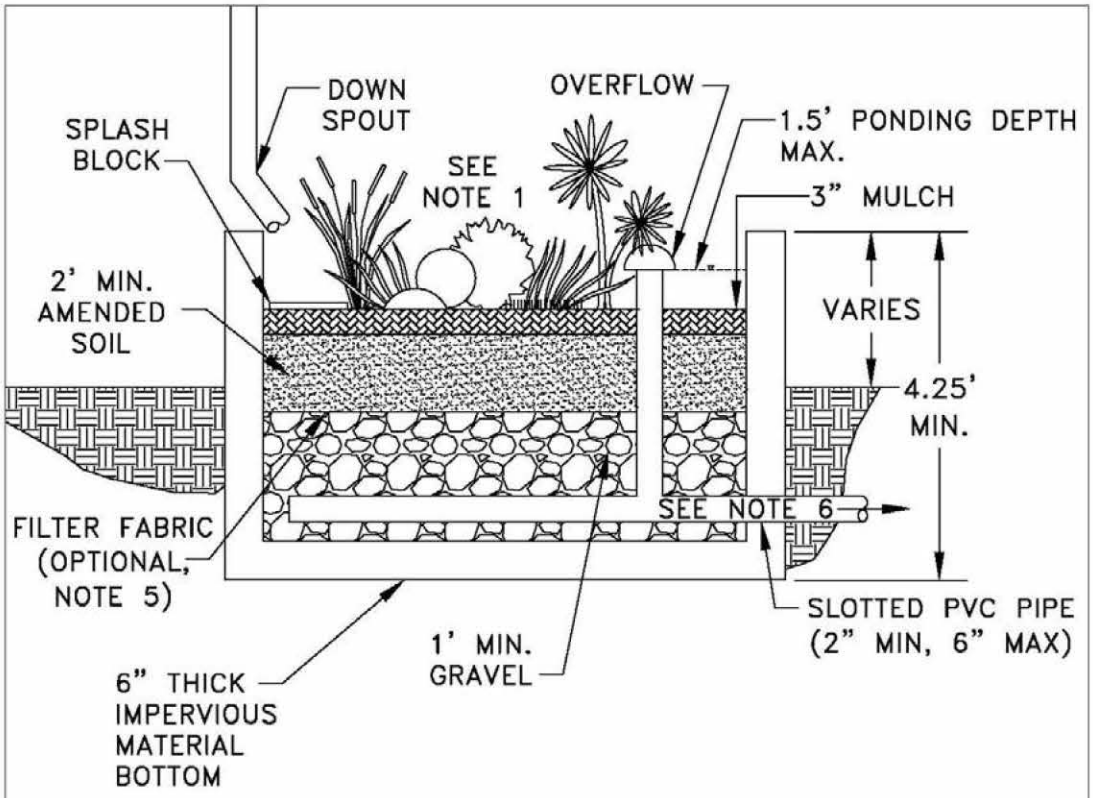
Currently not proposed, included as a reference for entitlement submittal. Will be removed during Final Engineering it not part of final design.

3.2 FLOW-THROUGH PLANTER BOX

Figure 1: Flow-through planter box (http://lateameffort.blogspot.com).

Design criteria for a flow-through planter box include the following:

- Design drawdown time = 48 hours (surface); 72 hours (total)
- Factor of safety = 2
- Max ponding depth = 18 inches
- Soil depth = 2 feet (3 preferred)
- Slotted PVC pipe (2 inches Minimum) within 6 inches of bottom of facility
- The area (width * length) must equal 4% of the tributary area
- Flows my outlet to a curb drain, rain garden, or equivalent
- Cover must be dense, wet, and dry tolerant vegetation



GENERAL NOTES:

1. DENSE, WET AND DRY TOLERANT VEGETATION.
2. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT VECTOR BREEDING.
3. IF NEEDED, MULTIPLE PIPES MAY BE USED.
4. THE PLANTER BOX AREA (WIDTH * LENGTH) MUST EQUAL 4% OF THE TRIBUTARY AREA.
5. FILTER FABRIC AVAILABLE AT LOCAL HARDWARE STORES.
6. FLOWS MAY OUTLET TO A CURB DRAIN, RAIN GARDEN, OR EQUIVALENT.

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	LID–FLOW THROUGH PLANTER BOX	

Underground Infiltration/ 9.2 Infiltration Gallery

Please read section 9.0 for important information applicable to all infiltration practices.

Description: Infiltration structures designed to deliver captured runoff to the subsoil through subsurface reservoirs usually composed of rock or gravel.

Planning Considerations: Below grade infiltration structures can provide innovative stormwater treatment in areas where space is limited. As with other infiltration practices, percolation tests should be performed to ensure adequate infiltration rates. It is important to consider possible pollutant loads and include pretreatment devices to help minimize maintenance cost. High flow bypasses should also be included in the design. Infiltration galleries are most appropriate as secondary treatment for runoff from impervious surfaces such as parking lots that have pretreatment structures in place. Be aware runoff discharged to groundwater is subject to the maximum pollutant loads discussed in Section 1.0. It is also important to consider potential impacts of structural subgrade materials and the possibility of surface instability caused by soil piping and/or slope destabilization.

Tips for Installation:

1. Consult a qualified soil scientist to determine if soil conditions are appropriate for infiltration.

Maintenance: Since infiltration galleries are below grade, they are extremely difficult to maintain. Inlets should be inspected regularly for pine needles and other debris that may clog the system. If infiltration rates have visibly diminished, the system must be dug up and rehabilitated.

Where to Use: Infiltration galleries are appropriate for treating runoff from small impervious areas where space is limited.

Where NOT to Use: Avoid installation in larger areas with high sediment loads, high oil and grease accumulation, and in soils with limited permeability. Like other infiltration methods, galleries should not be used in areas with high groundwater or shallow depth to an impervious layer.

Field Experience:

- Washoe County installed a 4 foot by 48 inch underground basin as part of a water quality improvement project. Pine needles and other debris frequently plug the inlet causing system bypass. Maintaining the underground basin is extremely time consuming.
- Infiltration facilities installed under roadways as part of California Tahoe Conservancy funded projects at Black Bart Avenue and Apache Street have not shown any apparent damage to roadway sections after several years of operation.

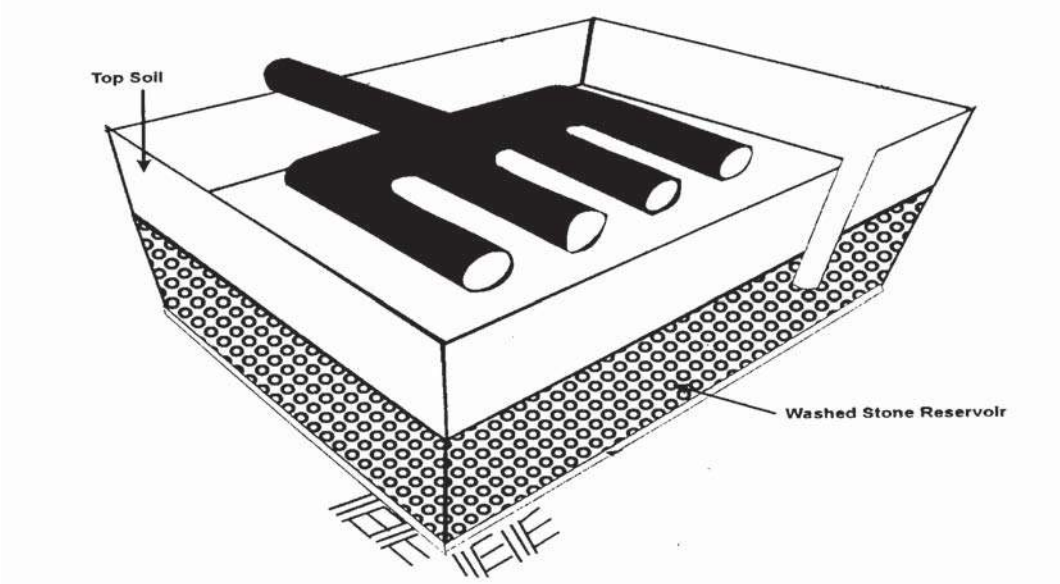

Figure 2 - Typical Infiltration Gallery – Source: Metropolitan Washington Council of Governments, 1987

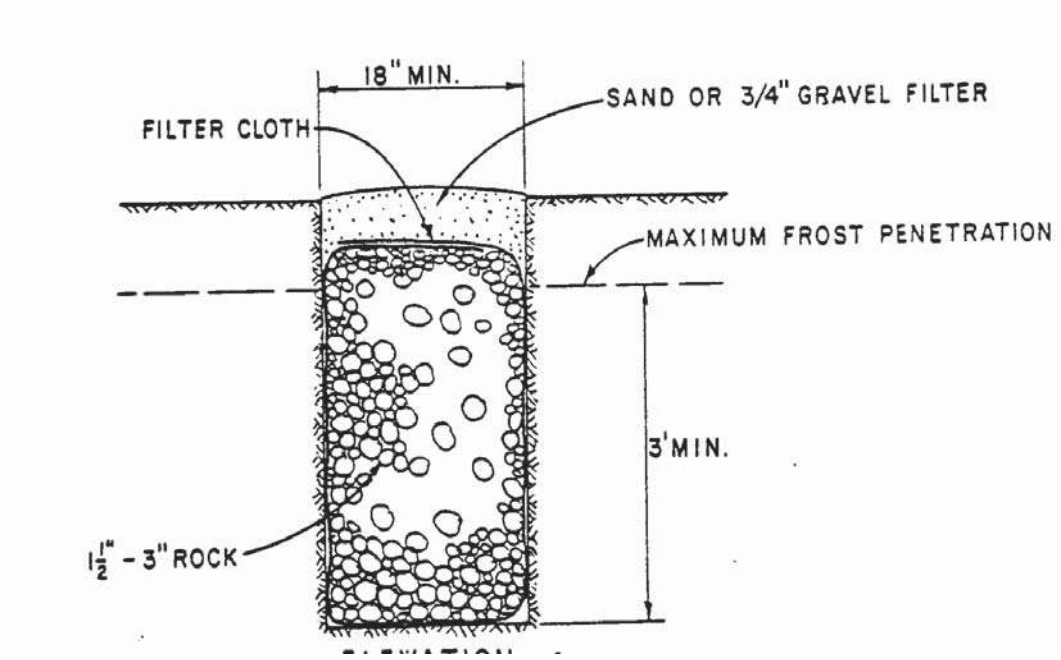

Figure 3 – Typical Dry Well – Source: TRPA Handbook of Best Management Practices, 1988

Drain Inserts MP-52

Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

References and Sources of Additional Information

Hrachovec, R., and G. Minton, 2001, Field testing of a sock-type catch basin insert, Planet CPR, Seattle, Washington

Interagency Catch Basin Insert Committee, Evaluation of Commercially-Available Catch Basin Inserts for the Treatment of Stormwater Runoff from Developed Sites, 1995

Larry Walker Associates, June 1998, NDMP Inlet/In-Line Control Measure Study Report

Manufacturers literature

Santa Monica (City), Santa Monica Bay Municipal Stormwater/Urban Runoff Project - Evaluation of Potential Catch basin Retrofits, Woodward Clyde, September 24, 1998

Woodward Clyde, June 11, 1996, Parking Lot Monitoring Report, Santa Clara Valley Nonpoint Source Pollution Control Program.

KRISTAR

FloGard®
+PLUS
Catch Basin Insert Filter

FloGard®+PLUS Catch Basin Insert Filter

GENERAL FILTER CONFIGURATION

FloGard®+PLUS catch basin insert filter shall provide solids filtration through a filter screen or filter liner, and hydrocarbon capture shall be effected using a non-leaching absorbent material contained in a pouch or similar removable restraint. Hydrocarbon absorbent shall not be placed at an exposed location at the entry to the filter that would allow blinding by debris and sediment without provision for self-cleaning in operation.

Filter shall conform to the dimensions of the inlet in which it is applied, allow removal and replacement of all internal components, and allow complete inspection and cleaning in the field.

FLOW CAPACITY

Filter shall provide two internal high-flow bypass locations that in total exceed the inlet peak flow capacity. Filter shall provide filtered flow capacity in excess of the required "first flush" treatment flow. Unit shall not impede flow into or through the catch basin when properly sized and installed.

MATERIALS

Filter support frame shall be constructed of type 304 stainless steel. Filter screen, when used in place of filter liner, shall be type 304 or 316 stainless steel, with an apparent opening size of not less than 4 U.S. mesh. Filter liner, when used in place of filter screen, shall be woven polypropylene geotextile fabric liner with an apparent opening size (AOS) of not less than 40 U.S. mesh as determined by ASTM D 4751. Filter liner shall include a support basket of polypropylene geogrid with stainless steel cable reinforcement.

Filter frame shall be rated at a minimum 25-year service life. All other materials, with the exception of the hydrocarbon absorbent, shall have a rated service life in excess of 2 years.

FloGard®+PLUS TEST RESULTS SUMMARY

Testing Agency	% TSS Removal	% Oil and Grease Removal	% PAH Removal
UCLA	80	70 to 80	
U of Auckland Tonking & Taylor Ltd. (for city of Auckland)	78 to 95		
U of Hawaii (for city of Honolulu)	80		20 to 40

FEATURES

- Easy to install, inspect and maintain
- Can be retrofitted to existing drain catch basins – or used in new projects
- Economical and efficient
- Catches pollutants where they are easiest to catch (at the inlet)
- No standing water – minimizes vector, bacteria and odor problems
- Can be incorporated as part of a "Treatment Train"

BENEFITS

- Lower installation, inspection and maintenance costs
- Versatile installation applications
- Higher return on investment
- Allows for installation on small and confined sites
- Minimizes vector, bacteria and odor problems
- Allows user to target specific pollutants

Innovative stormwater management products

FloGard® +PLUS
Catch Basin Insert Filter

INSTALLATION AND MAINTENANCE
Filter shall be installed and maintained in accordance with manufacturer's general instructions and recommendations.

PERFORMANCE
Filter shall provide 80% removal of total suspended solids (TSS) from treated flow with a particle size distribution consistent with typical urban street deposited sediments. Filter shall capture at least 70% of oil and grease and 40% of total phosphorus (TP) associated with organic debris from treated flow. Unit shall provide for isolation of trapped pollutants, including debris, sediments, and floatable trash and hydrocarbons, from bypass flow such that re-suspension and loss of pollutants is minimized during peak flow events.

FloGard®+PLUS COMPETITIVE FEATURE COMPARISON

Evaluation of FloGard+PLUS Units (Based on flow-comparable units) (Scale 1-10, 10 being best)	**FloGard+PLUS**	**Other Insert Filter Types****
Flow Rate	10	7
Removal Efficiency*	80%	45%
Capacity – Sludge and Oil	7	7
Service Life	10	3
Installation – Ease of Handling / Installation	8	6
Ease of Inspections & Maintenance	7	7
Value	**10**	**2**

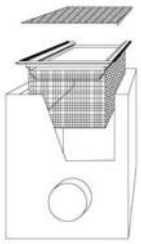
*approximate, based on field sediment removal testing in urban street application **average

Long-Term Cost Comparison (Scale 1-10, 10 being lowest cost, higher number being best)	**FloGard+PLUS**	**Other Insert Filter Types**
Unit cost — initial ($/cfs treated)	10	4
Installation cost ($/cfs treated)	10	7
Adsorbent replacement (annual avg $/cfs treated)	10	2
Unit materials replacement (annual avg $/cfs treated)	10	10
Maintenance cost (annual avg $/cfs treated)	10	7
Total first yr ($/cfs treated)	10	5
Total Annual Avg ($/cfs treated, avg over 20 yrs)*	**10**	**5**

*assumes 3% annual inflation

Captured debris from FloGard+PLUS, Dana Point, CA

FloGard+PLUS Combination Inlet



FloGard+PLUS Flat Grate

FloGard+PLUS Round Gated Inlet

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