

CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE

THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL

THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS

CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSA GUIDELINES.

PIPE

THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE

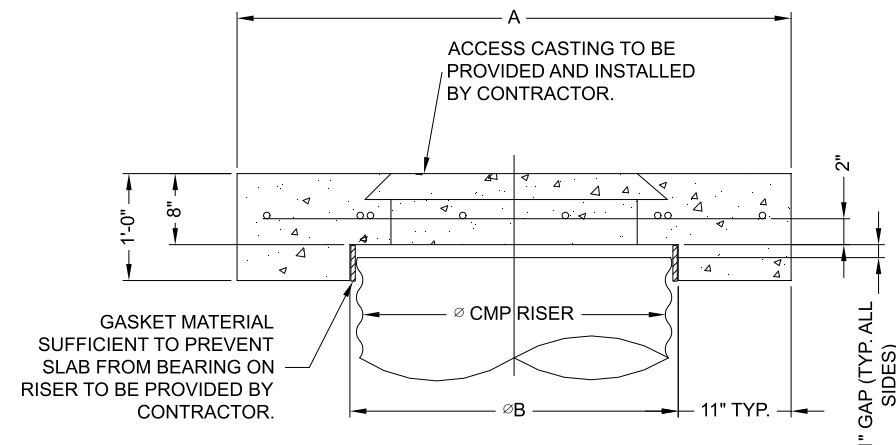
HANDLING AND ASSEMBLY

SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

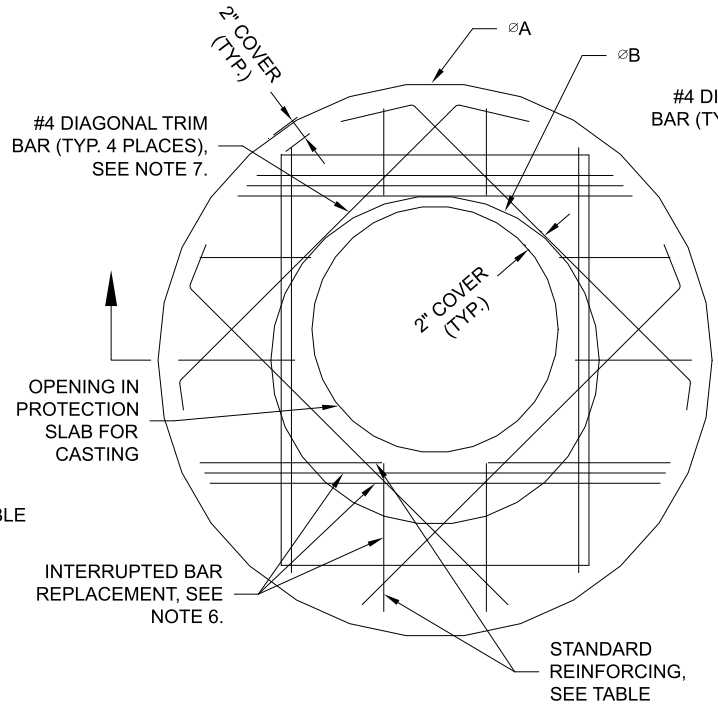
INSTALLATION

SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

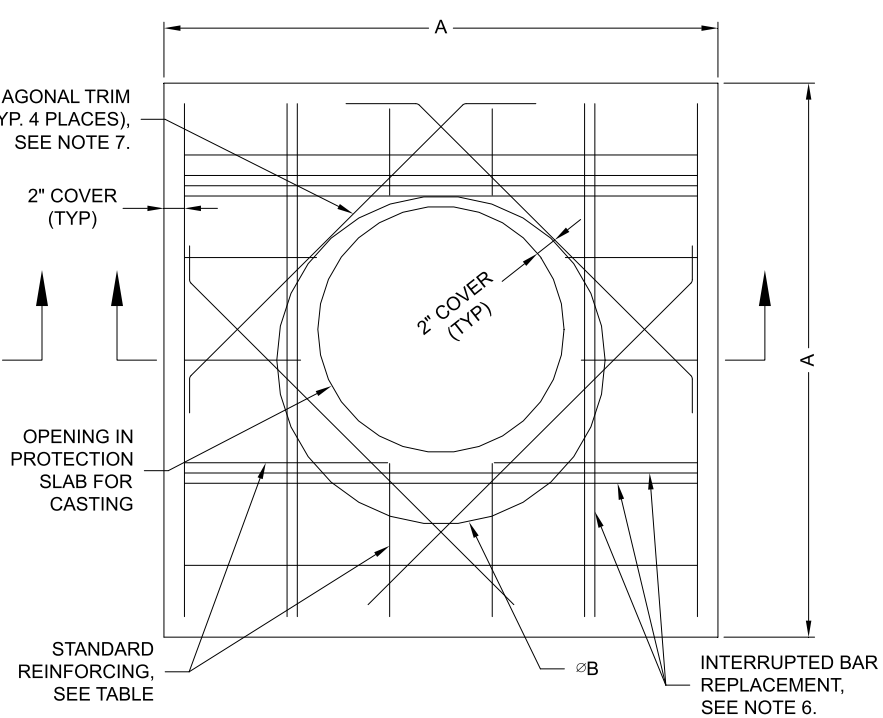
IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.



SECTION VIEW



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
- DESIGN LOAD HS25.
- EARTH COVER = 1' MAX.
- CONCRETE STRENGTH = 3,500 psi
- REINFORCING STEEL = ASTM A615, GRADE 60.
- PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
- TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
- PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
- DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	Ø 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY

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NOTE:
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CONTECH
CMP DETENTION SYSTEMS
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DYODS
DRAWING

DYO55739 Riverside Community Hospital Parking Garage
BMP 1
Riverside, CA
DETENTION SYSTEM

PROJECT No.: 39082	SEQ. No.: 55739	DATE: 10/7/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1

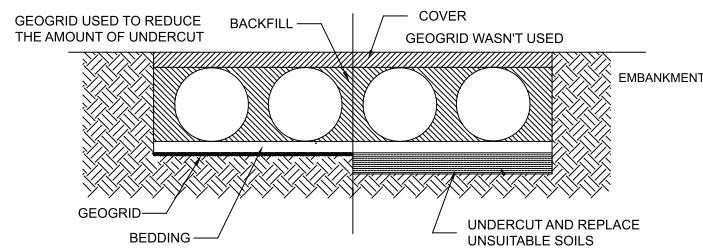
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

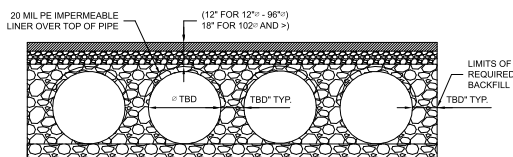
IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.



GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

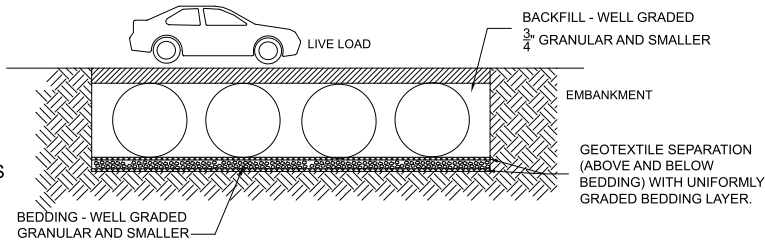
THE RESISTIVITY OF A PROJECT SITE MAY CHANGE OVER TIME DUE TO THE USE OF VARIOUS SALTING, DE-ICING, AND AGRICULTURAL AGENTS APPLIED ON OR NEAR THE AREA. TO MITIGATE THE POTENTIAL IMPACT OF THESE AGENTS, AN HDPE MEMBRANE LINER WILL BE INSTALLED ON THE CROWN OF EACH PIPE, CREATING AN IMPERMEABLE BARRIER. THIS MEASURE IS DESIGNED TO PROTECT THE SYSTEM FROM ENVIRONMENTAL CHANGES THAT COULD LEAD TO PREMATURE CORROSION AND REDUCE THE OVERALL SERVICE LIFE.



IN-SITU TRENCH WALL

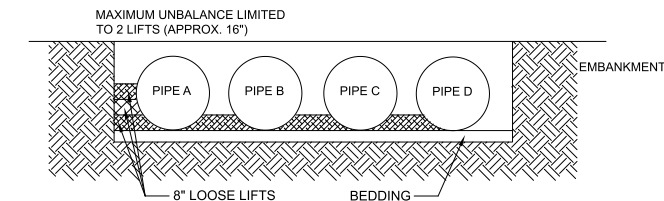
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



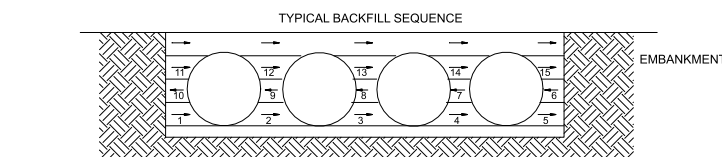
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

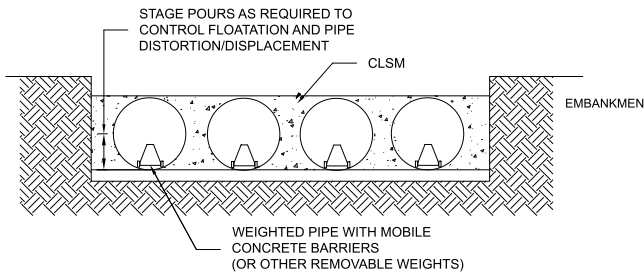


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10- FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

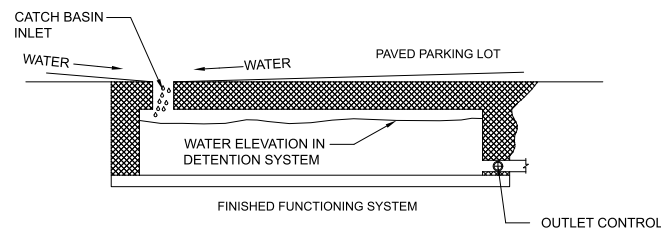


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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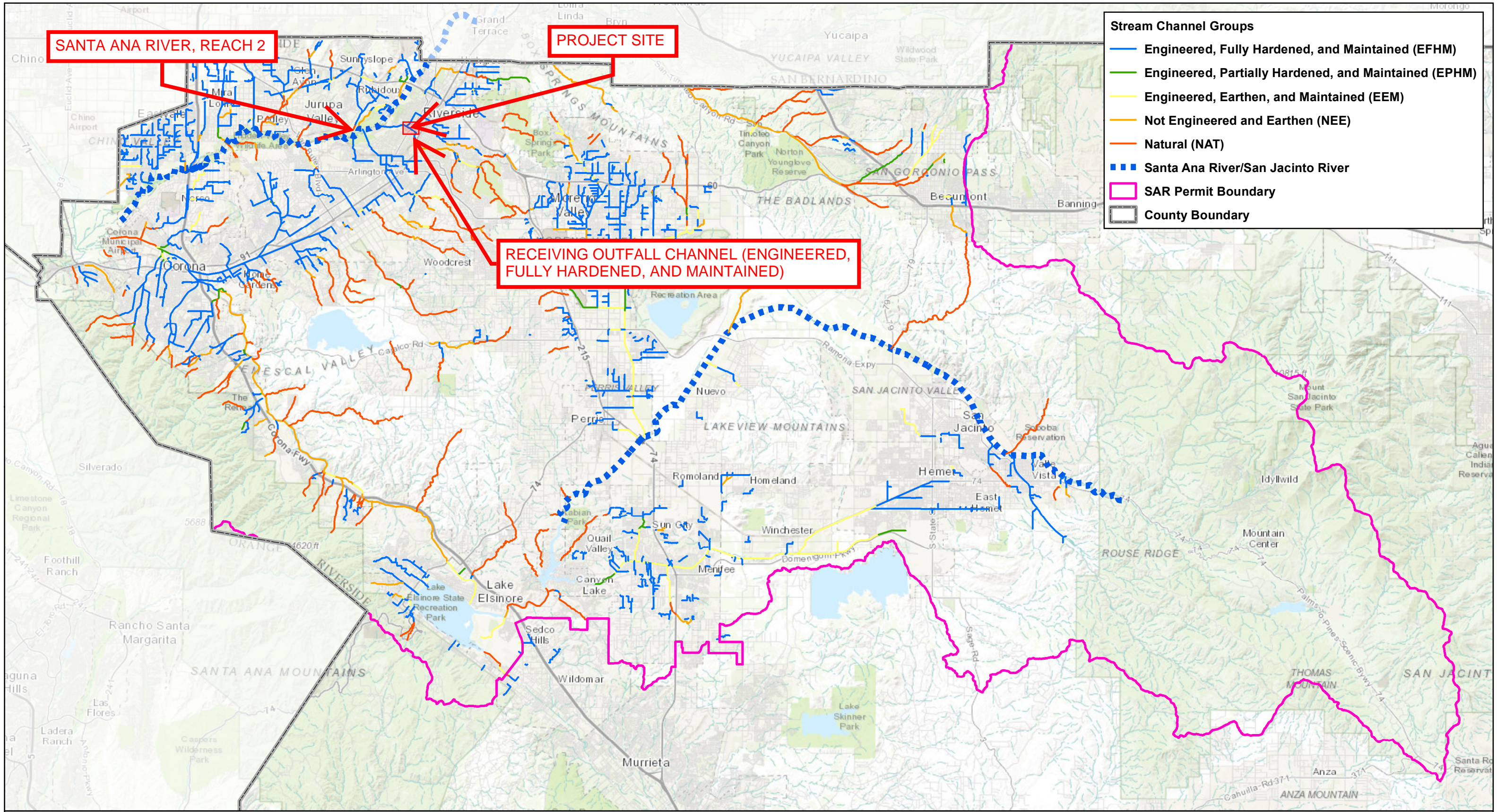
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DRAWING

DYO55739 Riverside Community Hospital Parking Garage
BMP 1
Riverside, CA
DETENTION SYSTEM

PROJECT No.: 39082	SEQ. No.: 55739	DATE: 10/7/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

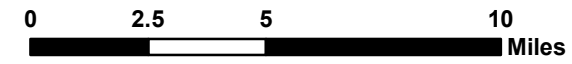


- Stream Channel Groups**
- Engineered, Fully Hardened, and Maintained (EFHM)
 - Engineered, Partially Hardened, and Maintained (EPHM)
 - Engineered, Earthen, and Maintained (EEM)
 - Not Engineered and Earthen (NEE)
 - Natural (NAT)
 - - - Santa Ana River/San Jacinto River
 - SAR Permit Boundary
 - County Boundary

SANTA ANA RIVER, REACH 2

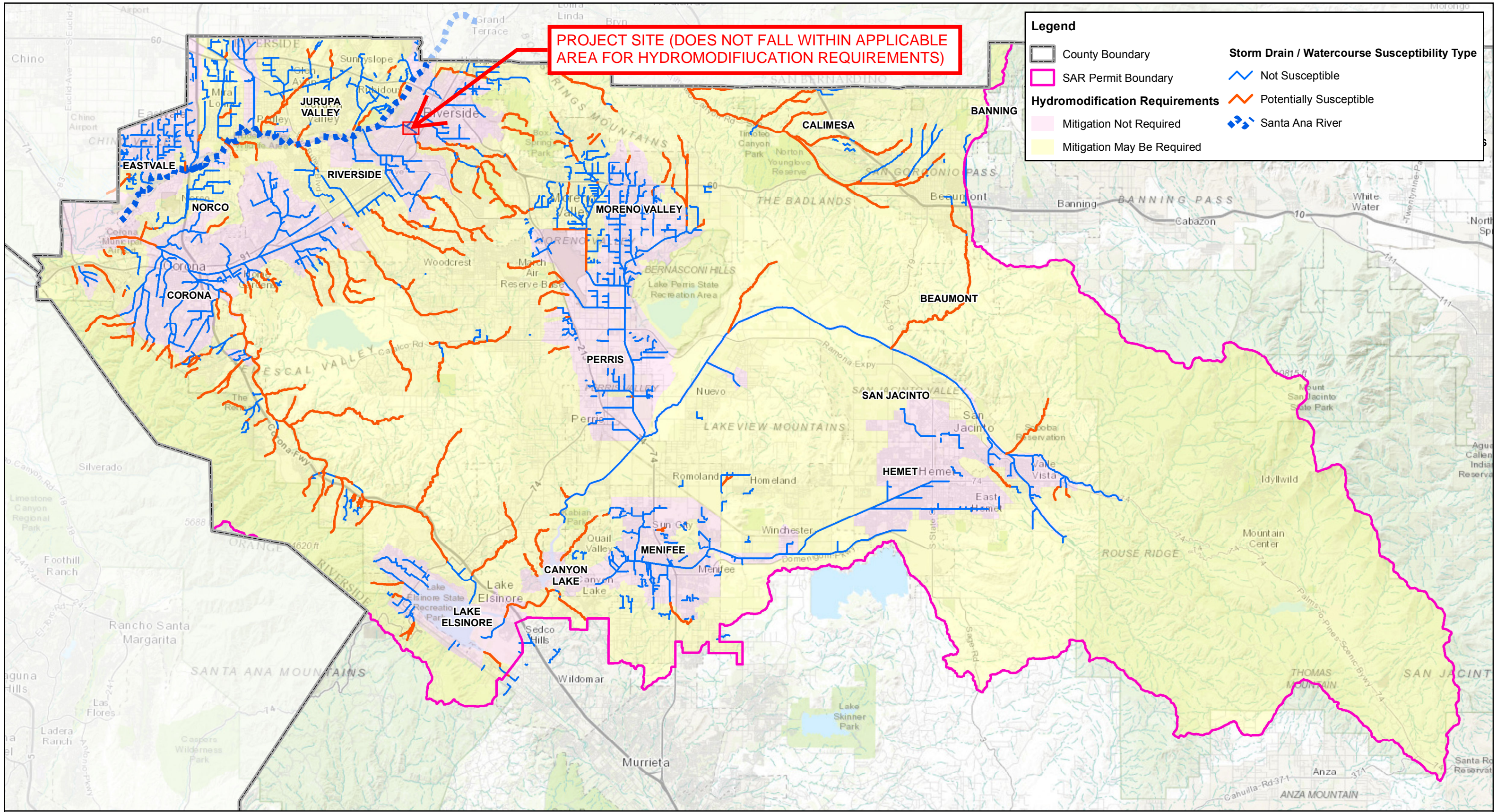
PROJECT SITE

RECEIVING OUTFALL CHANNEL (ENGINEERED, FULLY HARDENED, AND MAINTAINED)



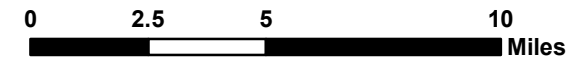
Revised February 2017

**Existing Storm Drain / Watercourse Delineation Map
SAR Permittees**



Legend

County Boundary	Storm Drain / Watercourse Susceptibility Type
SAR Permit Boundary	Not Susceptible
Hydromodification Requirements	Potentially Susceptible
Mitigation Not Required	Santa Ana River
Mitigation May Be Required	



Updated February 2017

**HCOC Applicability Map
SAR Permittees**

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	X		
Activity Restrictions	X		
Irrigation System and Landscape Maintenance	X		
Common Area Litter Control	X		
Street Sweeping Private Streets and Parking Lots	X		
Drainage Facility Inspection and Maintenance	X		
Structural Source Control BMPs			
MS4 Stenciling and Signage	X		
Landscape and Irrigation System Design	X		
Protect Slopes and Channels		X	No significant slopes or channels in development area
Provide Community Car Wash Racks		X	Not present on-site
Properly Design:			
Fueling Areas		X	Not present on-site
Air/Water Supply Area Drainage		X	Not present on-site
Trash Storage Areas	X		
Loading Docks		X	Not present on-site
Maintenance Bays		X	Not present on-site
Vehicle and Equipment Wash Areas		X	Not present on-site
Outdoor Material Storage Areas		X	Not present on-site
Outdoor Work Areas or Processing Areas		X	Not present on-site
Provide Wash Water Controls for Food Preparation Areas		X	Not present on-site

MS4 stenciling and signage will be performed during construction and maintained annually by the owner. The landscape and irrigation system is efficient and drought tolerant. The owner will inspect the sprinkler system quarterly to verify that the sprinkler heads remain directed at landscape areas to limit runoff.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the 2014 SMR WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1 on page 31 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input checked="" type="checkbox"/> A. On-site storm drain inlets	<input checked="" type="checkbox"/> Locations of inlets.	<input checked="" type="checkbox"/> Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	<input checked="" type="checkbox"/> Maintain and periodically repaint or replace inlet markings. <input checked="" type="checkbox"/> Provide stormwater pollution prevention information to new site owners, lessees, or operators. <input checked="" type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com <input checked="" type="checkbox"/> Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”
<input type="checkbox"/> B. Interior floor drains and elevator shaft sump pumps		<input type="checkbox"/> State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.
<input checked="" type="checkbox"/> C. Interior parking garages		<input checked="" type="checkbox"/> State that parking garage floor drains will be plumbed to the sanitary sewer.	<input checked="" type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> H. Industrial processes.	<input type="checkbox"/> Show process area.	<input type="checkbox"/> If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	<input type="checkbox"/> See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure “Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities” at http://www.rcflood.org/stormwater/Downloads/IndustrialCommercialFacilities.pdf
<input type="checkbox"/> I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	<input type="checkbox"/> Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. <input type="checkbox"/> Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. <input type="checkbox"/> Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	<input type="checkbox"/> Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: <ul style="list-style-type: none"> ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	<input type="checkbox"/> See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials ” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Appendix 8
STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> L. Fuel Dispensing Areas	<input type="checkbox"/> Fueling areas ⁶ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. <input type="checkbox"/> Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area ¹ .] The canopy [or cover] shall not drain onto the fueling area.		<input type="checkbox"/> The property owner shall dry sweep the fueling area routinely. <input type="checkbox"/> See the Fact Sheet SD-30 , “Fueling Areas” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

⁶ The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

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STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> M. Loading Docks	<input type="checkbox"/> Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. <input type="checkbox"/> Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. <input type="checkbox"/> Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		<input type="checkbox"/> Move loaded and unloaded items indoors as soon as possible. <input type="checkbox"/> See Fact Sheet SC-30, “Outdoor Loading and Unloading,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Appendix 8
STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input checked="" type="checkbox"/> P. Plazas, sidewalks, and parking lots.			<input checked="" type="checkbox"/> Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

The start-up date for maintenance activities will be at the close-out of construction.

HCA shall be responsible for maintenance:

4445 Magnolia Avenue

Riverside, CA 925001

Telephone: 951-788-3151

BMP	Frequency	Maintenance Activities
Catch Basin Stenciling	Annually	Inspect.
Drainage System	Monthly	Inspect catch basins for debris and clogging. Remove and dispose of contents as yard waste as necessary.
Litter Control	Daily	Empty trash receptacles and clean trash in plaza area.
Underground Infiltration Pipes	Quarterly	Inspect the top of the gravel layer. Remove lingering sediments at the top of the gravel layer. Dispose contents as trash.
	After Large Storms (1" or greater)	Inspect for stagnant ponding. If ponding is stagnant for more than 72 hours after the end of a storm event, test the unit infiltration rates once stagnant water is removed and replace the clogged portion of the underlying gravel. Replace areas with less than 0.5 inches per hour of hydraulic conductivity.

WQMP

Operation & Maintenance (O&M) Plan

Project Name:
Riverside Community Hospital Garage
(Phase 1 Ultimate Buildout)
Southwest corner of Brockton Avenue and 14th Street
Riverside, CA 92501

Prepared for:
Zach Weidman
HCA/Riverside Community Hospital
4445 Magnolia Avenue
Riverside, CA 92501
(951) 788-3151

Prepared by:
Kimley-Horn and Associates
1100 W Town and Country Rd, Suite 700
Orange, CA 92868
(714) 939-1030

Prepared on:
01/14/2025

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

9.1.1 Project Information

APN: 217-060-009, 217-060-020, 217-060-028, 217-060-027, 217-060-026, 217-060-024, 218-251-016

Address: Southwest corner of Brockton Avenue and 14th Street, Riverside, CA, 92501

Site Size: 3.28 ac

Proposed Structural BMPs: Infiltration CMP System (1), Pretreatment Unit (1), Storm Drain Inlets (19), Valley Gutter

Land use: Parking Garage

% Impervious of proposed site: 83%

Surface flow within each area drains towards inlets and is routed towards their respective BMPs. Overflows within the proposed systems connect into existing storm drain systems that lead to an existing 24" lateral along Tesquesquite Ave. Flow eventually drains into the Santa Ana River, Reach 3, continuing into Reach 2, Reach 1, and ultimately discharging into the Prado Basin Management Zone.

9.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

HCA/Riverside Community Hospital
4445 Magnolia Avenue
Riverside, CA 92501

9.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in Appendix 9.3 of this document.

The **WQMP Verification Form** (Appendix 9.4) shall be completed accurately and submitted, with associated documentation, to the City of Dana Point by September 30 of each year, or as requested by the City. **Failure to complete and submit the verification form will result in a noncompliance and enforcement actions may be taken.**

9.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. Autocad files and/or GIS coordinates of BMPs shall also be submitted to the City.

9.1.5 Vector Control

Standing water which exists for longer than 72 hours may contribute to mosquito breeding areas. Best Management Practices (BMPs) shall be inspected for standing water on a regular basis.

Standing water may indicate that the BMP is not functioning properly and proper action to remedy the situation shall be taken in a timely manner.

Elimination of standing water and managing garbage, lawn clippings, and pet droppings, can help decrease the presence of mosquitoes and flies in the area.

The Riverside County Flood Control District may be contacted for more information and support at 951-955-1200.

Required Permits

Permits are not required for the implementation, operation, and maintenance of the BMPs.

9.1.6 Inspections

The City may conduct a site inspection to evaluate compliance with the Project WQMP, at any time, in accordance with Dana Point Municipal Code Chapter 15.10, Storm Water/Surface Runoff Water Quality.

9.1.7 Monitoring Plan

The City or other agencies may require a monitoring plan. Details regarding monitoring plan, such as parameters to be tested, frequency, testing locations, laboratory, etc. shall be included as appropriate.

A monitoring plan is not required for the project.

9.1.8 Operation and Maintenance Requirements

The Table below addresses each BMP included in this project that requires regular implementation and/or operation & maintenance.

BMP	Implementation, Inspection and Maintenance Requirements	Frequency
N1. Education for Property Owners, Tenants and Occupants	<p>RP will insure that all owners & tenants will be given a copy of the recorded CC&R's which will contain a section outlining the environmental awareness education materials at the close of escrow.</p> <p>RP shall distribute appropriate materials to owners, tenants and/or occupants via contract language, mailings, website or meeting.</p> <p>Brochures can be requested or downloaded from www.ocwatersheds.com.</p> <p>Brochures and educational articles for RP distribution can also be requested from City Water Quality Engineer.</p>	<p>Information to be initially provided to owners & tenants upon sale or lease agreement.</p> <p>Educational materials will be provided to owners and/or tenants annually, thereafter.</p>
N2. Activity Restriction	<p>Within the CC&R's or lease agreement, the following activity restrictions shall be enforced:</p>	<p>Continuous</p>
N3. Common Area Landscape Management & Efficient Landscape Design	<p>Landscape Management Includes:</p> <ul style="list-style-type: none"> • Mitigation of the potential dangers of fertilizer and pesticide usage through the incorporation of an Integrated Pest Management Program (IPM). • Monitor for runoff and efficiency regularly. • Implementation of a water budget. • Irrigation systems shall be automatically controlled and designed, installed, and maintained so as to minimize overspray and runoff onto streets, sidewalks, driveways, structures, windows, walls, and fences. • Use of native and drought tolerant species when replanting 	<p>Inspected once a week</p>
N11. Common Area Litter Control	<p>Weekly sweeping and trash pickup as necessary within all project areas and common landscape areas. Daily inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations by homeowners and reporting the violations to the HOA/RP for investigation.</p>	<p>Daily inspection and weekly sweeping and clean-up or as needed</p>
N12. Contractor/Employee Training	<p>All contractors shall be trained and made aware of this WQMP and operation and maintenance requirements of BMPs.</p>	<p>At first hire and annually thereafter for HOA personnel and employees, to include the educational materials contained in the approved Water Quality Management Plan.</p>

BMP	Implementation, Inspection and Maintenance Requirements	Frequency
N14. Common Area Catch Basin Inspection	Catch basins will be owned, inspected and maintained by the HOA/RP. Catch basins will be inspected at a minimum on a yearly basis, and prior to the storm season, no later than October 1 st of each year.	At a minimum, basins will be inspected and cleaned around October 1 st of each year, prior to “first flush” storm, or as necessary after large storm events to clear inlets of trash, debris and silt.
N15. Street Sweeping Private Streets and Parking Lots	Vacuum street sweeping will occur on a weekly basis.	Streets will be vacuum swept on a weekly basis.
SD-13 Provide Storm Drain System Stenciling and Signage	All catch basins where applicable in paved areas, will be marked or stenciled with “No Dumping - Drains to Ocean, No Descargue Basura” language. This will be done in a location that can be clearly seen by all and will be routinely inspected and re-labeled, as necessary. Thereafter, the owner/operator shall routinely inspect and re-label the catch basins, as necessary.	Catch basin labels will be inspected once annually and relabeled as necessary to maintain legibility.
SD-32 Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction	Trash will be removed by the local private solid waste management contractor on a weekly basis for proper disposal of the trash to landfill; with recyclable materials and greenwastes to be processed offsite.	Trash dumpster shall be kept in a non-leaking condition.

BMP	Implementation, Inspection and Maintenance Requirements	Frequency
<p>LID BMP # 1: Contech CMP Infiltration System</p>	<p>Per manufacturer’s recommendations, inspections should be performed annually at a minimum, where more frequent inspections may be required due to instances in which one would expect higher sediment accumulation. Record of inspection is to be maintained for the life of the system.</p> <p>Maintenance of CMP system shall be performed when inspections reveal accumulated sediment or trash clogging the discharge orifice. It is recommended that systems are designed with an access/inspection manhole situated at or near the inlet and outlet orifice.</p> <p>For more details, see the refer to the CDS Inspection and Maintenance Guide attached in Appendix 9.3.</p>	<p>As recommended.</p>
<p>LID BMP # 2: Pretreatment Unit</p>	<p>Per manufacturer’s recommendations, inspections should be performed twice per year at a minimum, where more frequent inspections may be required due to occurrences such as sanding operations or equipment washdown. Visual inspection shall ascertain that system is in working order and that there are no blockages or obstructions within the inlet and separation screen.</p> <p>Maintenance of system shall be performed during dry weather conditions when no flow is entering the system. It is recommended to use a vacuum truck as the most effective and convenient approach. Remove the associated manhole cover and and drain the sediment using the vacuum hose.</p> <p>For more details, see the refer to the Inspection and Maintenance Guide attached in Appendix 9.3.</p>	<p>As recommended.</p>

Appendix 9.1
BMP SITEPLAN

TO BE PROVIDED IN FINAL SUBMITTAL

Appendix 9.2

EDUCATIONAL MATERIALS

The following is a selection of Educational Materials for Homeowners, Contractors and employees that address BMPS and water quality issues. Many are available in English and Spanish.

To meet the educational requirements of this O&M Plan, educational brochures can be downloaded or requested at no charge at <https://rcwatershed.org/about/links-and-resources/outreach-materials-library/> for inclusion on a website, in a newsletter or mailed to property owners, tenants and/or contractors. Property owners, tenants, staff and/or contractors must receive education/training at least once per year.

Brochure	Pollutant(s) Addressed	Activities Addressed
"The Ocean Begins At Your Front Door" - English, Spanish, Vietnamese	Household hazardous waste, trash, motor oil, chlorine, overwatering, green waste, dirt, pesticides/fertilizer, pet waste	Household maintenance and activities (i.e. hosing driveway), automotive maintenance and washing, pool maintenance, landscape and gardening, trash disposal, pet care
Homeowners Guide for Sustainable Water Use Pamphlet	Household hazardous waste, trash, motor oil, chlorine, overwatering, green waste, dirt, pesticides/fertilizer, pet waste	Preventing urban runoff through low impact development in residential properties, water conservation, use of IPM techniques and California-friendly landscaping, general water pollution prevention methods
"Help Prevent Ocean Pollution: Your Local Used Oil Collection Center" - South- English, Spanish, Vietnamese	Motor Oil	Automotive Maintenance, Disposal of Used Motor Oil
"Help Prevent Ocean Pollution: Tips for Pool Maintenance" - English, Spanish	Chlorine, runoff	Pool Drainage/Maintenance
"Help Prevent Ocean Pollution: Tips for Landscape and Gardening" - English, Spanish	Fertilizer, pesticide, dirt, overwatering, green waste	Landscape maintenance, pesticide/fertilizer application, proper disposal of household hazardous waste and green waste
"Help Prevent Ocean Pollution: Tips for Pet Care" - English, Spanish	Surfactants, chemicals, pet waste	Proper disposal of pet waste, proper pet bathing techniques
"Help Prevent Ocean Pollution: Household Tips" - English, Spanish	Household hazardous waste, pet waste, pesticides/fertilizers, overwatering, green waste, surfactants, motor oil, trash	Household maintenance and activities (i.e. hosing driveway), automotive maintenance and washing, pool maintenance, landscape and gardening, trash disposal, pet care
"Help Prevent Ocean Pollution: Proper Disposal of Household Hazardous Materials" - English, Spanish, Vietnamese	Household hazardous wastes	Proper identification and disposal of household hazardous wastes

Brochure	Pollutant(s) Addressed	Activities Addressed
“Help Prevent Ocean Pollution: Maintenance Practices for Your Business” - English, Spanish	Fertilizer, pesticides, green waste, overwatering, trash, toxic substances	Landscape maintenance, proper application of pesticides and fertilizers, trash management, proper storage of materials
“Help Prevent Ocean Pollution: Tips for Using Concrete and Mortar” - English, Spanish	Concrete and mortar, slurry	Proper preparation, use, clean up and disposal of concrete and mortar
“Responsible Pest Control”	Pesticides	Proper identification of pests, selection of least toxic chemical, proper pesticide application, spill prevention and proper storage and disposal of pesticides (use of Integrated Pest Management (IPM) techniques)
“Help Prevent Ocean Pollution: Residential Pool, Landscape and Hardscape Drains” - English, Spanish	Chlorine, chemicals, pet waste, green waste, overwatering, motor oil and vehicle fluids	Pool maintenance, spill prevention, proper disposal of household hazardous waste, proper disposal of pet waste, proper use of pesticides and fertilizers, proper vehicle maintenance
“Help Prevent Ocean Pollution: Proper Use and Disposal of Paint” - English, Spanish	Paint, chemicals	Proper use, storage and disposal of paint
“Help Prevent Ocean Pollution: Tips for Home Improvement Projects” - English, Spanish	Construction debris, concrete, paint, household hazardous waste, sediment	Proper storage of construction materials, recycling of construction materials, proper disposal of household hazardous waste, proper erosion and spill control
“Help Prevent Ocean Pollution: Children’s Coloring & Activity Book”	Trash, pet waste, motor oil, green waste	Litter control, proper disposal of pet waste, proper spill clean up (e.g. use of cat litter)
“Help Prevent Ocean Pollution: Tips for the Automotive Industry” - English, Spanish	Motor oil, metals, surfactants, toxic substances, dirt	Proper maintenance and washing practices for automobiles, proper storage and disposal of automotive liquids and materials
“Help Prevent Ocean Pollution: Tips for the Home Mechanic”	Motor oil, metals, surfactants, toxic substances	Proper maintenance and washing practices for automobiles and automotive detailing materials, proper storage and disposal of automotive liquids and materials, use of used oil collection centers
“Compliance Best Management Practices for Mobile Businesses”	Surfactants, toxic substances, dirt, metals	Mobile car washing and detailing, proper high pressure cleaning, proper storage and disposal of washwater from mobile automotive detailing, washing and carpet and fabric cleaning

Brochure	Pollutant(s) Addressed	Activities Addressed
"Help Prevent Ocean Pollution: A Guide for Food Service Facilities" - English, Spanish, Vietnamese	Grease, food waste, trash	Proper food waste disposal, proper grease and oil disposal, proper procedures for spill cleanup, proper maintenance of trash dumpsters, proper floor mat cleaning, proper wastewater disposal

Regulatory Information

1. City of Riverside Municipal Code: Storm Water/Surface Runoff Water Quality
2. City of Riverside Municipal Code: Landscaping Standards and Requirements

Both of the above Code Chapters are available on the City's website at:
https://library.municode.com/ca/riverside/codes/code_of_ordinances

Appendix 9.3

BMP OPERATION & MAINTENANCE AND TRAINING LOGS

BMP OPERATION & MAINTENANCE LOG
Riverside Community Hospital Garage

Today's Date: _____

Name of Person Performing Activity
(Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

TRAINING / EDUCATIONAL LOG

Date of Training/Educational Activity: _____

**Name of Person Performing Activity
(Printed):** _____

Signature: _____

Topic of Training/Educational Activity: _____

Name of Participant	Signature of Participant

Appendix 9.4

CITY OF RIVERSIDE
WATER QUALITY MANAGEMENT PLAN (WQMP) VERIFICATION SURVEY

Project Name/Site Address: _____

Responsible Party : _____

Contact Phone: _____ Contact Email: _____

1. Have your contractors (landscape, maintenance, etc.) been educated regarding the applicable requirements to prevent pollution as outlined in the WQMP?

Yes **No** Name of Landscape/Maintenance Contractor:

Method of education (contract language, Copy of O&M, educational brochures, etc.):

2. Have the storm drains and inlets been inspected and maintained, at a minimum, annually prior to Oct 1?

Yes **No** Date of Last Inspection/Maintenance:

Maintenance conducted by:

3. Have you observed any runoff from the irrigation system?

Yes **No** If yes, how was the problem resolved?:

4. What type of Integrated Pest Management (IPM) practices are used on site?

5. Are native and/or drought tolerant plants established and considered for any new landscaping?

Yes **No**

6. Have the storm drain stencils been inspected annually for legibility prior to Oct. 1?

Yes **No** Total number of stencils on site: _____

How many inlets required restenciling / date of restenciling? _____/_____

7. Have education materials been distributed to the residents/tenants/contractors within the past year?

Yes **No** Topic / Date of Distribution: _____/

Method of Distribution: newsletter, billing insert, etc.: _____

8. Is street sweeping conducted weekly?

Yes **No** **Contractor:**

9. Are trash areas in common area inspected daily?

Yes **No**

10. Have any vector concerns been observed (standing water, mosquito larvae, etc.). if yes, please contact Orange County Vector Control District at www.ocvcd.org.

Yes **No**

11. Have the LID BMPs been inspected and maintained per Manufacturer instructions? (attach invoices and inspection/maintenance forms).

Yes **No**

12. Have there been any issues with operation and maintenance of the LID BMPs units?

I certify that the above information is correct and that the BMPs for this project have been implemented and operated and maintained in accordance with the Operation and Maintenance (O&M) Plan on site and on file at the City.

Print Name of Responsible Party

Signature (required)

Date

Contech® CMP Detention Inspection and Maintenance Guide

Underground stormwater detention and infiltration systems must be inspected and maintained at regular intervals for purposes of performance and longevity.

Inspection

Inspection is the key to effective maintenance of CMP detention systems and is easily performed. Contech recommends ongoing, annual inspections. Sites with high trash load or small outlet control orifices may need more frequent inspections. The rate at which the system collects pollutants will depend more on-site specific activities rather than the size or configuration of the system.

Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in other various instances in which one would expect higher accumulations of sediment or abrasive/corrosive conditions. A record of each inspection is to be maintained for the life of the system.

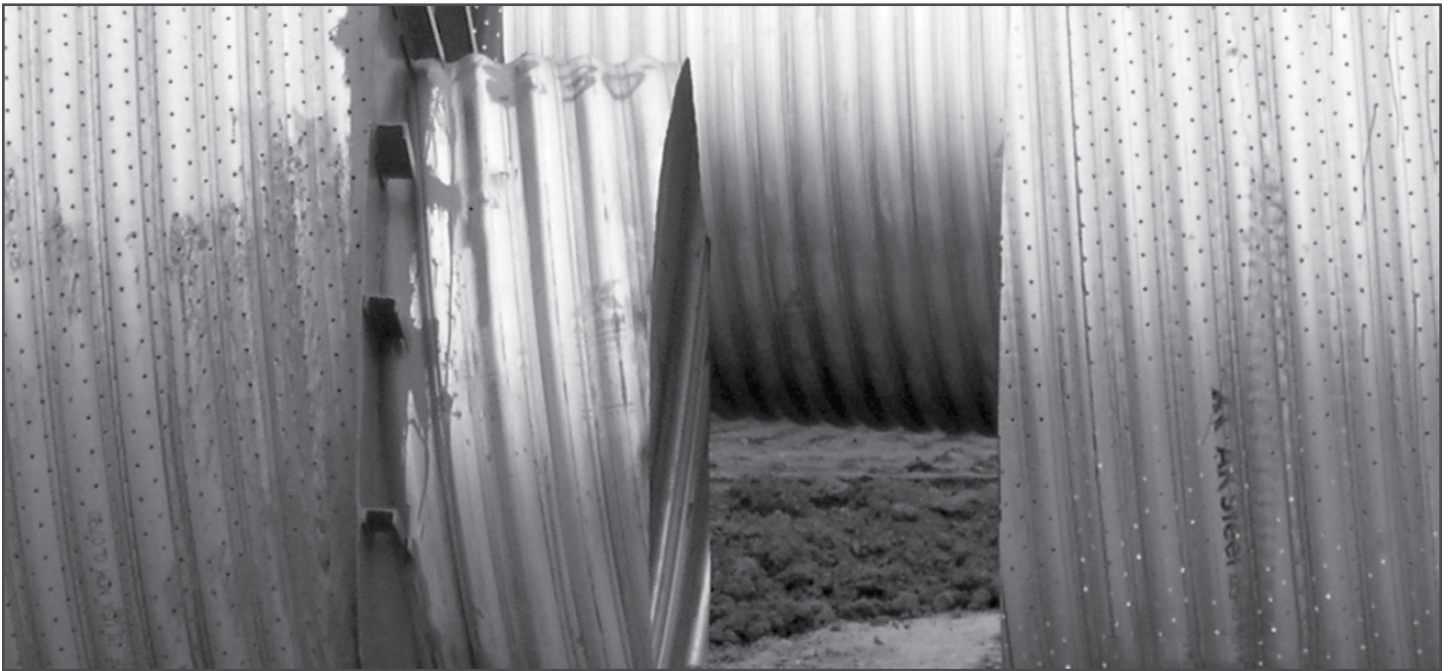
Maintenance

CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice. Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. Contech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

Annual inspections are best practice for all underground systems. During this inspection if evidence of salting/de-icing agents is observed within the system, it is best practice for the system to be rinsed, including above the spring line soon after the spring thaw as part of the maintenance program for the system.

Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.



NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

CMP MAINTENANCE GUIDE 10/19 PDF

CONTECH®
CMP DETENTION SYSTEMS

CONTECH®
ENGINEERED SOLUTIONS

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Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines, and Other End-User BMP Information

Drainage System Maintenance SC-44

Description

As a consequence of its function, the stormwater drainage facilities on site convey stormwater that may contain certain pollutants either to the offsite conveyance system that collects and transports urban runoff and stormwater, or directly to receiving waters. The protocols in this fact sheet are intended to reduce pollutants leaving the site to the offsite drainage infrastructure or to receiving waters through proper on-site conveyance system operation and maintenance. The targeted constituents will vary depending on site characteristics and operations.

Approach

Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- 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.
- Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.



Good Housekeeping

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

 Good Housekeeping	✓
 Preventative Maintenance	✓
 Spill and Leak Prevention and Response	✓
 Material Handling & Waste Management	
 Erosion and Sediment Controls	
 Employee Training Program	✓
 Quality Assurance Record Keeping	✓



CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Drainage System Maintenance **SC-44**

- ✓ Identify evidence of spills such as paints, discoloring, odors, etc.
- ✓ Record locations of apparent illegal discharges/illicit connections.
- ✓ Track flows back to potential discharges 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” or similar 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 for additional information.

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); and
 - ✓ 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 for additional information.



Preventative Maintenance

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.

Drainage System Maintenance **SC-44**

- 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. Prioritize storm drain inlets; 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 state of any river, stream, or lake in California, must enter into a Stream or Lake Alteration Agreement with the Department of Fish and Wildlife. 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 Army Corps of Engineers and USFWS.



Spill Response and Prevention Procedures

- Keep your spill prevention control plan up-to-date.

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- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- 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.



Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- Train employees and subcontractors in proper hazardous waste management.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
- 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).



Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for drainage system maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Keep accurate logs of illicit connections, illicit discharges, and illegal dumping into the storm drain system including how wastes were cleaned up and disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Provided below are typical limitations and recommended “work-arounds” for drainage system maintenance:

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- 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.
 - ✓ Perform all maintenance onsite and do not flush accumulated material downstream to private property or riparian habitats.
- 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, and liquid/sediment disposal.
 - ✓ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
 - ✓ Do not dump illegal materials anywhere onsite.
 - ✓ Identify illicit connections, illicit discharge, and illegal dumping.
 - ✓ Cleanup spills immediately and properly dispose of wastes.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the sanitary sewer system.
 - ✓ Collect all materials and pollutants accumulated in drainage system and dispose of according to local regulations.
 - ✓ Install debris excluders in areas with a trash TMDL.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and characteristics of the drainage system. Significant capital costs may be associated with purchasing water trucks, vacuum trucks, and any other necessary cleaning equipment or improving the drainage infrastructure to reduce the potential .
- Developing and implementing a site specific drainage system maintenance plan will require additional capital if a similar program is not already in place.

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.
- 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.

Supplemental Information

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 re-suspension 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 if allowed or that fire hydrant line flushing coincide with storm sewer flushing.

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References and Resources

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