Appendix E Water Quality Opportunities Memorandum (McGowan Consulting LLC)

MEMO from McGowan Consulting LLC

To: Prem Kumar, City Engineer
From: Kathleen McGowan and Susan Robinson
Subject: Review of 2021 Storm Drain Master Plan for Water Quality Improvement Opportunities
Date: June 2, 2021
Link: Certified Full Capture System List of Trash Treatment Control Devices (Updated February 2021)

This memo summarizes our focused review of the City of Manhattan Beach (City) 2021 Storm Drain Master Plan dated February 2021 (90% complete) targeting identified opportunities for stormwater quality mitigation and protection.

I. Stormwater Infiltration and Multi-Benefit Infrastructure Opportunities

McGowan Consulting has reviewed storm drain capital improvements and the multi-benefit project concepts developed for the Storm Drain Master Plan to identify whether their location and sizing overlap with identified stormwater capture needs in the Updated Beach Cities EWMP (2021). We found that many of the projects are located within the 28th Street Storm Drain System (in the Central Watershed in the Storm Drain Master Plan) and as such do not fill an immediate stormwater capture need since Phase 1 of the 28th Street Storm Drain Infiltration Project planned near the outfall is anticipated to provide the capture volume to meet the necessary pollutant load reduction for the 28th Street Storm Drain compliance point. We did note project opportunities in the East and West Watersheds identified in the Storm Drain Master Plan that have the potential to meet additional EWMP needs by incorporating stormwater capture, treatment and infiltration and, as such, the City may wish to consider pursuing and/or modifying the prioritization of one or more of those projects.

Herondo Storm Drain Watershed

The City's EWMP obligation to provide for stormwater capture volume and associated pollutant load reduction in the Herondo Storm Drain watershed (within the East Watershed in the Storm Drain Master Plan) is currently to be met by two planned projects: 1) a planned green street project on Artesia Boulevard between Herrin Street and South Redondo Avenue to address the 85%, 24-hour storm event volume generated from its 7-acre tributary area, and 2) a 1.3 acre-feet, 24-hr management volume share of the planned Fulton Playfield Regional Project in Redondo Beach to address the remaining capture volume obligation from the City. It appears that the following CIP project identified in the Storm Drain Master Plan could be used to meet some of the City's stormwater capture responsibility in this watershed.

Aviation Blvd. and Artesia Blvd. Improvement Project

The Artesia and Aviation Improvement Project proposes installation of storm drain piping, additional catch basins and new dry wells to improve water quality. Depending on the timing of the project and design capacity of the dry wells for this project, it could reduce or eliminate the City's share of the planned Fulton Playfield Regional Project in Redondo Beach, either as a stand-alone project or in coordination with the adjacent planned green street project on Artesia Boulevard between Herrin and S. Redondo.

Dominguez Channel Watershed

Aviation & 33rd Improvement (NE02) and Aviation Blvd and Marine (NE04)

The City needs 5.2 AF of additional stormwater capture capacity in the East Watershed area of the City tributary to Dominguez Channel to meet its EWMP obligation for this area. The City may wish to combine the project concept developed in the EWMP for distributed infiltration via dry wells in this area with Storm Drain Master Plan projects NE02 and NE04 in order to create a multi-benefit water quality and drainage improvement project.

28th Street Storm Drain Watershed

In the event that Phase 1 of the 28th Street Storm Drain Infiltration Project is unable to realize the performance anticipated by the preliminary design and Phase 2 is not feasible, supplemental project(s) could be needed to address the remaining capture volume. The table at the end of this memo lists project concepts developed in the Storm Drain Master Plan that could be used to meet supplemental EWMP stormwater capture needs, if necessary, in lieu of or in combination with Phase 2 of the 28th Street Storm Drain Infiltration Project.

Identify Areas with Potential Water Supply Benefits from Infiltration

We suggest that to enhance the potential for securing outside funding for the various improvement projects in the Storm Drain Master Plan and in the EWMP, it would be helpful to identify areas of the City that could potentially accrue water supply benefits through infiltration to identify where conjunctive use or groundwater basin augmentation could be claimed from stormwater infiltration projects. If the projects overlie the West Coast Groundwater Basin and there is no aquitard/confining layer between the shallow groundwater table and the water supply aquifer, potential water supply benefits could be key to securing future grant funding for one or more of the CIP projects.

II. Certified Full Capture Systems for Trash

Assessment of Opportunities for Centralized High Flow Capacity Trash Capture Systems

To meet the City Public Works staff preference for complying with the Santa Monica Bay Debris TMDL (Central and West Watersheds) and the Statewide Trash Amendments (East Watershed) utilizing centralized High Flow Capacity Trash Devices, also referred to as continuous deflection systems (CDS) or hydrodynamic separators, it is recommended that an assessment be made of the feasibility of installing such devices at key locations within the storm drain system. A variety of certified High Flow Capacity Trash Devices approved by the State Water Resources Control Board (State Board) and offered by multiple vendors are available as listed in Table 2 of the document linked to this memo. The City has already installed Contech CDS units at various locations within the City's storm drain network as identified in Figure 4-3 of the Storm Drain Master Plan. As part of our review of the City's Storm Drain Master Plan, McGowan Consulting identified the following additional key locations for assessing the feasibility of installing centralized High Flow Capacity Trash Devices near storm drain outfalls. These locations are organized below by Storm Drain Master Plan Watershed:

West Watershed Outfalls as shown in Figure 4-3

- 1st Street storm drain
- 14th Street storm drain
- 18th Street storm drain

- 21st Street storm drain
- 24th Street storm drain
- 26th Street storm drain
- 32nd Street storm drain
- Four storm drain outfalls along the El Porto Parking Lot at the north end of the City.

Also note that most segments of The Strand and its drainage system do not appear to meet the definition of MS4 under the Municipal NPDES Permit and should not require retrofitting for full capture systems or devices - please review our separate draft memo to the Public Works Director and Utilities Division Manager dated June 10, 2020, for our assessment of the Strand Stormwater Collection Sumps and drainage system.

Central Watershed

A centralized trash capture system is planned to be incorporated into the design of the 28th Street Storm Drain Infiltration Regional Project and installed at the diversion point near 28th Street storm drain outfall. If that system is designed to divert and treat the peak flow rate resulting from a 1-year, 1-hour storm event (trash capture design storm) which is the criteria for full capture systems for trash, no other centralized trash capture system would be required for the 28th Street storm drain system. However, if the peak flow rate through the diversion system is not sufficient to manage the 1-year, 1-hour design storm peak flow rate, then City staff should consider augmenting that trash capture system with additional centralized systems on each main storm drain line feeding the 28th Street storm drain to achieve the trash capture design flow treatment criteria via a treatment train approach. Note that a CDS unit is installed on the storm drain line discharging into the detention basin at Polliwog Park, so that catchment has already been addressed by a trash capture system.

East Watershed

An assessment of opportunities for installation of centralized High Flow Capacity Trash Devices should be performed near the point at which major storm drain lines flow out of the City's jurisdiction and into neighboring jurisdictions. These include:

- Aviation Blvd storm drain line at Marine Avenue
- Aviation Blvd storm drain line at Artesia at the boundary crossing into Redondo Beach

III. General Suggestions for Finalizing Storm Drain Master Plan Document

The following suggestions are offered for consideration in finalizing the Storm Drain Master Plan document:

- To assist the user in navigating the document, it is recommended that the Table of Contents be interactive with internal links for ease of navigation, to sections, tables and figures in the Master Plan.
- In the Prioritized Capital Improvement Program section of the Storm Drain Master Plan narrative, for each improvement project:
    - provide references to each Figure/Map number and page number where the improvement project is shown in the maps
    - provide the project ID in the title heading for the project narrative
    - identify which watershed (West, Central, or East) in which the project lies.

This will assist the user of the Master Plan in locating the projects of interest and navigating between the narrative, maps and figures. It may also be useful to create a master table listing each project ID, project title and map and figure on which they appear.

IV. Supplemental Projects Table

Storm Drain Master Plan Multi-Benefit Project Concepts With Potential to Supplement 28th Street Storm Drain Infiltration Project			
Project IDs	**Title**	**Description**	**Proposed Capture Volume (24-hr)**
NE06 Fig C-6) 60627240 (Fig C-15.1)	Bell Ave Sub-Basin Facility Project Concept	Divert flows from County Main at 27th Street from 414-acre drainage area to subsurface infiltration via dry wells in Sand Dune Park	Appears to be sized for 85%/24-hr capture volume from 5.4 acres so possibly only 0.3 AF (13,000 CF detention)
NW02B (Fig C-6) 60627240 (Fig C-15.2)	18th Street Improvement Project Concept	Divert flows from 183-acre drainage area via City's storm drain on 18th Street for subsurface detention/infiltration prior to outfall in Polliwog Park	Appears to be sized for 85%/24-hr capture volume from 1.8 acres, so possibly only 0.1 AF (4,500 CF detention)
NW08B (Fig C-6) 60627240 (Fig C-15.3)	Pacific Elementary Facility Project Concept	Divert flows from 1,040 AC drainage area from County Pine Ave SD for subsurface detention/infiltration below Pacific Elementary Field	Appears to be sized for 85%/24-hr capture volume from 3.3 acres, so possibly only 0.18 AF (8,000 CF detention)
M01 (Fig C-7) 60627240 (Fig C-15.5)	Vorhees Sump Detention & Infiltration Project Concept	Divert flows from Vorhees Sump to subsurface detention/infiltration below parking lot	1.5 AF (66,000 CF) 85%/24-hr capture volume from 28 acres

To: Stephanie Katsouleas, Public Works Director and Shawn Igoe, Utilities Division Manager
From: Susan Robinson and Kathleen McGowan
Subject: Strand Stormwater Collection Sumps
Date: June 10, 2020
Attachments:

1. Maps 1-5: Strand Drainage System Configuration
2. Photos of Strand Drainage System

McGowan Consulting was asked by City staff to investigate the possibility of certifying eleven (11) Strand stormwater sumps[1] as full capture systems for trash consistent with the Santa Monica Bay Nearshore and Offshore Debris TMDL (SMB Debris TMDL) and as defined by the State Water Resources Control Board (SWRCB) Trash Implementation Program. Our investigation included: review of original design drawings of the Strand Stormwater Collection Basins, phone conversations with Los Angeles Regional Water Quality Control Board (Regional Board) and SWRCB staff, and a systematic field reconnaissance conducted jointly with the City's Wastewater Supervisor. This memorandum summarizes our investigation and makes recommendations for how to address the Strand stormwater sumps with respect to the City's SMB Debris TMDL Implementation Strategy.

Background

Stormwater runoff from the City of Manhattan Beach (City) discharges via the municipal separate storm sewer system (MS4) to the Santa Monica Bay, therefore the City is identified as a responsible jurisdiction subject to the SMB Debris TMDL. As outlined in the City's approved Trash Monitoring and Reporting Plan (TMRP)[2], the City plans to meet the interim and final compliance milestones in the SMB Debris TMDL by installing full capture devices to address 100% of the storm drainage system (MS4 system) tributary to Santa Monica Bay within its jurisdiction, and has until March 20, 2023 to complete these installations as a result of having adopted ordinances prohibiting public smoking, plastic bags at point-of-sale, and polystyrene food service ware.

On February 6, 2018 Regional Board staff approved modifications to the SMB Debris TMDL interim milestone schedule for the Beach Cities Enhanced Watershed Management Program (EWMP), including the City of Manhattan Beach. The schedule modifications allow time for the Beach Cities agencies to investigate the broader range of trash capture devices certified by the SWRCB through the Statewide Trash Policy, including incorporation of trash capture into planned multi-benefit treatment systems in regional EWMP BMPs and green street projects. The approved revised interim milestones and final deadline applicable to the City for implementing the SMB Debris TMDL are shown in Table 1.

The City has fulfilled Milestones 1 and 2 as documented in the *City of Manhattan Beach Implementation Strategy Report for the Santa Monica Bay Nearshore and Offshore Debris TMDL* (Implementation Strategy) which was submitted to the Regional Board in December 2019 with the City's Annual Stormwater Report for FY1819. The City's Implementation Strategy for meeting Milestones 3 and 4 includes this investigation into the possibility of obtaining full capture certification for the eleven (11) stormwater sumps located along The Strand between 2nd

[1] These have previously been referred to as "Water Quality Inlets", however the California Stormwater Quality Association definition of a "Water Quality Inlet" refers to a multi-chambered device with a discharge chamber which does not accurately describe these units (CASQA, *California Stormwater BMP Handbook New Development and Redevelopment TC-50 Water Quality Inlet* [BMP Fact Sheet], January 2003).

[2] The Regional Board approved the City's TMRP and directed the City to begin implementation of the TMRP in its Review of the Beach Cities CIMP Letter dated May 22, 2015.

Street at the City's southern border and 43rd Street at the northern border of the City. McGowan Consulting initiated this investigation in late February 2020.

Table 1 Santa Monica Bay Debris TMDL Revised Interim and Final Compliance Milestones

No.	Milestone	Date
1	Determine compliance strategy for installing full capture trash systems, taking into account planned regional projects.	**August 20, 2019**
2	Report compliance strategy to the Regional Board.	**December 2019**
3	Complete installation of full capture trash systems serving 50% of the MS4 drainage area not tributary to planned regional projects and investigate full capture certification for eleven (11) Stormwater Collection Basins.	**March 20, 2020**
4	Complete installation of full capture trash systems serving the remainder of the City to achieve 100% retrofit of the City's MS4 system.	**March 20, 2023**

Desktop Investigation

Based on discussions with City staff and review of the original design drawings for the Strand Stormwater sumps (see Appendix A), McGowan Consulting understood that stormwater surface flows from the Strand are captured by various drop and curb inlets situated along the length of the Strand and directed via segments of 8" subsurface drainage pipes to one of the eleven (11) stormwater collection basins or sumps which have permeable bottoms comprised of native beach sandy soil. Nine (9) of the eleven (11) basins are sumps of the type shown as "Case B" in the original design drawings, and as such they have no outlets and are in fact sumps. Two (2) of the eleven basins are of the type shown as "Case A" in the original design drawings with an outlet connector pipe connecting to an MS4 outfall and are not in fact sumps. Based on this information, it is our opinion that if the capacity of each of the nine (9) sumps is determined to be sufficient to retain the 1-year, 1-hour storm runoff volume from its tributary area, then it should be feasible to certify them as full capture systems consistent with the SWRCB Trash Implementation Program.

McGowan Consulting spoke with Regional Board staff[3] assigned to the SMB Debris TMDL and was told that trash control devices installed after December 2, 2015 must be certified by the SWRCB Executive Director prior to installation. The staffer suggested that we speak with someone at the SWRCB to discuss how to go about certifying the Strand stormwater sumps which were installed prior to 2015. McGowan Consulting then spoke with the Technical Advisor for the SWRCB's Trash Implementation Program[4] and he explained that the Strand stormwater sumps would be considered a Certified Multi-Benefit Trash Treatment System Detention Basin as defined by the SWRCB's list of Certified Multi-Benefit Trash Treatment Systems[5] and as such would not require separate certification so long as they meet all the following criteria:

- The system must be designed and maintained to trap trash particles that are 5-mm or greater for the peak flow rate generated by the region specific 1-year,1-hour storm event from the applicable sub-drainage area.
- The system must include either a screen at the system's inlet, overflow, or bypass outlet to trap trash particles 5mm or greater **OR** an up-gradient structure designed to bypass flows exceeding the peak flow

[3] Alexander Prescott, phone conversation with McGowan Consulting Senior Scientist, February 26, 2020.

[4] Leo Cosentini, phone conversation with McGowan Consulting Senior Scientist, February 27, 2020.

5 Certified Multi-Benefit Trash Treatment Systems (July 9, 2019), obtained from the SWRCB's Trash Implementation webpage: https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html on February 27, 2020.

rate generated by the region specific 1-year, 1-hour storm event from the applicable sub-drainage area. Alternatively, upon approval by the Regional Board Executive Officer, a 5mm screen and/or upgradient structure may not be required if the Multi-Benefit Trash Treatment System is designed to capture flows generated from very large 24-hour storm events.

- The Multi-Benefit Trash Treatment System Design shall be stamped and signed by a registered California licensed Professional Engineer.
- The owner of the system must establish a maintenance schedule based on site-specific factors, including the design trash capture capacity of the Multi-Benefit Trash Treatment System, storm frequency, and estimated or measured trash loading from the drainage area.

Field Reconnaissance

McGowan Consulting's Senior Scientist and the City's Wastewater Supervisor performed field reconnaissance on March 11, 2020 to confirm how each of the stormwater sumps was configured and to determine whether they would meet the SWRCB's criteria for a Multi-Benefit Trash Treatment System as described above. We systematically traversed the length of the Strand and observed each of the sumps, opening each unit whenever possible. Maps showing the Strand stormwater sump system's configuration[6] along with photo documentation of the Strand stormwater sumps are included as Appendix B and C, respectively. The field reconnaissance confirmed that the Strand sump drainage system is distinct from the municipal separate storm sewer system (MS4) in that runoff does not enter the Strand stormwater sumps from the MS4, including City streets with drainage systems, curb and gutter, catch basins or storm drains.

Importantly, during the field reconnaissance, McGowan Consulting also observed that the Strand sump system does not have a bypass and therefore stormwater that exceeds the capacity of the sumps during a very large rain event is retained on the Strand (as shown in Photos #1 and #14 of Appendix C). There is a 10-inch high concrete curb that runs the length of the Strand on the westerly side, separating it from the bike path and beach below. Walls from adjacent properties bound the easterly side of the Strand and exceed 10 inches in height. The curb and adjacent residential walls essentially serve as a containment barrier, preventing stormwater that has exceeded the capacity of the Strand stormwater sumps from discharging onto the bike path and/or the beach. The 10+ inch height of the curb/wall bounding the Strand provides a stormwater volume capture capacity that is approximately seven times greater than the 1.4 inch rainfall depth generated during the 95th%, 24-hour rain event in this area, even without accounting for the storage and infiltrative capacity of the nine (9) stormwater sumps themselves. When localized flooding does occur on the Strand during large storm events that exceed the infiltrative capacity of the stormwater sumps, City Public Works field staff address this localized flooding as quickly as possible by pumping the stormwater into a collection bin and transporting it back to the Public Works yard for disposal into the sanitary sewer.

Discussion/Conclusion:

Based on the information collected during the desktop investigation and field reconnaissance, McGowan Consulting concludes that the nine (9) Strand stormwater sumps meet the criteria for a certified Multi-Benefit Trash Treatment System and that, if requested, the City would likely receive approval from the Regional Board Executive Officer to waive the requirement for installation of 5mm screens on these sumps based on the Strand's detention of the stormwater volume from a very large 24-hour rain event.

However, because eight (8) of the nine (9) Strand stormwater sumps are distinct from the MS4 system since they do not receive flow from or discharge to the MS4 system, and, when considered as a system along with the Strand itself, are able to detain the stormwater volume from a very large 24-hour rain event, it is our conclusion

[6] Maps compiled based on information obtained from the Wastewater Supervisor on March 11, 2020

that these Strand sump systems are effectively self-contained and do not need to be certified or retrofit with screens and should be removed from the City's MS4 inventory. The eight (s) Strand stormwater sumps meeting the criteria for removal from the City's MS4 inventory are:

1. Sump #1 at 2nd Street
2. Sump #2 at 6th Street
3. Sump #3 at 6th Place
4. Sump #4 at 8th Place
5. Sump #5 at Manhattan Beach Blvd.
6. Sump #7 at 21st Place
7. Sump #8 at 28th Street
8. Sump #10 at 41st Street

Sump #11 at 43rd Street may only be partially distinct from the MS4 as it appears that during large storms some sheet flow from 44th Street may enter the Strand via a small culvert and could enter an inlet connected to this sump. The additional surface flows from 44th Street may prevent this sump from fully retaining the very large, 24-hour storm volume. Flows exceeding the capacity of sump #11 backflow onto the Strand and may overflow onto the adjacent El Porto Parking Lot during a very large storm event. Despite this, sump #11 does not require retrofit with a screen because any overflow from sump #11 that reaches the El Porto Parking Lot will be captured and addressed by the downstream MS4 inlets in the parking lot which will be retrofit with full capture devices by March 20, 2023 in accordance with Milestone #4 above.

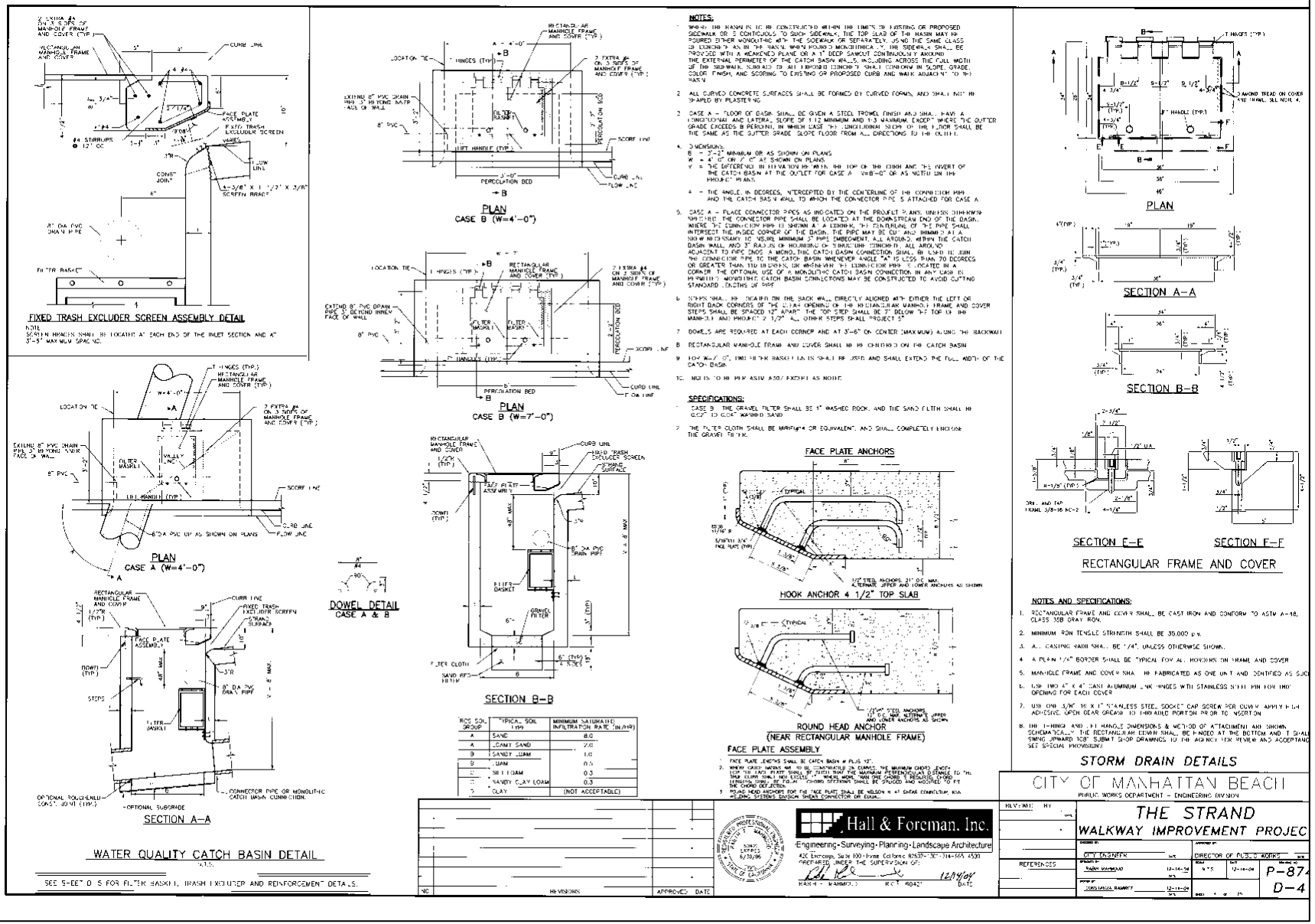
The remaining two (2) collection basins, #6 and #9, are connected to the MS4 system. These two collection basins will therefore require retrofit with 5-mm screens designed to prevent the discharge of trash from the volume of runoff from their tributary areas generated during the 1-year, 1-hour storm event in order to be certified as full-capture devices[7]:

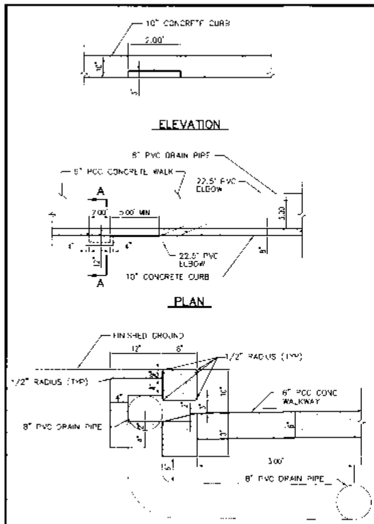
1. Collection Basin #6 at 17th Place: We were unable to open this unit, however the Wastewater Supervisor confirmed that Public Works staff had connected it into the MS4 outfall that discharges just west of the dunes at the terminus of 18th Street.
2. Collection Basin #9 at 39th Street: It was determined based on visual observation of a connector pipe in the back wall of this sump (shown in the enclosed photo of Basin #9 with a blue arrow denoting the connector pipe) that this unit is "Case A" and is connected to the MS4 outfall located at the terminus of 39th Street.

The retrofit of Basins #6 and #9 should be completed no later than March 20, 2021 which is the City's deadline for completing retrofits of 100% of its MS4 system outside the tributary area to planned Regional Stormwater projects, i.e., outside the tributary area to the 28th Street Storm Drain system. This updated approach will be reported to the Regional Board in the City's Annual Stormwater Report for FY1920 that is due December 15, 2020.

[7] A list of currently certified full capture devices can be found on the State Water Board's Trash Implementation webpage: https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/certified_fcsdevicelist_feb20.pdf

Appendix A: Strand Sump Original Design Drawings


FIXED TRASH EXCLUDER SCREEN ASSEMBLY DETAIL
PLAN
CASE B (W=4'-0")
PLAN
CASE B (W=7'-0")
PLAN
CASE A (W=4'-0")
DOWEL DETAIL
CASE A & B
SECTION B-B
SECTION A-A
WATER QUALITY CATCH BASIN DETAIL
FACE PLATE ANCHORS
HOOK ANCHOR 4 1/2" TOP SLAB
ROUND HEAD ANCHOR
(NEAR RECTANGULAR MANHOLE FRAME)
FACE PLATE ASSEMBLY
NOTES:
SPECIFICATIONS:
PLAN
SECTION A-A
SECTION B-B
SECTION E-E
SECTION F-F
RECTANGULAR FRAME AND COVER
NOTES AND SPECIFICATIONS:
STORM DRAIN DETAILS
CITY OF MANHATTAN BEACH
PUBLIC WORKS DEPARTMENT - ENGINEERING DIVISION
THE STRAND
WALKWAY IMPROVEMENT PROJEC
Hall & Foreman, Inc.
Engineering • Surveying • Planning • Landscape Architecture
P-87
D-4



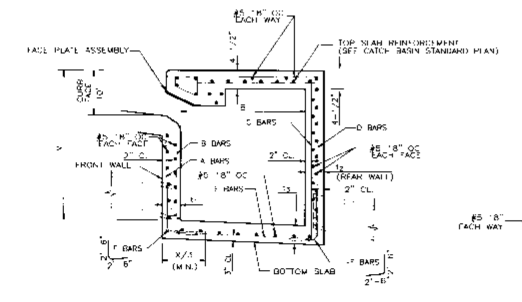
ELEVATION

PLAN

SECTION A-A

CURB OPENING DRAIN DETAIL

N.T.S.



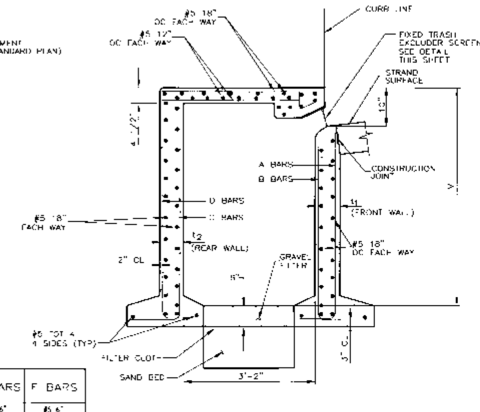
WATER QUALITY CATCH BASIN – (CASE A)

MAX. W	MAX. V	t_1	t_2	t_3	A BARS	H BARS	C BARS	D BARS	E BARS	F BARS
7'	9'	6"	6"	6"	#5 12"	#6 5"	#5 12"	#5 12"	#5 6"	#5 6"
7'	8'	6"	6"	6"	#5 15"	#6 5"	#5 12"	#5 9"	#6 6"	#6 6"

NOTE: USE REAR WALL REINFORCEMENT IN END WALLS

TYPICAL REINFORCEMENT DETAILS

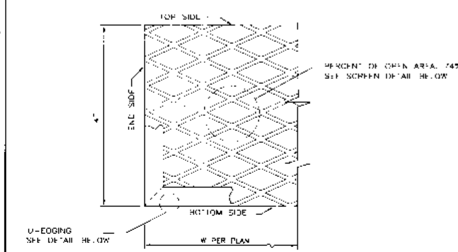
N.T.S.



WATER QUALITY CATCH BASIN – (CASE B)

MAX. W	MAX. V	t_1	t_2	A BARS	B BARS	C BARS	D BARS
7'	8'	6"	6"	#5 18"	#5 6"	#5 18"	#5 18"
7'	8'	6"	6"	#5 18"	#5 6"	#5 18"	#5 18"

NOTE: USE REAR WALL REINFORCEMENT IN END WALLS



TRASH EXCLUDER SCREEN

NOTE: THE HEIGHT SHOWN FOR TRASH EXCLUDER SCREEN DOES NOT INCLUDE U-EDGING THICKNESS.

SCREEN DETAIL

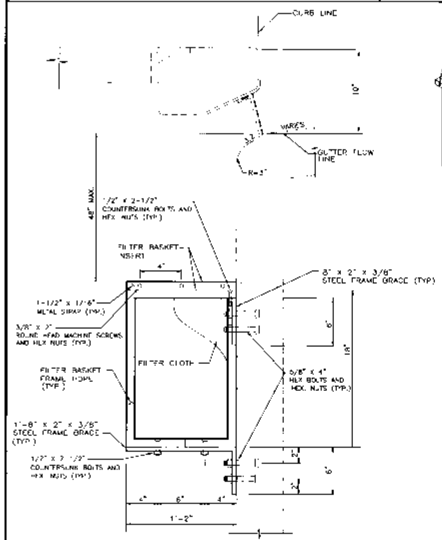
U-EDGING DETAIL

FIXED TRASH EXCLUDER DETAIL

N.T.S.

SPECIFICATIONS:

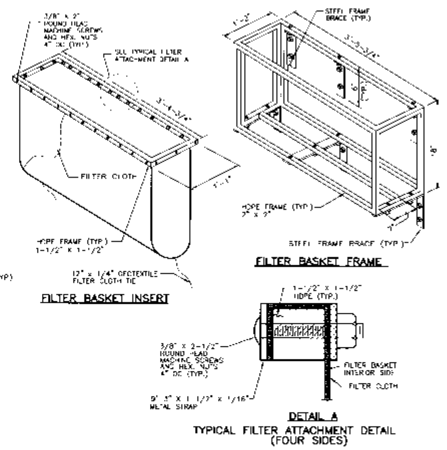
1. TRASH EXCLUDER SCREEN SHALL BE STYLE 3/4" #16 FSS 0.050" STAINLESS STEEL TYPE 316 – FLATTENED
2. THE SCREEN SHALL BE BOND SHEARED AT ONE END SIDE AND ALONG THE BOTTOM SIDE WHICH WILL BE LOCATED ALONG THE CATCH BASIN GUTTER LINE. THE TOP SIDE SHALL BE RANDOM SHEARED TO FIT THE REQUIRED HEIGHT OF THE SCREEN.
3. THE EDGE OF THE SCREEN SHALL BE GROUND TO REMOVE SHARP EDGES
4. THE SCREEN SHALL BE FABRICATED ACCORDING TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) UNCOATED TYPE 316 STAINLESS STEEL.
5. THE SCREEN SHALL BE FRAMED ON FOUR SIDES WITH A U EDGING MANUFACTURED FROM STAINLESS STEEL
6. U-FRAMED CORNERS MAY BE MITERED OR BUTT JOINTED
7. U-FRAMED SHALL BE SPOT WELDED TO THE SCREEN AT 2 1/10" MAXIMUM SPACING ON THE SIDE OF THE SCREEN INSIDE THE CATCH BASIN.
8. THE SCREEN SHALL BE SPOT WELDED TO SCREEN BRACES ON BOTH SIDES AT EACH SCREEN BOND POINT OR STRAND



END VIEW

FILTER BASKET ASSEMBLY

N.T.S.



FILTER BASKET INSERT

FILTER BASKET FRAME

DETAIL A

TYPICAL FILTER ATTACHMENT DETAIL (FOUR SIDES)

FILTER BASKET

N.T.S.

NOTES:

GENERAL

1. ALL METAL PARTS SHALL BE STAINLESS STEEL, INCLUDING FILTER ATTACHMENT STRAP, FILTER BASKET FRAME SUPPORTS, AND ALL NUTS, BOLTS, AND SCREWS.

FILTER BASKET FRAME

2. HIGH-DENSITY POLYETHYLENE (HDPE) MATERIAL FOR THE FILTER BASKET FRAME SHALL COMPLY WITH SECTIONS 207-18.2, 500-1.3.1, AND 500-1.3.2 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. FABRICATION PERMITTED FOR MITERED BUTT FUSION

FILTER BASKET INSERT

3. FILTER MATERIAL SHALL BE A NONWOVEN GEOTEXTILE AND SHALL COMPLY WITH APPLICABLE REQUIREMENTS OF SECTION 213-2, GEOSYNTHETICS, OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION. THE FILTER PHYSICAL PROPERTIES SHALL MEET THE FOLLOWING REQUIREMENTS.

PROPERTY	TEST METHOD	VALUE
UNIT WEIGHT	ASTM D 5261	405 g/m² (12 OZ/YD²)
UV RESISTANCE	ASTM D 4355 % RETAINED @ 500 HOURS	70%
GRAB TENSILE STRENGTH	ASTM D 4632	1512 N (340 LBS)
GRAB ELONGATION	ASTM D-4632	50%
PUNCTURE STRENGTH	ASTM D-4833	1240 N (280 LBS)
MULLEN BURST	ASTM D 3786	4480 KPa (650 psi)
TRAPEZOIDAL TEAR	ASTM D-4533	600 N (135 LBS)
APPARENT OPENING SIZE	ASTM D-4751	0.106 mm (0.0042 IN.)
PERMITIVITY	ASTM D 4491	1.0 SEC-1
PERMEABILITY	ASTM D-4491	0.40 CM/SEC
WATER FLOW RATE	ASTM D-4491	3665 L/MIN/m² (90 GPM/FT²)

4. GEOTEXTILE TIES USED TO SECURE THE FILTER CLOTH TO THE FILTER BASKET FRAME SHALL BE A NONWOVEN GEOTEXTILE MEETING THE REQUIREMENTS OF THE FILTER MATERIAL FOR UV RESISTANCE AND GRAB TENSILE STRENGTH SPECIFIED IN NOTE 3. THE CONTRACTOR SHALL SUBMIT THE METHOD OF ATTACHING THE TIES TO THE FILTER MATERIAL TO THE AGENCY FOR REVIEW AND ACCEPTANCE. SEE SPECIAL PROVISIONS

NO.	REVISIONS	APPROVED	DATE

Hall & Foreman, Inc.

Engineering • Surveying • Planning • Landscape Architecture

420 Exchange, Suite 100 • Irvine, California 92602-1301 • 714-665-4500

PREPARED UNDER THE SUPERVISION OF:

RABIH F. MAHMOUD R.C.E. 60421 DATE 12/14/04

STORM DRAIN DETAILS

CITY OF MANHATTAN BEACH

PUBLIC WORKS DEPARTMENT – ENGINEERING DIVISION

REVIEWED BY

REFERENCES

THE STRAND WALKWAY IMPROVEMENT PROJECT

CHECKED BY: CITY ENGINEER DATE

APPROVED BY: DIRECTOR OF PUBLIC WORKS DATE

DESIGNED BY: RABIH MAHMOUD 12-14-04

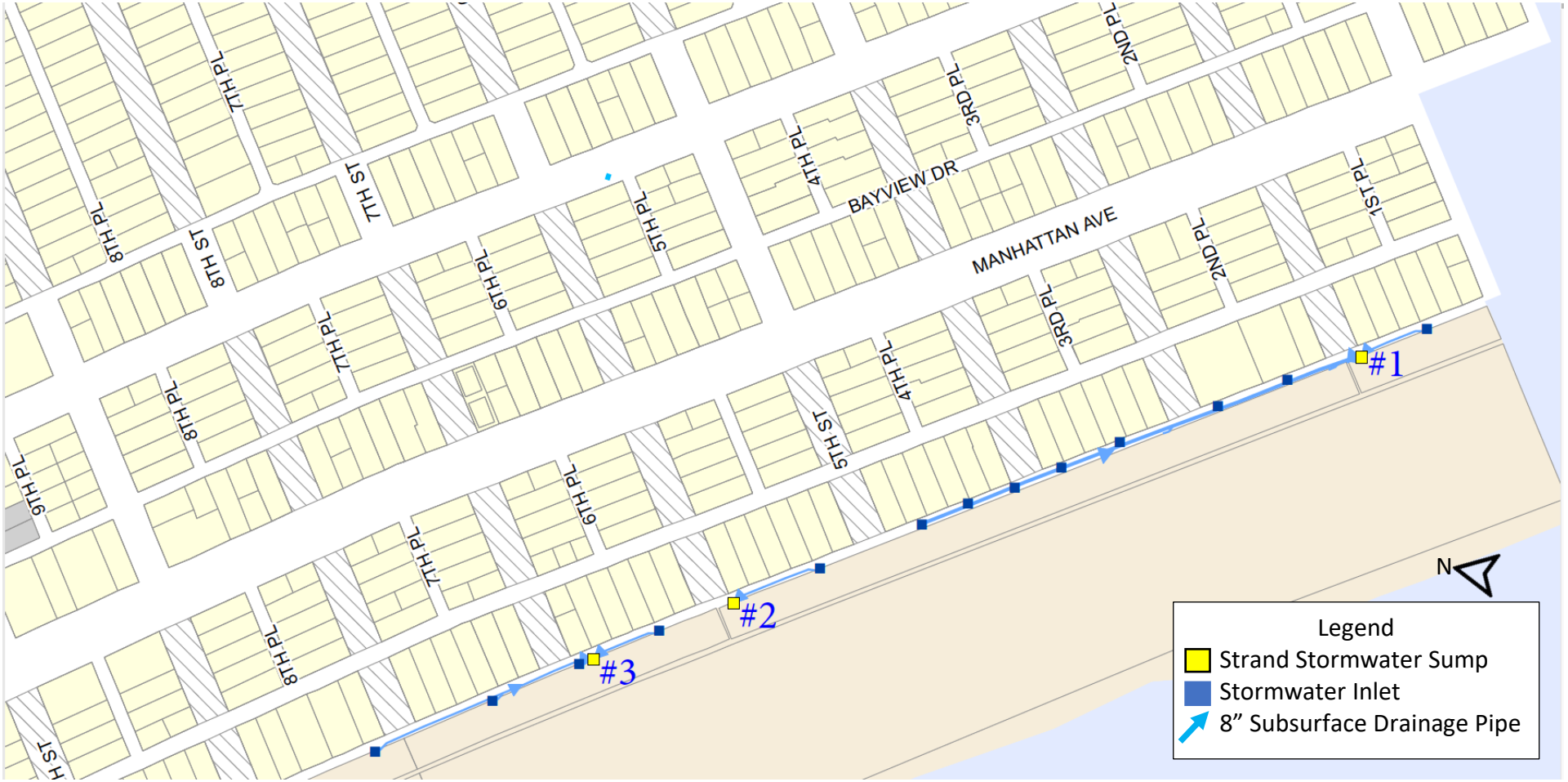
DRAWN BY: CONSTANZA RAMIREZ 12-14-04

SCALE: N.T.S. DATE: 12-14-04 SHEET 5 OF 70

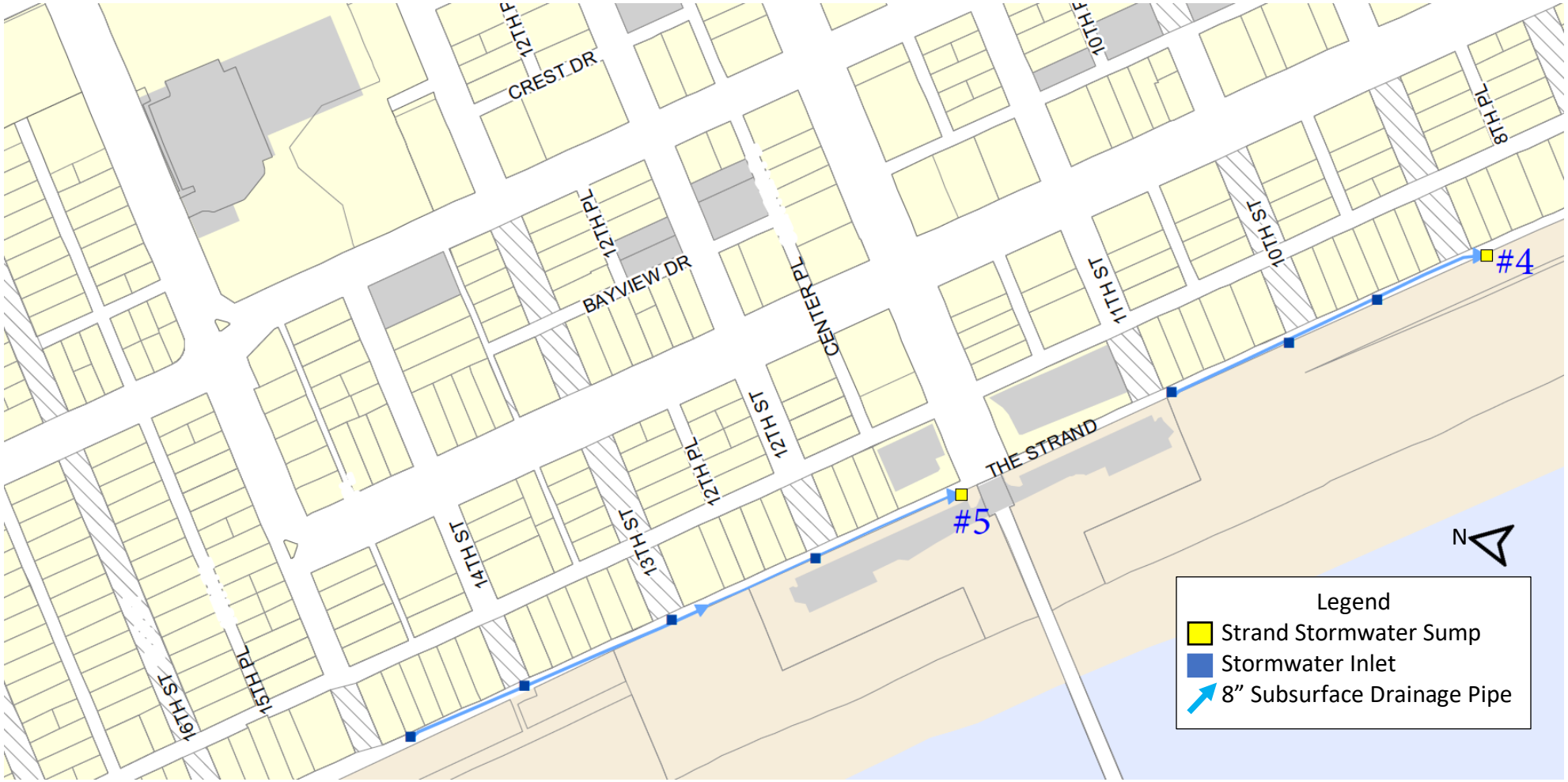
DRAWING NO. P-874 D-5

Appendix B: Strand Drainage System Configuration Maps

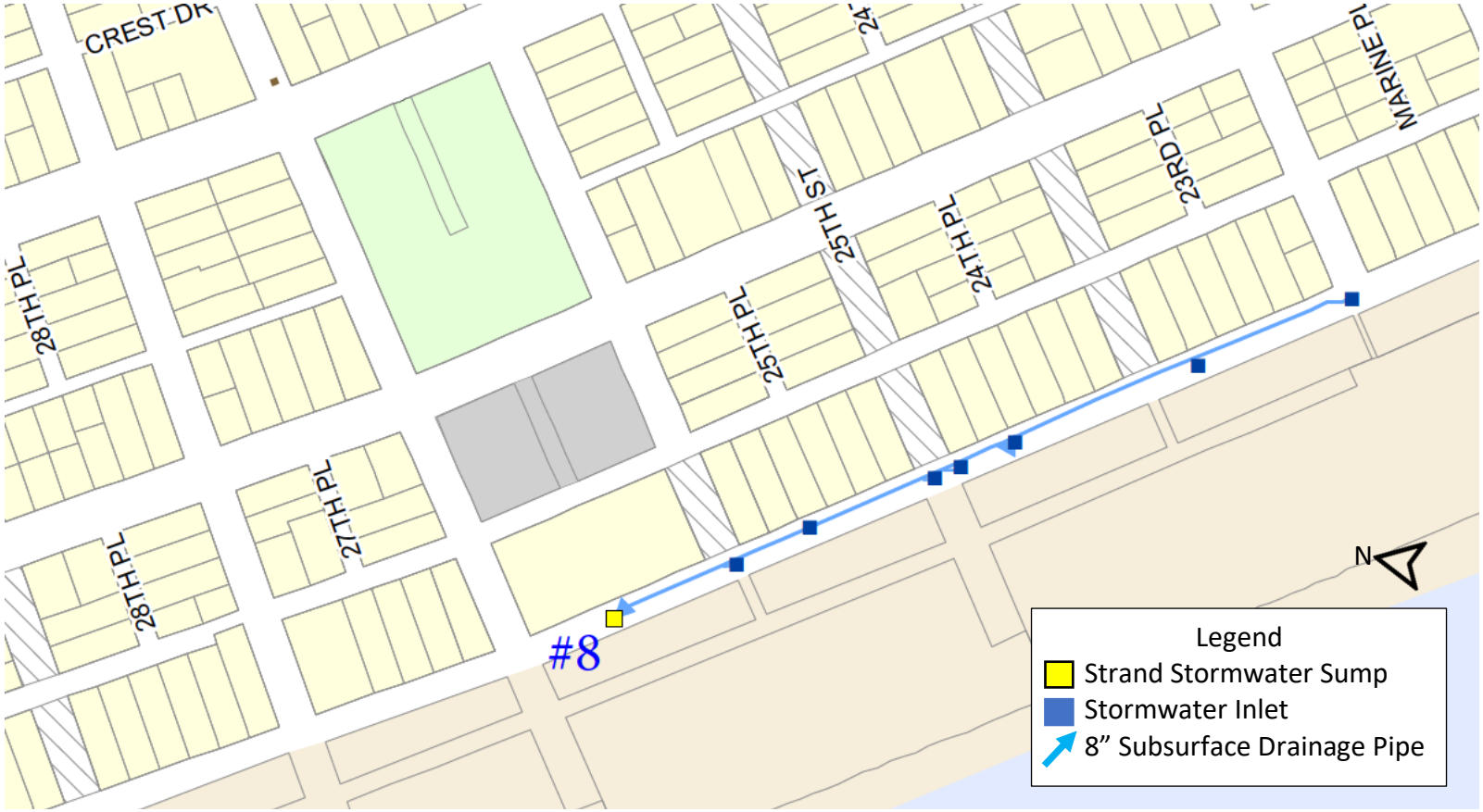
Map 1 Strand Drainage System Configuration: Sumps #1-3



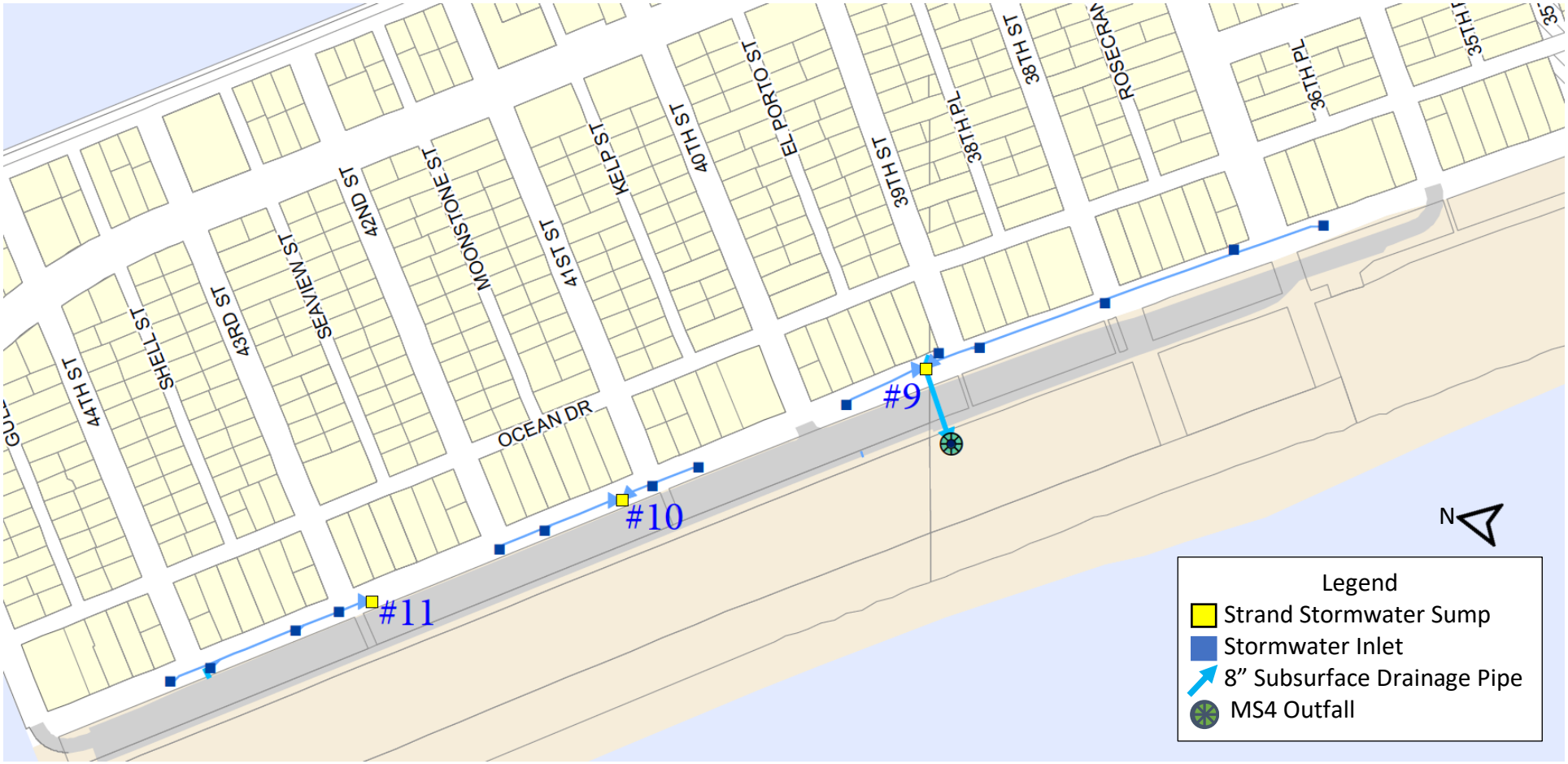
Map 2 Strand Drainage System Configuration: Sumps #4-5



Map 3 Strand Drainage System Configuration: Collection Basin #6 and Sump #7



Map 4 Strand Drainage System Configuration: Sump #8



Map 5 Strand Drainage System Configuration: Collection Basin #9, Sump #10, Sump #11

Appendix C: March 11, 2020 Field Reconnaissance Photos

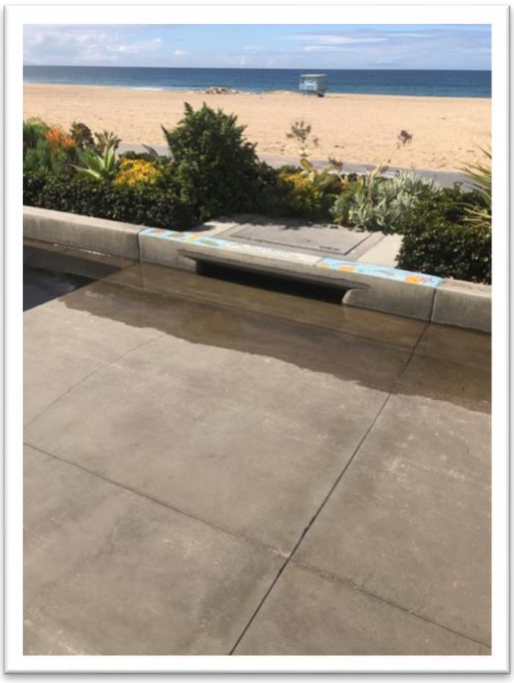


Photo #1 - Strand Stormwater Sump #1 at 2nd Street

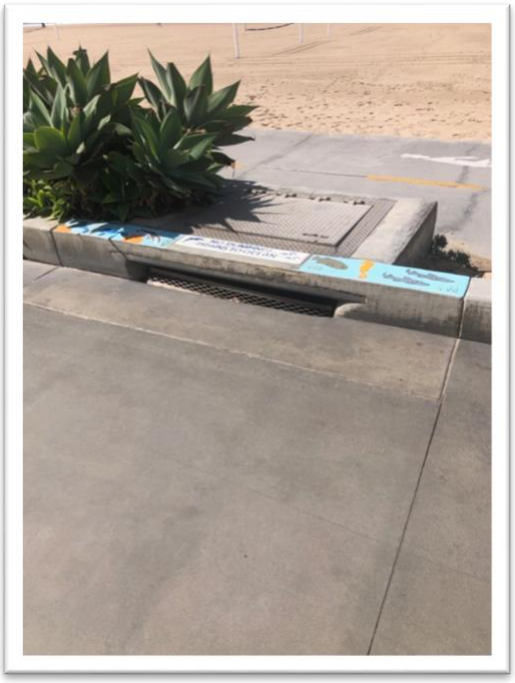


Photo #2 - Strand Stormwater Sump #2 at 6th Street

Photo #3 - Inside Strand Stormwater Sump #2 at 6th Street

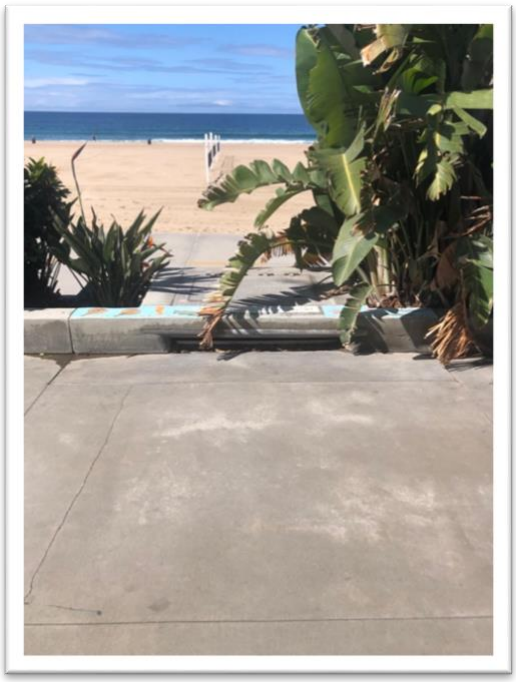


Photo #4 - Strand Stormwater Sump #3 at 6th Place

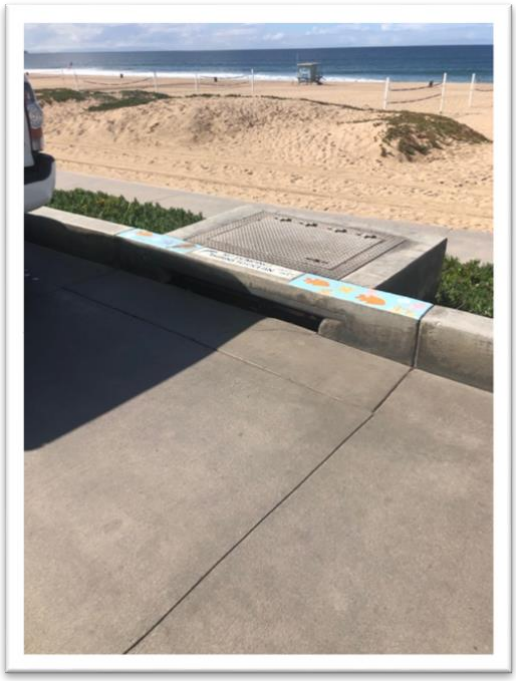


Photo #5 - Strand Stormwater Sump #4 at 8th Place

Photo #6 - Inside Strand Stormwater Sump #4 at 8th Place

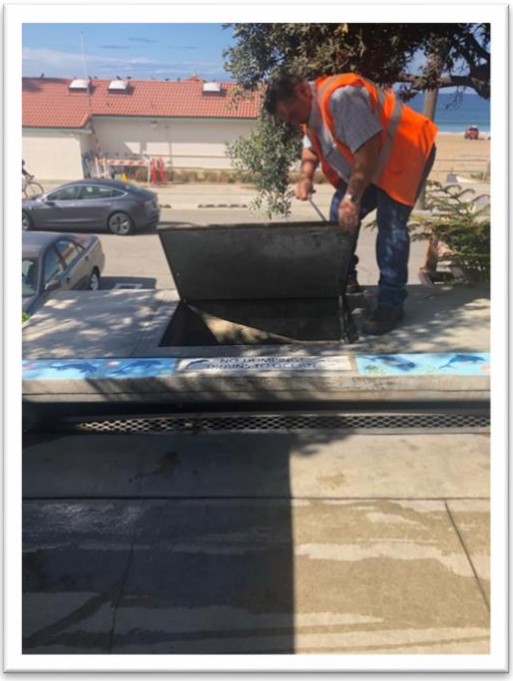


Photo #7 - Strand Stormwater Sump #5 at Manhattan Beach Blvd.

Photo #8 - Strand Collection Basin #6 at 17th Place – Note this basin is tied into the MS4 outfall that discharges to the beach just west of the dunes.

Photo #9 - Strand Stormwater Sump #8 at 28th Street

Photo #10 - Inside Strand Stormwater Sump #8 at 28th Street

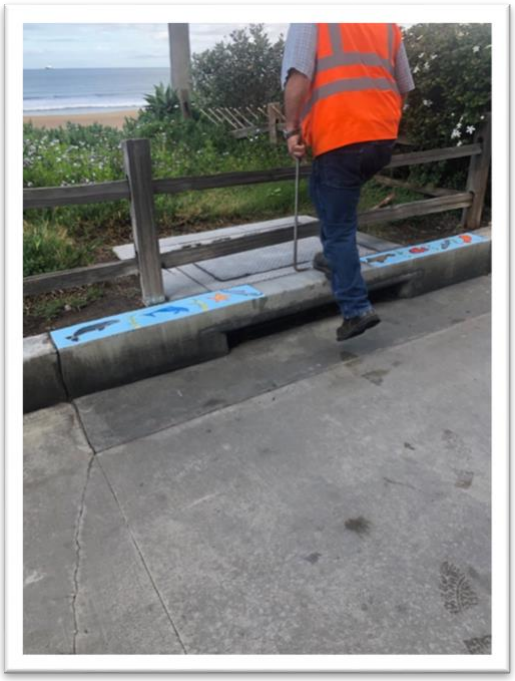


Photo #11 - Strand Collection Basin #9 at 39th Street

Photo #12 - Inside Strand Collection Basin #9 at 39th Street – Note outlet pipe denoted by blue arrow which ties into MS4 outfall that discharges onto beach.

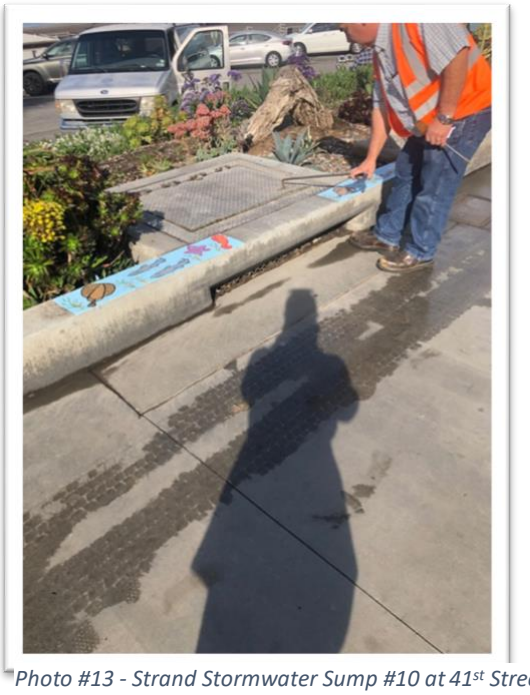


Photo #13 - Strand Stormwater Sump #10 at 41st Street

Photo #14 - Strand Stormwater Sump #11 at 43rd Street

Photo #15 - Inside Strand Stormwater Sump #11 at 43rd Street