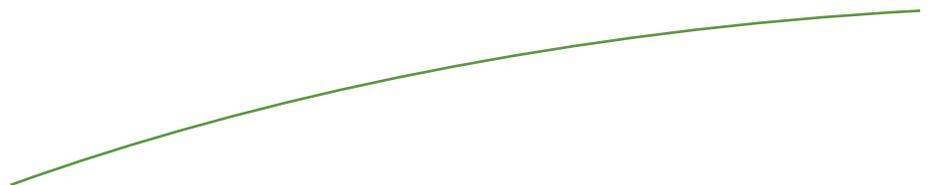




Appendix I

DRAINAGE / WATER QUALITY SUMMARY





February 4, 2015
Job No.: 1496-040

MEMORANDUM

TO: Steve Nuedecker, Resource Balance, Inc.
Dave Claycomb, Helix, Inc.

FROM: Greg Miller

CC: Mark Butler, Integral Communities
Glenn Brown, Integral Communities

SUBJECT: Drainage / Water Quality Summary
Gateway Station West
Newark, California

Purpose

The Purpose of this memorandum is to provide a summary of the proposed drainage and storm water quality systems for Gateway Station West to assist with the CEQA Consultant's understanding of the project. Dam Inundation, Tsunami, Seche and Mudplow were addressed in the EIR for the Dumbarton TOD Specific Plan and there is no new or additional information with respect to those issues. Information regarding water quality issues related to hazardous material contamination may be available from Jym Schwartz at Haley & Aldrich.

Watershed Area

The Dumbarton TOD Specific Plan Area lies within the Plummer Creek Watershed which drains to the San Francisco Bay. This watershed is approximately 1,400 acres and extends easterly to the vicinity of Fremont Boulevard on the east side of Interstate 880. Gateway Station West (The Project Site) lies in the lower portion of this watershed and drains to an unnamed tidal slough just upstream from Plummer Creek.

Existing Facilities

The Plummer Creek Watershed lies within Zone 5 of the Alameda County Flood Control and Water Conservation District (ACFC). Zone 5 facilities within the Dumbarton TOD include the F1 Channel along the southerly boundary and the F6 Ditch along the easterly boundary, which are improved man made channels. In addition, the City of Newark has existing storm drains, ranging in size from 18" to 36" in diameter in Willow Street and Enterprise Drive.

The Project Site is largely undeveloped and does not have an improved storm drainage system. Stormwater runoff currently sheet flows to an existing swale along the westerly boundary that flows to the southwest corner of the property. There is a sheet pile across the swale to prevent tidal water from backing up into the Project Site and a culvert just below it that discharges into a tidal slough that flows into Plummer Creek and then to the San Francisco Bay.

FEMA Flood Designation

The FEMA flood designation for the Project Site is shown on the flood insurance rate map, F.I.R.M. Panel 06001C0443G, dated August 3, 2009. The Project Site is in three different zones; Zone X, Zone X shaded and Zone AE (EL11). Zone X is not a high risk flood hazard area and is for areas outside of the 500 year flood plain. Zone X shaded is not considered a high risk flood hazard area and is for areas inside the 500 year flood plain or inside the 100 year flood plain, but with depths less than one foot. Zone AE (EL11) is considered a high risk flood hazard area or commonly the 100 year flood zone and is for areas within the 100 year flood plain with a base flood elevation of 11 (NAVD 88).

City of Newark Elevation / Fill Requirements

Portions of the Project Site are within Special Flood Hazard Area AE (EL11) which has a 100 year base flood elevation of 11 (NAVD 88) or 8.24 (NGVD 29). The City of Newark has adopted flood elevation standards for lands within special flood hazard areas as defined by FEMA. These standards require that building pads of all occupied structures have a minimum elevation of 11.25 feet (NGVD29) and a finished floor elevation, a minimum of, 6 inches above the building pad (Section 15.40.51 Newark Municipal Code). In addition, the City requires that the top of curb grades for new residential streets be no less than elevation 10.0 (NGVD29) throughout the City (Section 16.08.06 Newark Municipal Code). These standards are more stringent and provide a greater level of protection than that required by FEMA.

The preliminary Grading and Drainage Plan which is included in the Vesting Tentative Map package complies with these standards and will result in the entire developed portion of the Project Site being elevated above the 100 year flood plain.

Letter of Map Revisions (LOMR)

FEMA has a process to amend or revise the flood insurance rate maps. A request for a Letter of Map Revision (LOMR-Fill) be filed with FEMA upon the completion of project rough grading which will raise the developed portion of the Project Site above the base flood elevation. The approval of this request will remove those portions of the Project Site from Zone AE (EL11) and re-designate them Zone X.

Pre and Post Project Impervious Area

There are very little existing impervious surfaces on the Project Site. The project will result in an increase in impervious area from 5,260 sf± for the pre-project condition to 1,048,378 sf± for the post-project condition.

Pre and Post Project Stormwater Runoff

The amount of stormwater runoff, among other things, is proportional to the amount of impervious area, i.e. with all other factors equal, an increase in impervious area will result in an increase in stormwater runoff. In addition to an increase in impervious area, the post project condition also includes additional drainage area from the adjacent Ashland and FMC properties as planned in the Dumbarton TOD Specific Plan. The stormwater runoff from the adjacent Torian project has been design to discharge to the existing Wildland properties south of the Project Site. The pre and post project stormwater runoff rates were calculated using the rational method and ACFC design criteria at the southwest corner of the Project Site. The pre and post project stormwater runoff rate from a 15 year storm is 24.2 cfs and 53.4 cfs.

Proposed Facilities

The Project Site is located in Shed 2 as described in the Dumbarton TOD Specific Plan and EIR. Shed 2 was previously planned to drain to Plummer Creek and not to the ACFC F1 Channel.

The Project Site, and adjacent Ashland and FMC properties, will drain to Plummer Creek as described in the Dumbarton TOD Specific Plan and EIR. The adjacent Torian Property has been designed to drain to the Wildlands property located to the south of the Project Site. The Project Site is located at the bottom of the Plummer Creek watershed and will drain directly to a tidal slough connected to Plummer Creek and the San Francisco Bay. Standard practice for these conditions, and as described in the Specific Plan and EIR, such that the project does not require a detention basin which would only delay the peak stormwater runoff and compound it with stormwater runoff from upper portions of the watershed.

The proposed facilities include a storm drain system consisting of catch basins, manholes and storm drain mains that will collect and convey stormwater runoff from the Project Site to the two proposed bioretention areas. The stormwater quality design flow will be treated by the bioretention areas and discharged directly into the wetland reserve. Excess stormwater flows will bypass the bioretention areas and be discharged directly into the wetland reserve. The storm drain mains discharging into the wetland reserve will have outfall protection consisting of loose rock rip rap to dissipate and slow down the flow so as to not cause erosion. Stormwater runoff will flow overland and through existing channels in the wetland reserve and be discharged into the existing tidal slough by way of a new culvert near the southwest corner of the property.

The storm drain system will also include a separate storm drain main to convey stormwater runoff from the adjacent Ashland FMC properties. These properties will provide their own water quality treatment so that storm water runoff from these properties can be discharged directly into the wetland reserve and bypass the bioretention areas.

All facilities will be designed in accordance with the City of Newark and ACFC standards.

Storm Water Quality / Hydromodification

Rules / Requirements

The City of Newark uses the C.3 guidelines from the Alameda Countywide Clean Water Program (ACCWP) which are consistent with and used to implement the requirements of the Municipal Regional Storm Water Permit issued by the San Francisco Bay Region of the California Regional Water Quality Control Board.

The current storm water permit for Alameda County requires 100% LID (Low Impact Development) treatment measures for projects receiving their final discretionary approvals after December 1, 2011. The proposed project does not have its final discretionary approvals, so the requirement to have 100% LID treatment measures applies to the project. The permit requires that projects first evaluate Rain Water Harvesting and Reuse, Infiltration and Evapotranspiration using established protocols. If these three items are proven to be infeasible, a project may use Bio-Retention as a storm water treatment measure. CBG has evaluated the potential for using Rain Water Harvesting, Infiltration or Evapotranspiration at this site by completing the City of Newark's Storm Water Checklist and confirmed that they are infeasible and that the project may use Bio-Retention as the primary storm water quality treatment measure.

The current stormwater permit also requires that projects address hydromodification impacts. This requires implementation of measures to ensure that stormwater runoff rates do not change or increase for smaller, more frequent storm events. CBG has evaluated whether the project is required to provide hydromodification mitigation and confirmed that the project is exempt because it is located in a tidally influenced zone.

Special Projects

The current stormwater permit defines special projects and the criteria by which special projects can obtain LID treatment reduction credits which will allow for a portion of the stormwater to be treated with non-LID measures, such as media filters. The permit defines three types of special projects; Category A, B, and C. Categories A and B are for sites less than 2 acres and are not applicable to this project. Category C is for transit oriented developments located within a half mile of a transit hub or within a Priority Development Area (PDA) and also having a minimum density of 25 DU/AC for residential projects and a minimum F.A.R. of 2:1 for commercial and mixed use projects. The project does meet some of the requirements for a Category C special project, but falls short of the minimum density requirements, so it does not qualify as a special project.

Stormwater Control / Management Plan

CBG has prepared a Storm Water Control Plan which is included in the Vesting Tentative Map package and a separate Storm Water Management Plan that illustrates and describes the storm water quality treatment planned for the project.

The plan includes two bioretention areas located at the downstream end of the improved drainage system to treat the required amount of stormwater runoff prior to discharge into the wetland reserve.

The bioretention areas are designed to be near the same elevation as the proposed streets, allowing stormwater to flow into the Reserve via subdrains after passing through the bioretention system. Gravity storm drain pipes will have invert elevations such that it will be necessary to lift the water quality flows up to the surface of the bioretention areas with higher flows bypassing the bioretention areas and flowing directly to the wetland reserve.

A system of smaller sump pumps will be used for this purpose. Sump pumps are readily available, dependable and simple to operate and maintain. The sump pumps will be sized to use a single phase power source and be small enough to be placed inside a typical storm drain structure. Multiple pumps will be used to deliver the water quality flows to the bioretention areas so that the system will not be dependent on a single pump. Each bioretention area will have a minimum of three pumps capable of delivering the design flow with one pump out of service. In addition, each pump will be installed in separate wet wells with separate power sources. An alarm will be installed with each pump that will send an alert signal to the entity responsible for maintaining the system in the case of pump failure. With these measures in place; multiple pumps, standby pumps, individual wet wells, power supply and alarms, the likelihood of a total system failure is remote.

A separate storm drain main will be located in Hickory Street and "A" Avenue to convey stormwater runoff from the adjacent Ashland and FMC Properties directly to the wetland reserve. Those properties would provide their own stormwater treatment prior to discharging to this storm drain main.

Construction Dewatering

Prior studies have indicated that there is a shallow groundwater zone within the Dumbarton TOD Specific Plan Area. The design level geotechnical investigation, prepared by Berlogar Stevens, Associates, for the Project Site, included a large number of borings that indicate groundwater on the Project Site varies from elevation - 3.0 to 4.0 (NGVD 29). The minimum proposed street elevation for the project is 10.0 (NGVD 29). Most parts of most utility systems will be less than 6' deep and above that anticipated groundwater level. However, the sanitary sewer system is anticipated to vary between 6' and 12' deep so that it and deeper portions of the other utility systems may encounter groundwater during construction and require temporary dewatering. Any dewatering at the Project Site would be regulated by ACWD and require a permit in accordance with ACWD Ordinance No. 2010-01. Dewatering activities may also be regulated by other resource agency permits required for the project.

Storm Water Pollution Prevention Plan (SWPPP)

A SWPPP will be prepared during the preparation of Grading and Improvement Plans and will be filed with the State of California in compliance with the NPDES General Permit.

Attachments

1. Watershed and Existing Facilities Exhibit
2. FEMA FIRM Panel 06001C0443G
3. FEMA Flood Map
4. Pre Project Impervious Area Map
5. Post Project Impervious Area Map
6. Pre Project Stormwater Runoff Map
7. Post Project Stormwater Runoff Map
8. Proposed Stormwater Facilities Map
9. Bioretention Area Details
10. Stormwater Management Plan
11. Stormwater Checklist
12. Tentative Map



NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 10. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NINGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from multiple sources. Within the City of Livermore, base map information was derived from digital orthophotos provided by the City of Livermore Engineering Department. This information was produced at scales of 1:1,200 and 1:2,400 with 1-foot pixel resolution from photography dated May 7, 2001. Within the City of San Leandro, base map information was derived from digital orthophotos provided by the City of San Leandro Information Services Department. This information was produced at a scale of 1:2,400 with 1-foot pixel resolution from photography dated April 19, 2003. Additional information was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1991 or later.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://msc.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently destroyed. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

Cross section line
Transect line
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
1000-meter Universal Transverse Mercator grid values, zone 10N
5000-foot grid ticks; California State Plane coordinate system, zone III (FIPSZONE 0403), Lambert Conformal Conic projection
Bench mark (see explanation in Notes to Users section of this FIRM panel)
M 1.5
River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index.
EFFECTIVE DATE OF COUNTY-WIDE FLOOD INSURANCE RATE MAP
August 3, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0443G

FIRM
FLOOD INSURANCE RATE MAP
ALAMEDA COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 443 OF 725
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

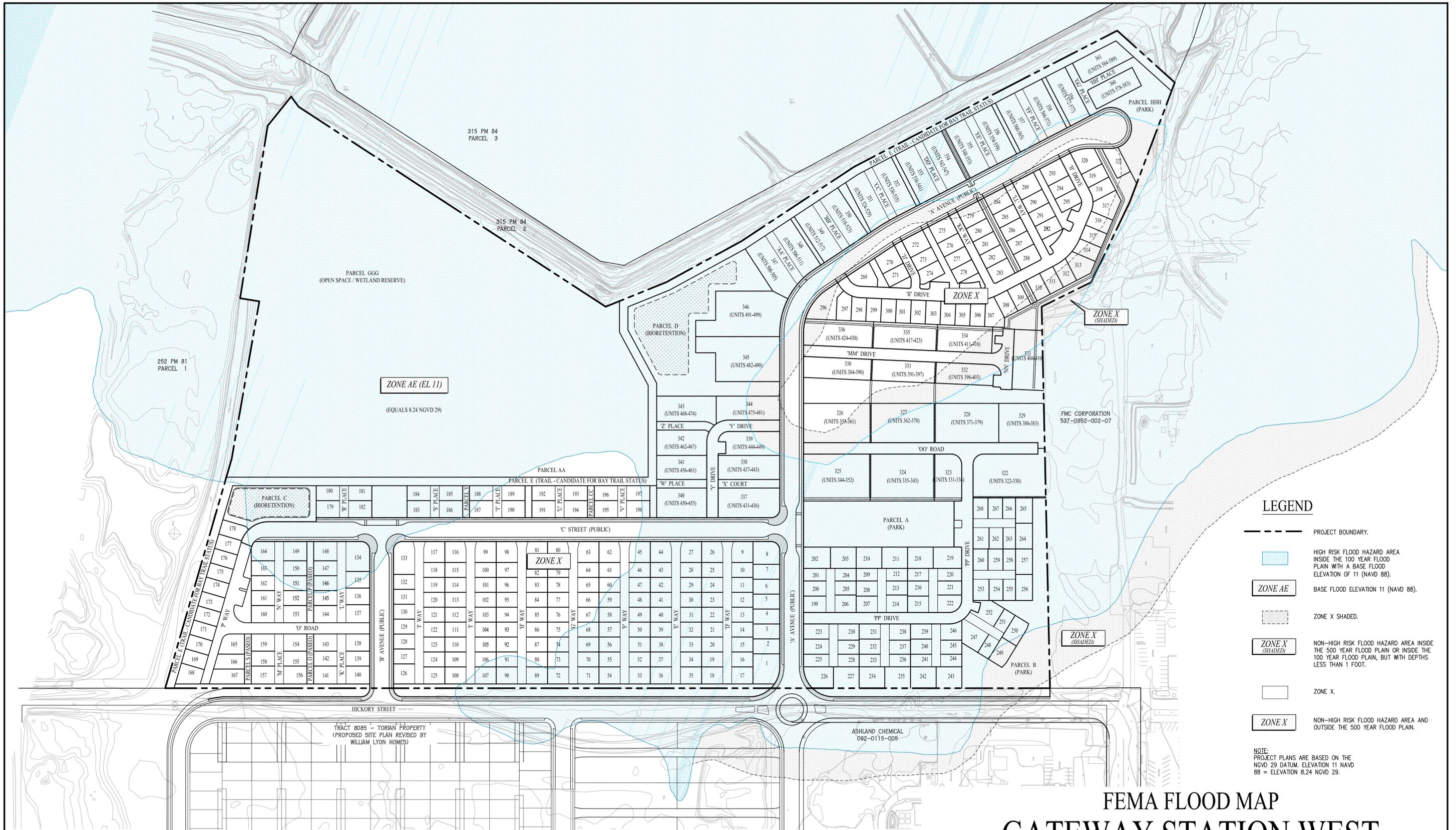
COMMUNITY	NUMBER	PANEL	SUFFIX
FREMONT, CITY OF	060028	0443	G
NEWARK, CITY OF	060009	0443	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06001C0443G

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

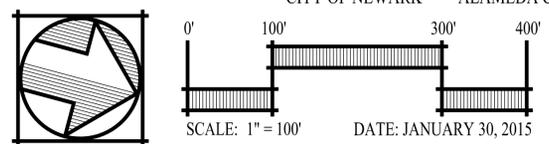


- LEGEND**
- PROJECT BOUNDARY.
 - HIGH RISK FLOOD HAZARD AREA INSIDE THE 100 YEAR FLOOD PLAIN WITH A BASE FLOOD ELEVATION OF 11 (NAVD 88).
 - ZONE AE** BASE FLOOD ELEVATION 11 (NAVD 88).
 - ZONE X SHADED** ZONE X SHADED.
 - ZONE X (SHADED)** NON-HIGH RISK FLOOD HAZARD AREA INSIDE THE 500 YEAR FLOOD PLAIN OR INSIDE THE 100 YEAR FLOOD PLAIN, BUT WITH DEPTHS LESS THAN 1 FOOT.
 - ZONE X** ZONE X.
 - ZONE X** NON-HIGH RISK FLOOD HAZARD AREA AND OUTSIDE THE 500 YEAR FLOOD PLAIN.

NOTE:
PROJECT PLANS ARE BASED ON THE
NGVD 29 DATUM. ELEVATION 11 NAVD
88 = ELEVATION 8.24 NGVD 29.

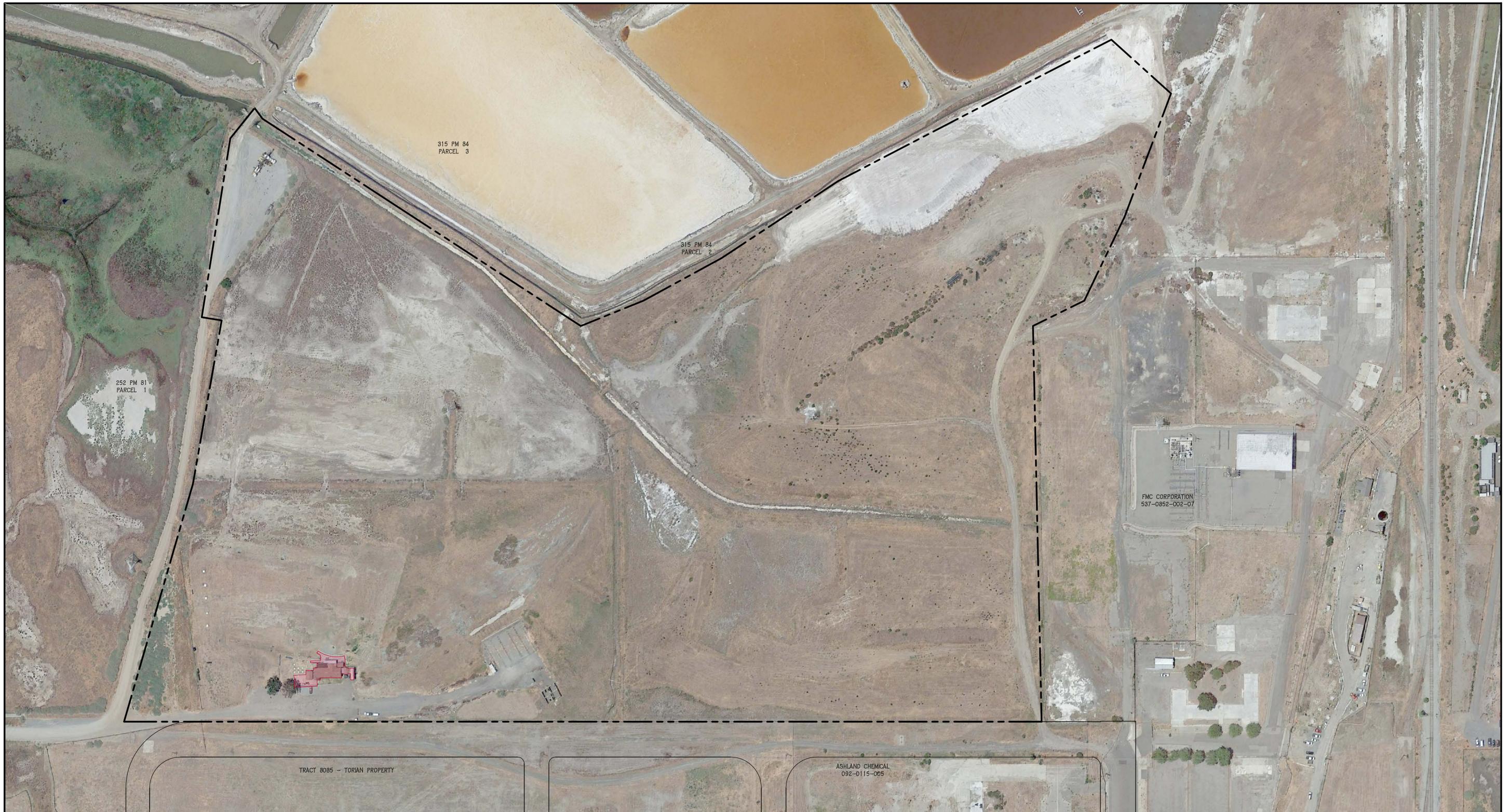
FEMA FLOOD MAP GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA



cbg Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CAMINO RAMON, SUITE 350
SAN RAMON, CALIFORNIA 94583
www.cbamg.com (925) 866-0322



LEGEND

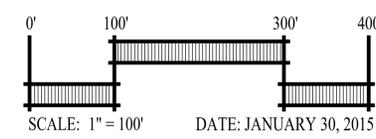
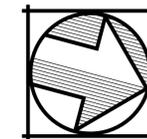


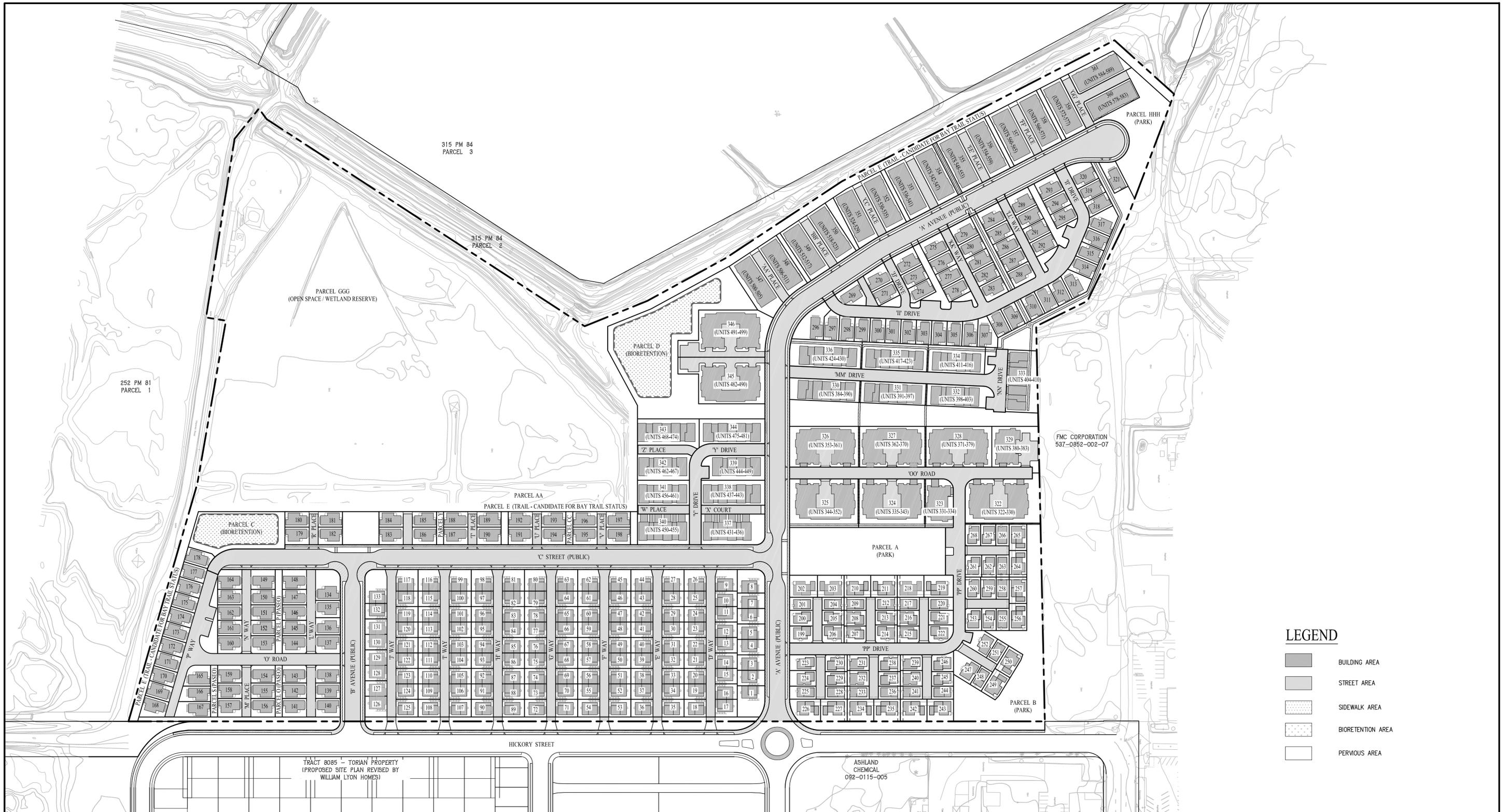
PROJECT BOUNDARY
EXISTING IMPERVIOUS AREA

EXISTING SURFACES SUMMARY			
DESCRIPTION	AREA (sf.)	AREA (ac.)	PERCENTAGE
IMPERVIOUS	5,260	0.12	0.22
PERVIOUS	2,369,958	54.41	99.78

PRE-PROJECT IMPERVIOUS AREA MAP GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

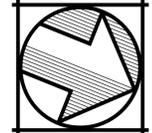
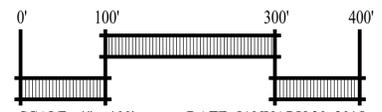




PROPOSED SURFACES SUMMARY			
DESCRIPTION	AREA (sf.)	AREA (ac.)	PERCENTAGE
IMPERVIOUS	1,048,378	24.07	44.1
PERVIOUS	1,326,838	30.46	55.9

POST PROJECT IMPERVIOUS AREA MAP GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

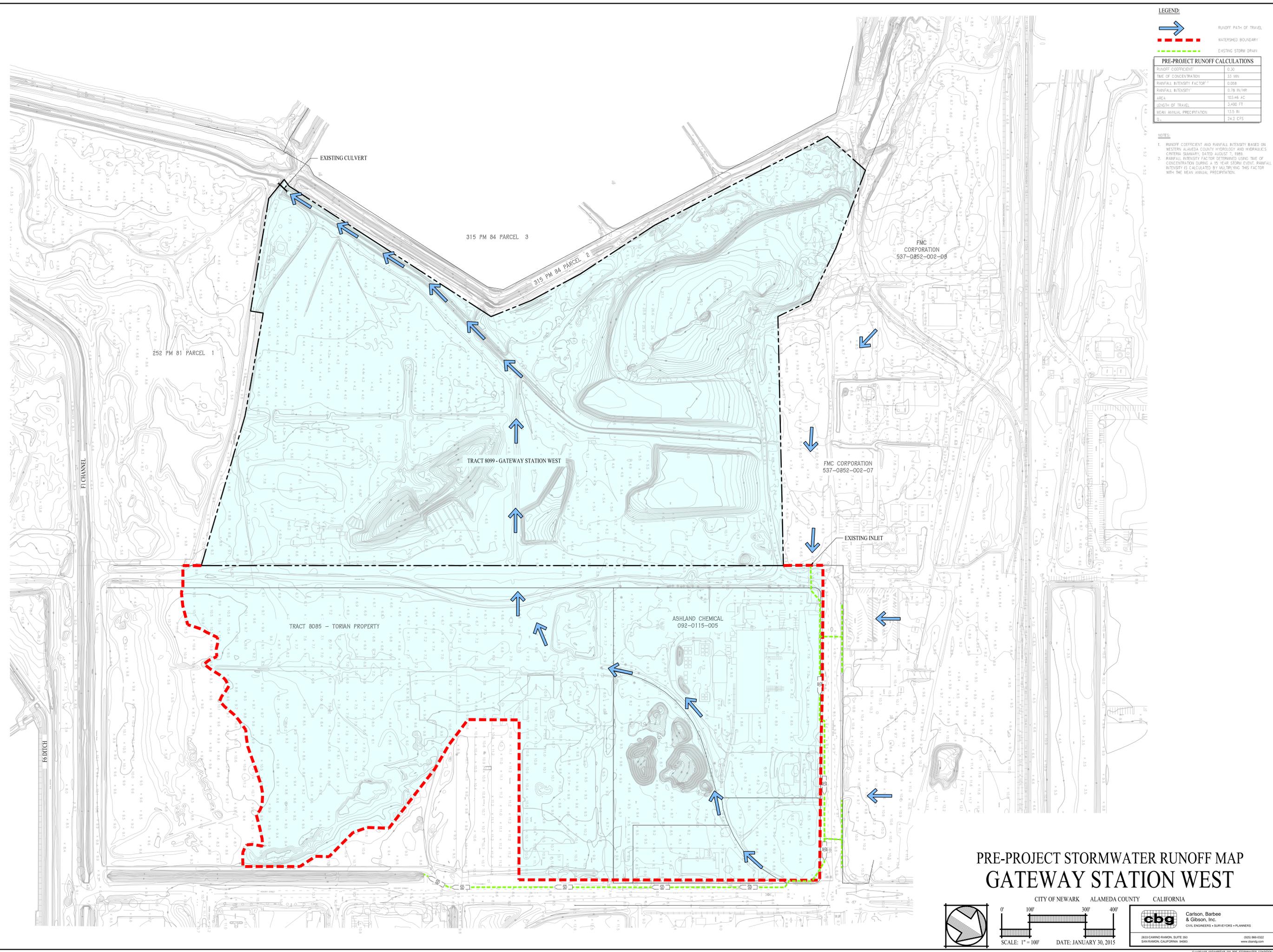



SCALE: 1" = 100' DATE: JANUARY 30, 2015



Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CAMINO RAMON, SUITE 350
SAN RAMON, CALIFORNIA 94583 (925) 866-0322
www.cbamg.com



LEGEND:

- RUNOFF PATH OF TRAVEL
- WATERSHED BOUNDARY
- EXISTING STORM DRAIN

PRE-PROJECT RUNOFF CALCULATIONS	
RUNOFF COEFFICIENT	0.30
TIME OF CONCENTRATION	33 MIN
RAINFALL INTENSITY FACTOR ²	0.058
RAINFALL INTENSITY	0.78 IN/HR
AREA	103.46 AC
LENGTH OF TRAVEL	3,400 FT
MEAN ANNUAL PRECIPITATION	13.5 IN
Q ₁	24.2 CFS

- NOTES:**
- RUNOFF COEFFICIENT AND RAINFALL INTENSITY BASED ON WESTERN ALAMEDA COUNTY HYDROLOGY AND HYDRAULICS CRITERIA SUMMARY, DATED AUGUST 7, 1989.
 - RAINFALL INTENSITY FACTOR DETERMINED USING TIME OF CONCENTRATION DURING A 15 YEAR STORM EVENT. RAINFALL INTENSITY IS CALCULATED BY MULTIPLYING THIS FACTOR WITH THE MEAN ANNUAL PRECIPITATION.

PRE-PROJECT STORMWATER RUNOFF MAP GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

SCALE: 1" = 100' DATE: JANUARY 30, 2015

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 GAMINO RAMON, SUITE 350
SAN FRANCISCO, CALIFORNIA 94133 (925) 866-0322
www.cbgi.com

DATE: 01/30/15

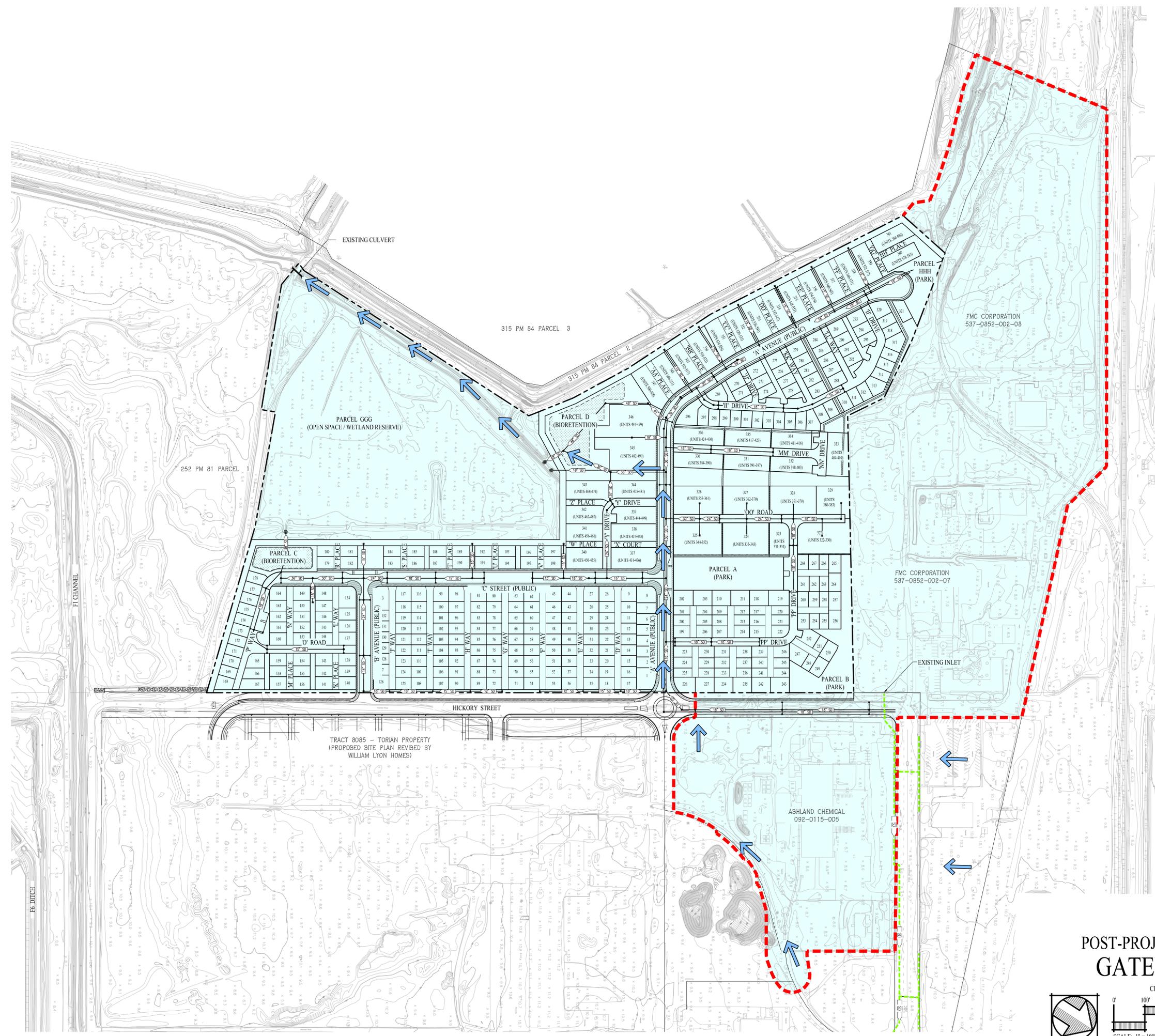
LEGEND:

-  RUNOFF PATH OF TRAVEL
-  WATERSHED BOUNDARY
-  EXISTING STORM DRAIN

PRE-PROJECT RUNOFF CALCULATIONS	
RUNOFF COEFFICIENT	0.70
TIME OF CONCENTRATION	32 MIN
RAINFALL INTENSITY FACTOR ¹	0.059
RAINFALL INTENSITY ²	0.80 IN/HR
AREA	95.30 AC
LENGTH OF TRAVEL	3,270 FT
MEAN ANNUAL PRECIPITATION	13.5 IN
Q ₁	53.4 CFS

NOTES:

- RUNOFF COEFFICIENT AND RAINFALL INTENSITY BASED ON WESTERN ALAMEDA COUNTY HYDROLOGY AND HYDRAULICS CRITERIA SUMMARY, DATED AUGUST 7, 1989.
- RAINFALL INTENSITY FACTOR DETERMINED USING TIME OF CONCENTRATION DURING A 15 YEAR STORM EVENT. RAINFALL INTENSITY IS CALCULATED BY MULTIPLYING THIS FACTOR WITH THE MEAN ANNUAL PRECIPITATION.



POST-PROJECT STORMWATER RUNOFF MAP GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA





SCALE: 1" = 100'

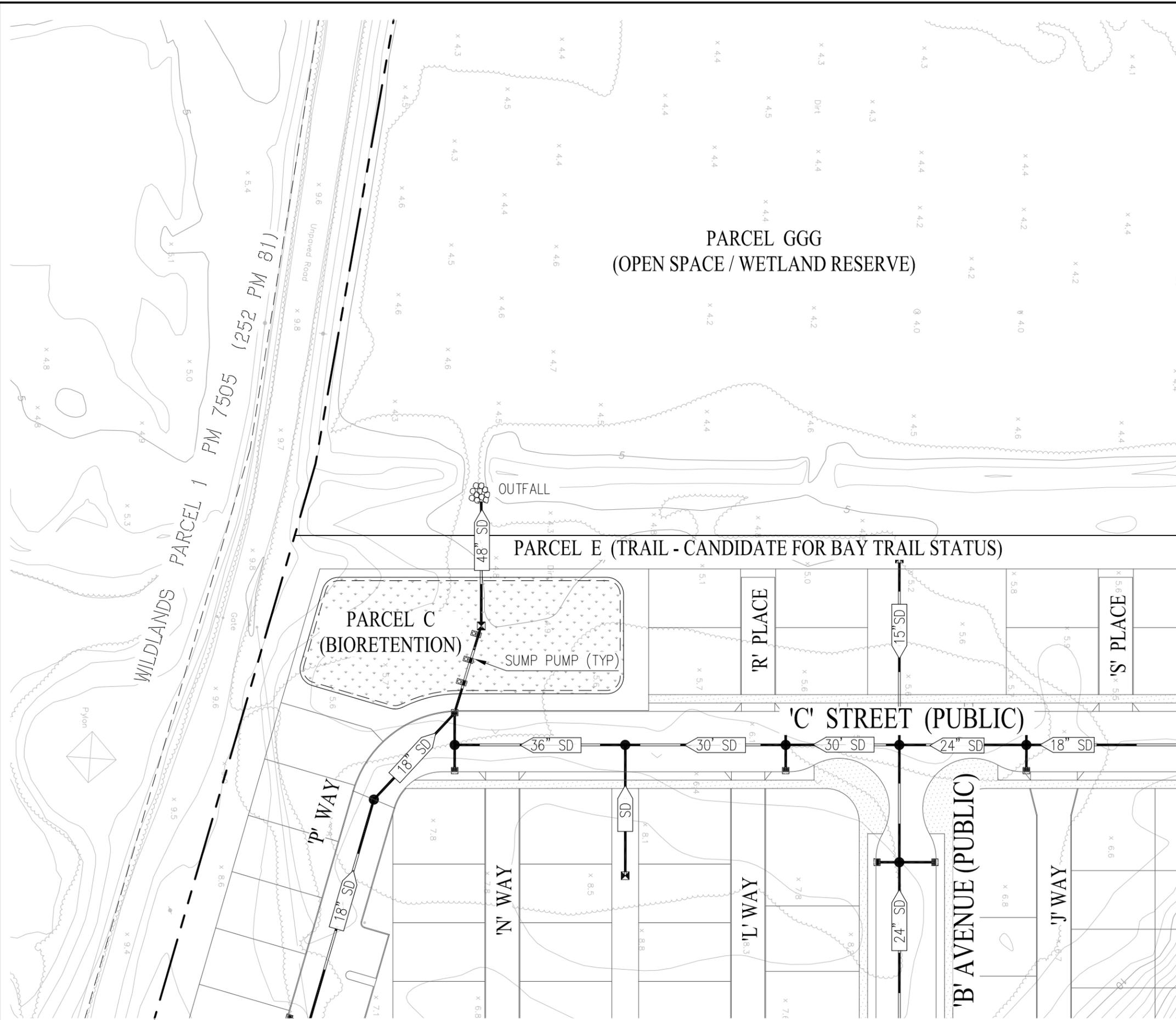


Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CANNON RAMON, SUITE 350
SAN FRANCISCO, CALIFORNIA 94083

(925) 866-0322
www.cbgi.com

DATE: JANUARY 30, 2015

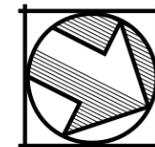


CONCEPTUAL BIORETENTION PLAN GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

DATE: JANUARY 30, 2015

SCALE: 1"=60'

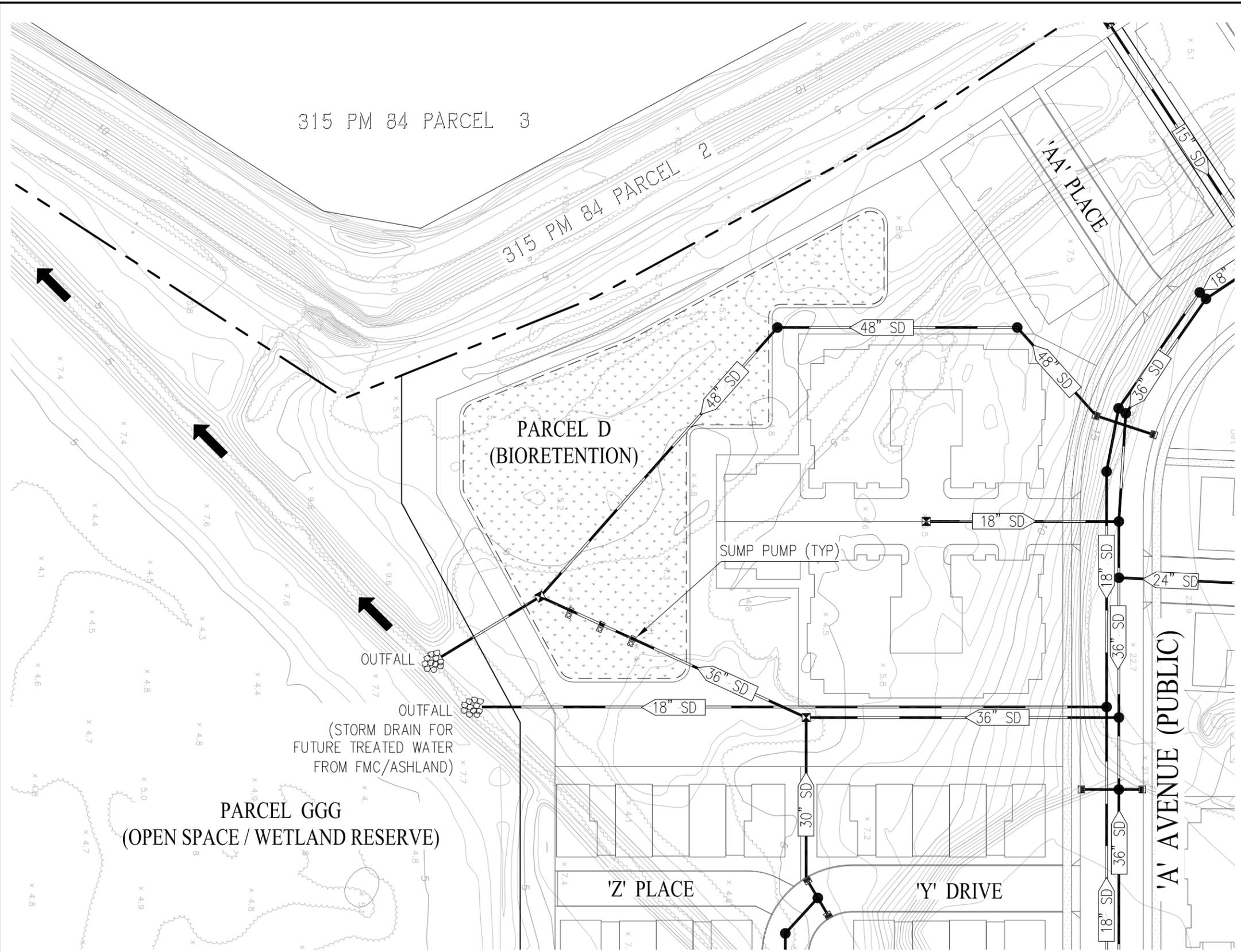


cbg Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CAMINO RAMON, SUITE 350
SAN RAMON, CALIFORNIA 94583

(925) 866-0322
www.cbmg.com

SHEET NO.
1
OF 3 SHEETS

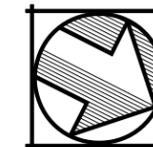


CONCEPTUAL BIORETENTION PLAN GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

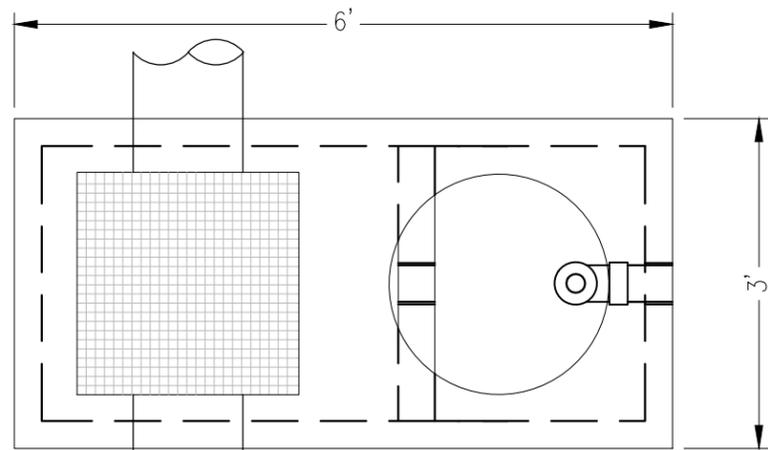
DATE: JANUARY 30, 2015

SCALE: 1"=60'



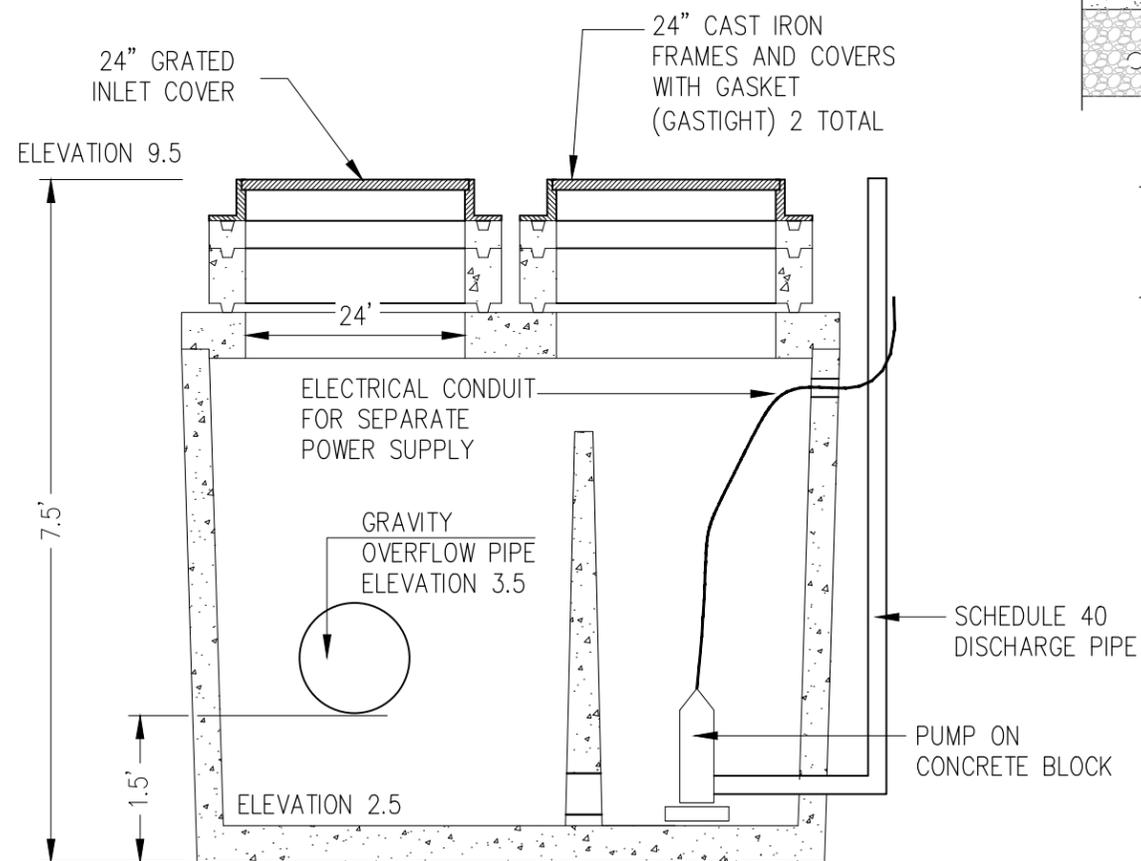
	Carlson, Barbee & Gibson, Inc. CIVIL ENGINEERS • SURVEYORS • PLANNERS
	<small>2633 CAMINO RAMON, SUITE 350 SAN RAMON, CALIFORNIA 94583</small>

SHEET NO.
2
OF 3 SHEETS



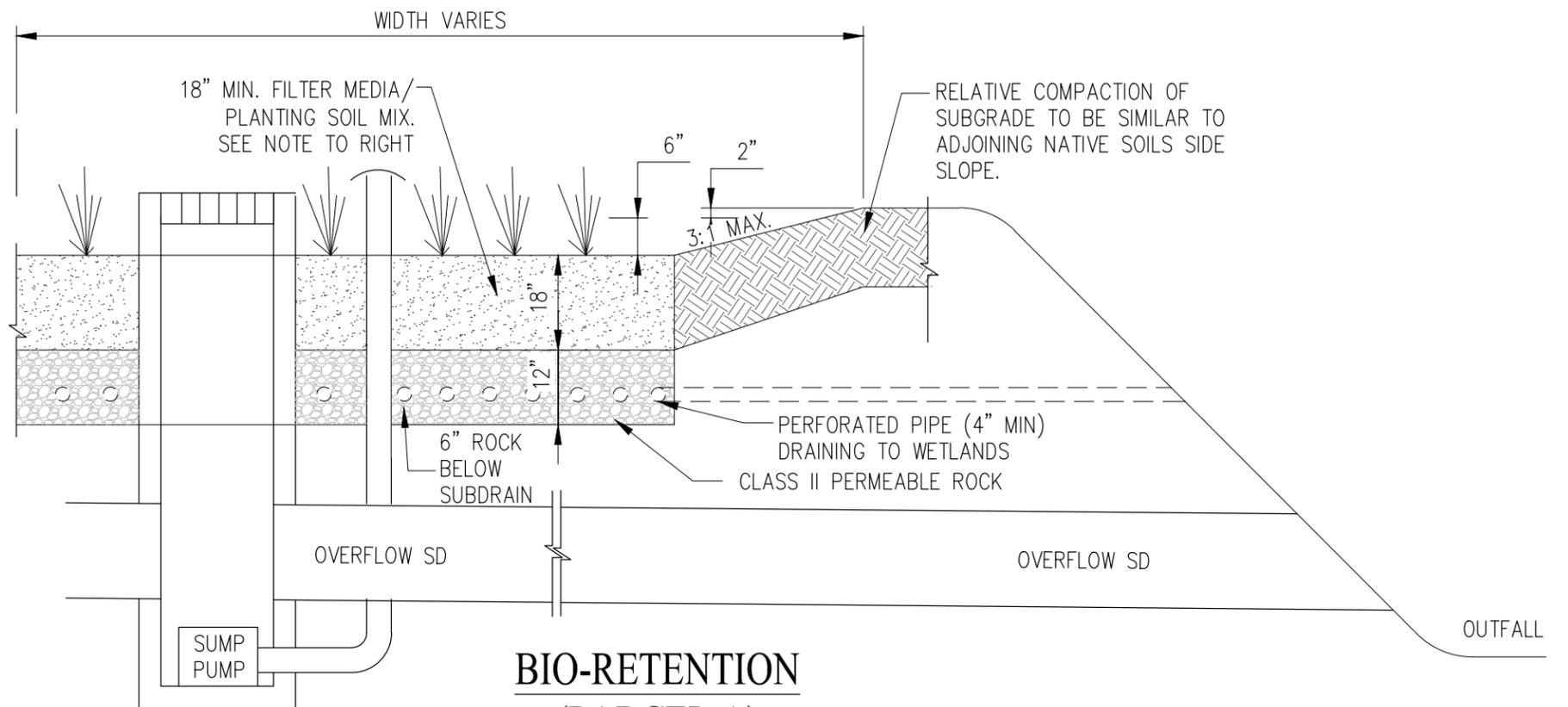
TOP VIEW

(COVERS & RINGS REMOVED)



SIDE SECTION VIEW

INLET (SUMP PUMP)



**BIO-RETENTION
(PARCEL A)**

NOT TO SCALE

CONCEPTUAL BIORETENTION DETAIL GATEWAY STATION WEST

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

DATE: JANUARY 30, 2015

SCALE: NOT TO SCALE

	Carlson, Barbee & Gibson, Inc. CIVIL ENGINEERS • SURVEYORS • PLANNERS
	<small>2633 CAMINO RAMON, SUITE 350 SAN RAMON, CALIFORNIA 94583</small>

SHEET NO.
3
OF 3 SHEETS