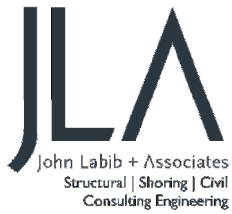


APPENDIX H
HYDROLOGY AND WATER QUALITY STUDY



514 Prospect Ave
Beach City Health District
Hydrology and Water Quality Report
February 11, 2021

PREPARED BY:

John Labib & Associates
319 Main Street
El Segundo, CA 90245
(213) 239 - 9700

SECTION	PAGE
1. Project Description	1
2. Surface Hydrology	1
3. Low Impact Development Measures.....	2-3
4. Sustainability.....	4
5. Conclusion.....	5

APPENDICES

- Appendix A Hydrology Maps
- Appendix B Hydrology Calculations

1. Project Description

Existing Condition

The project site is approximately 10.38 acres and is located at 514 Prospect Ave in the City of Redondo Beach. Refer to Appendix A for the Project Vicinity Map. The lot currently consists of two Medical Office Buildings, a Hospital, a utility equipment building, one above ground parking structure and one subterranean parking structure. The remainder of the site is paved for at grade parking areas with various landscape areas intermittently spaced throughout the site. The northern most part of the property is undeveloped at the current time.

Proposed Condition

The proposed project is a partial redevelopment of the existing property. A new medical facility building, wellness facility, and parking structure are proposed and will replace the existing hospital, parking garage, and utility equipment building. The medical office buildings and subterranean parking structure will remain for the proposed project. Other site features will include open landscape areas for common use, paved walkways, and roads, as well as a new utility yard.

2. Surface Hydrology

Surface hydrology is regulated by the Cities of Redondo Beach and Torrance, Los Angeles County Department of Public Works (LACDPW) and State of California Water Resources Control Board. Requirements include compliance with the State of California General Permit for storm water discharges during construction for projects with over one acre of land disturbance, and post-construction compliance with the Los Angeles County Department of Public Works Hydrology Manual and City of Redondo Beach Low Impact Development (LID) Standards.

Existing Hydrology

The existing project drainage sheet flows towards the perimeters of the site. The portion of the site draining to the east, is collected in a catch basin located towards the northeast portion of the project where runoff will be collected and discharged to Flagler In. The portion of the site draining westerly, sheet flows across the site until it is eventually discharged to the curb and gutter in Prospect Ave. The existing project does not have any permanent BMPs on-site for stormwater quality and mitigation.

The site is located within the Federal Emergency Management Agency (FEMA) Flood Zone X, which denotes an area where the potential for flooding is minimal. There are no surface

water bodies in the project vicinity. See Appendix A for the FEMA Flood Map for the project location.

The LACDPW Hydrology Manual requires that a storm drain conveyance system be designed for a 25-year storm event and that the combined capacity of a storm drain and street flow system accommodate flow from a 50-year storm event. The existing site's peak flow generated from a 50-year storm event is approximately 20.0 cubic feet per second. See Existing Hydrology Exhibit in Appendix A and Existing Hydrology Calculation in Appendix D. The street flow capacity in Prospect is approximately 225 cfs.

Proposed Hydrology

The proposed project will be designed to retain and infiltrate the first flush from the 85th percentile storm. The existing catch basin and storm drain outlet will be cut and capped and site run-off will be redirected to the water quality BMP instead of a direct discharge into Flagler Ln. This will greatly reduce the impact from the proposed project on the municipal storm drain system.

Larger storm events producing more runoff than the design storm (85th percentile) will overflow from the infiltration BMP to Prospect Ave and eventually conveyed through to the municipal storm water system. Proposed site run-off will be conveyed through both methods of sheet flow and pipe conveyance to the infiltration BMP. The Northern portion of the project at the corner of Flagler Ln and Berryl St may require a pump to convey the runoff to the proposed infiltration BMP. Schematic pipe conveyance system and on-site stormwater infrastructure can be found in Appendix A. The 85th percentile storm will be mitigated in compliance with the City of Redondo Beach Low Impact Development standards and requirements. The proposed and existing hydrologic conditions can be seen in Appendix A.

The proposed development will also decrease the existing impervious area by adding additional landscape areas, permeable paving pathways, and removing the existing large footprint of asphalt at grade parking lots. The proposed project will reduce the volume of runoff and furthermore will decrease the runoff that will be discharged to the City Municipal Conveyance system by implementing BMPs that will treat and retain the 85th percentile storm water volume on site. Due to the additional storm water treatment requirements and increase in pervious area, the project's impact on the surface water hydrology is considered less than significant.

Table 1 – Runoff Volume by Storm Event size Comparison

24-Hr Clear Runoff Volume [cu-ft]					
	85th	10 yr	50 yr	100 yr	100 yr %increase
Existing	21,161	105,038	147,568	165,791	-
Phase 1	15,582	77,720	109,979	123,920	-25.3%
Phase 2	17,377	86,523	122,053	137,370	-17.1%

Table 2 – Runoff Flow by Storm Event size Comparison

Clear Peak Flow Rate [cfs]					
	85th	10 yr	50 yr	100 yr	100 yr %increase
Existing	1.4	12.0	20.0	24.1	-
Phase 1	0.9	8.8	16.3	20.0	-17.0%
Phase 2	1.1	10.0	17.1	20.8	-13.5%

3. Low Impact Development Measures

The State of California Water Resources Control Board’s National Pollutant Discharge Elimination System (NPDES) requirements mandate that storm water Best Management Practices (BMPs) be implemented during Project construction including Storm Water Pollution Prevention Plan (SWPPP) for projects disturbing one acre or more. The Project will implement various mitigation measures during the process of construction to mitigate any sediment, debris, and or toxic material/waste leaving the project site. The proposed development will also need to treat and retain the first flush or the 85th percentile storm event per the City of Redondo Beach Low Impact Development (LID) standards.

Existing Water Quality Management

Based on our research and existing records, there is currently no storm water BMPs on the existing site.

Proposed Water Quality Management

Permanent post-construction storm water management mitigation will be implemented per the County of Los Angeles Department of Public Works Low Impact Development Standards Manual, dated February 14, 2014.

LID (Low Impact Development) is a storm water management strategy with goals to mitigate the impacts of increased runoff and storm water pollution as close to its source as possible. Per the latest LID guidelines new construction developments must treat storm water through infiltration, capture and reuse, or biofiltration.

Considering the proposed development's footprint and the results from the Geotechnical exploration performed in 2016 we anticipate an infiltration system will be used to mitigate the required LID volume. Existing Groundwater was not encountered up to depths more than 60' and no geological restrictions were noted in the exploration for the proposed project. This system will be sized to retain and infiltrate the 85th percentile storm into the groundwater. Any flows larger than the design storm will be conveyed to Prospect Ave where it will be conveyed through the curb and gutter to the nearest city catch basin. The percolation tests performed in 2016 by Converse Consultants showed in-situ infiltration rates in the range of 3-4 inches per hour which exceeds the counties minimum infiltration rate of 0.3 inches/ hour.

The infiltration system can be either a drywell or infiltration trench configuration but both systems will operate by recharging the groundwater with treated stormwater runoff. The proposed project will provide new stormwater treatment and mitigation features that will improve the water quality and decrease the flow conveyed in the existing municipal storm drain system. The proposed project will only improve the existing hydrologic condition and water quality and will have no impact on any of the existing infrastructure.

4. Sustainability

The proposed project will implement several sustainability features. Stormwater runoff will be treated prior to recharging the groundwater through infiltration means. Only large storm events more than the Low Impact Design criteria will discharge to the street and be conveyed by the municipal storm drain system. All common storm event runoff will be treated and infiltrated on-site. Permeable paving will be used for a fire access road in lieu of concrete or asphalt paving further reducing the runoff generated by the proposed project. The proposed project also reduces the impermeable footprint by approximately 20% further reducing the generated runoff from existing to proposed conditions. Existing drainage patterns and grades have been maintained as much as possible in the proposed condition.

5. Conclusion

The proposed project will reduce the stormwater runoff volumes produced by the site by creating more pervious areas for stormwater to infiltrate back into the groundwater system. The project will also implement temporary and permanent mitigation features that will further reduce the runoff generated by the proposed project. The proposed project will only improve the water quality and will positively impact the existing City Storm water system by reducing runoff flows and volumes.

APPENDIX A
Hydrology Maps

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 FIRMA. Users should be aware that BFEs shown on the FIRMA 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 FIRMA for purposes of construction and/or floodplain management.

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

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 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMA for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRMA.

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 1959 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, NIMS-18
National Geodetic Survey
SSMC-3, #3027
1215 East-West Highway
Silver Spring, MD 20910-3282

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 FIRMA was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1984 or later and from National Geospatial Intelligence Agency imagery produced at a scale of 1:5,000 from photography dated 2002 or later.

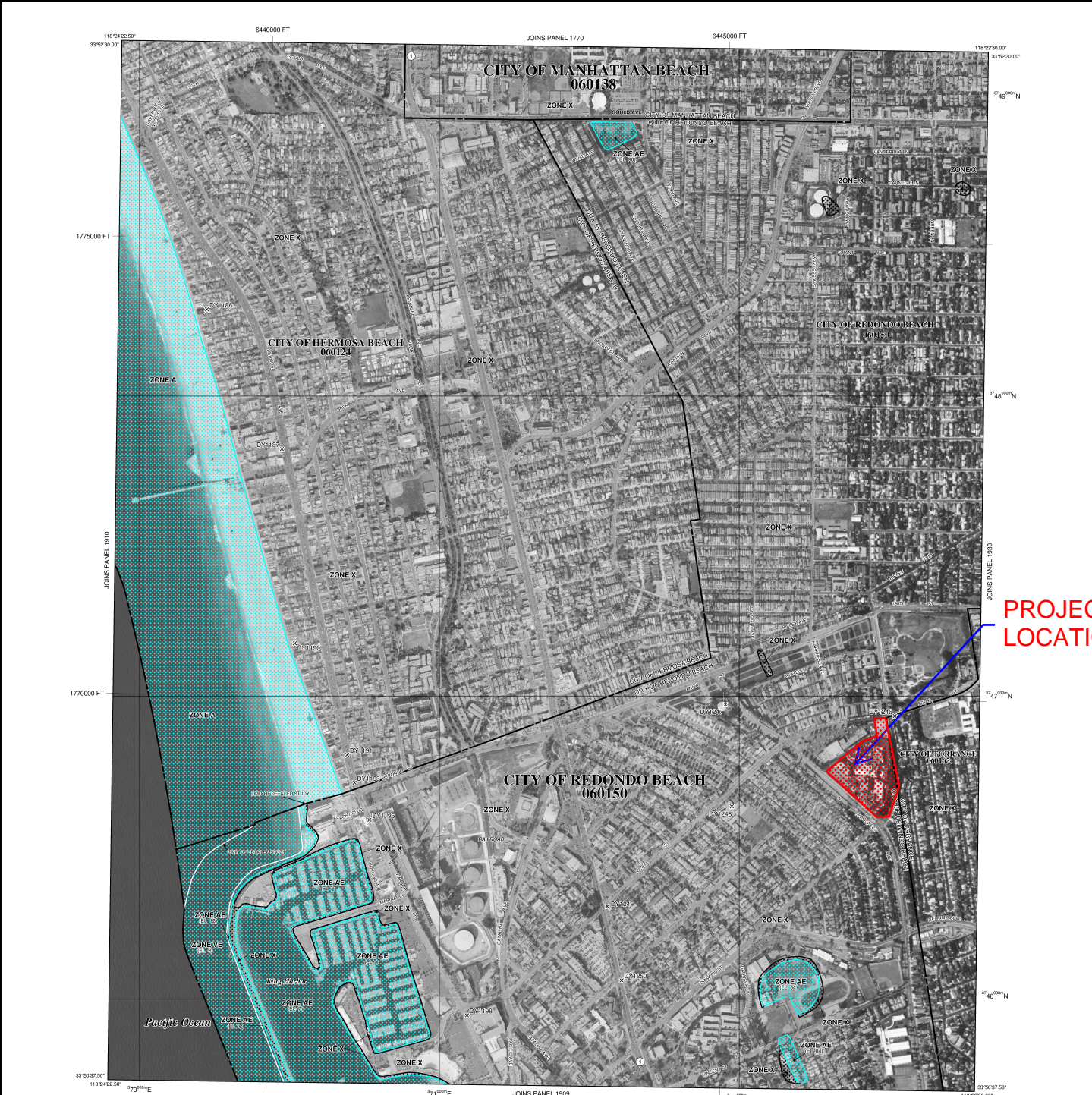
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRMA for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRMA may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report which contain authoritative hydraulic data may reflect stream channel details 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 of the county 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 FIRMA. 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://www.msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

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

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled 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, AP, 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 3 to 3 feet (usually areas of ponds); Base Flood Elevations determined.

ZONE AO Flood depths of 3 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of shallow bay 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 identified. Zone AR indicates that the former flood control system is being removed to provide protection from the 1% annual chance or greater flood.

ZONE AP 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

ZONE X 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, including Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation and value; elevation in feet*

(EL 987)

Base Flood Elevation value where uniform within zone; elevation in feet

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

△ Cross section line

⊖ Transient line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-foot Universal Transverse Mercator grid values, zone 11

6000000 FT State Plane coordinate system, V zone (FIPS ZONE 4605), Lambert Conformal Conic

DX5510, M1.5 Bench mark (see explanation in Notes to Users section of this FIRMA panel)

• M1.5 River Mile

MAP REPOSITORIES

Refer to Map Repository list on Map Index

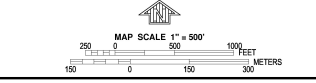
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 26, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

PROJECT LOCATION

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.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1907F

FIRM FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1907 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	HERMOSA BEACH CITY OF	060124	1907	F
	MANHATTAN BEACH CITY OF	060138	1907	F
	REDONDO BEACH CITY OF	060150	1907	F
	TORRANCE CITY OF	060165	1907	F

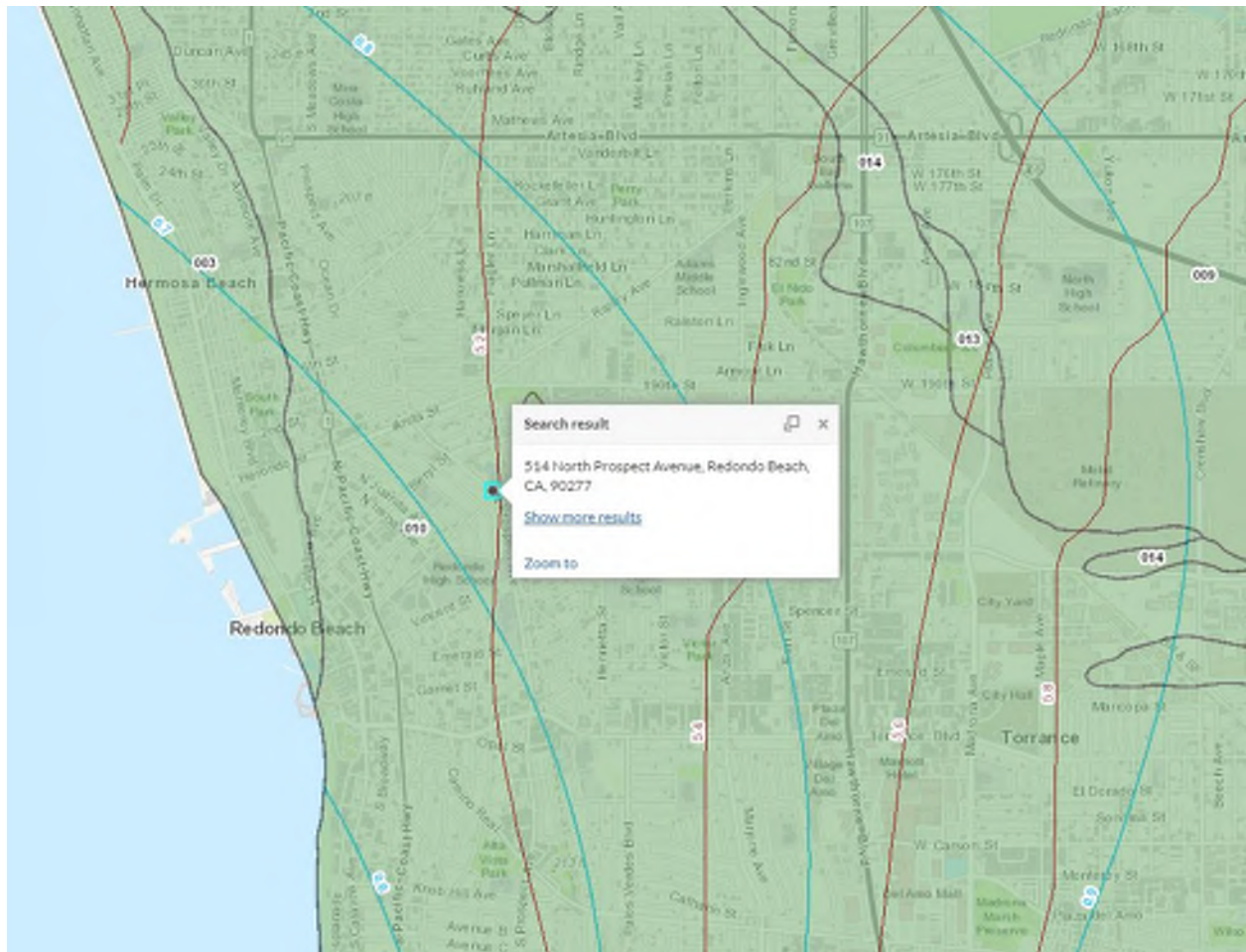
Notes to User: The Map Number shown above should be used when referring to this map. The Community Number shown above should be used on insurance applications by the subject community.

MAP NUMBER 06037C1907F

EFFECTIVE DATE SEPTEMBER 26, 2008

Federal Emergency Management Agency

LA County Hydrology Map



Legend

Hydrology GIS

50yr Two Tenths (Rainfall)



Soils 2004



Final 85th Percentile, 24-hr
Rainfall



BERYL STREET

NOT A PART OF THIS SURVEY

NOT A PART OF THIS SURVEY

FLAGLER LANE

PROJECT SITE AREA = 452,174 SF
PERVIOUS AREA = 81,391 SF
IMP AREA = 370,782 SF
%IMP = 82%

DIRECTION OF SURFACE FLOW

EXISTING CATCH BASIN AND STORM DRAIN PIPE DISCHARGE TO FLAGLER LANE CULVERT

TOWERS ST.

CARNELIAN STREET (VACATED)

PROSPECT AVENUE

PARCEL MAP NO. 13030

1

DIAMOND ST.

LEGEND

- EXISTING BUILDING
- CONCRETE
- BRICK
- WOOD DECK
- +106.76 EXISTING ELEVATION
- EXISTING CONTOUR
- BLOCK WALL
- EXISTING FENCE
- BCR BEGINNING OF CURB RETURN
- CL CENTERLINE EASTERN
- FD FOUND
- FF FINISH FLOOR
- FH FIRE HYDRANT
- FL FLOW LINE
- GFF GARAGE FINISH FLOOR
- GM GAS METER
- GW GUY WIRE
- LAT LEAD AND TAG
- MH MANHOLE
- NLY NORTHERLY
- PC PROPERTY CORNER
- PL PROPERTY LINE
- PP POWER POLE
- SAW SPIKE AND WASHER
- SLY SOUTHERLY
- SPK SPIKE
- SSMH SANITARY SEWER MANHOLE
- STK STAKE
- STL STREET LIGHT
- TC TOP OF CURB
- TW TOP OF WALL
- TX TOP OF DRIVEWAY APRON
- WLY WESTERLY
- WM WATER METER

NOTE: ALL SETBACK DIMENSIONS SHOWN ARE MEASURED TO EXTERIOR SURFACE OF BUILDINGS UNLESS OTHERWISE NOTED.

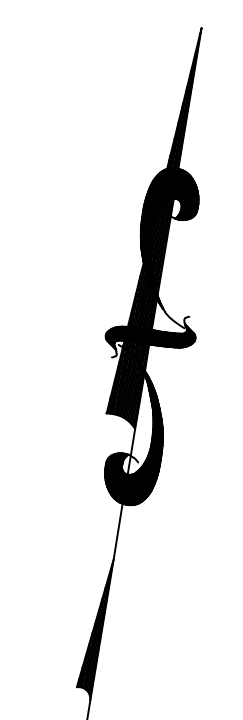
BOUNDARY MONUMENTS ARE NOT NECESSARILY SET ON PROPERTY CORNERS. PLEASE REFER TO THE NOTATION ON THE PLANS FOR OFFSET DISTANCES. IF THERE ARE ANY QUESTIONS, PLEASE DO NOT HESITATE TO CONTACT DENN ENGINEERS FOR CLARIFICATION AT: (310) 542-8433, M-F 8:00 AM TO 5:00 PM.

LINE TABLE

Course	Bearing	Distance
L1	N 54°27'45" E	18.22'
L2	N 68°41'19" E	36.23'
L3	N 56°07'14" E	33.64'
L4	N 61°10'11" E	30.80'
L5	N 47°58'42" E	21.16'
L6	N 34°45'39" W	2.57'
L7	S 25°00'14" W	19.72'
L8	S 33°30'59" W	47.04'
L9	S 25°58'25" W	63.88'
L10	S 34°29'00" W	72.68'
L11	S 43°48'19" W	8.66'
L12	N 85°19'44" W	31.63'
L13	N 63°20'39" W	10.45'
L14	N 58°11'03" W	6.35'

CURVE TABLE

Curve	Radius	Length	Delta
C1	15.00'	12.77'	48°47'35"
C2	15.00'	23.50'	89°46'17"
C3	15.00'	29.02'	110°51'36"



SCALE: 1" = 40'

JOB ADDRESS
514 N. PROSPECT AVE.
REDONDO BEACH, CA.

LEGAL DESCRIPTION
PARCEL 1
P.M. NO. 13030
P.M.B. 144-3
APN 7502-017-901

NOTE: TOPOGRAPHY BASED ON AERIAL PHOTOGRAMMETRY PROVIDED BY OLYMPIC MAPPING.

NOTE: A TITLE POLICY WAS NOT PROVIDED TO DENN ENGINEERS AT THE TIME OF THIS SURVEY. THEREFORE, DENN ENGINEERS DOES NOT GUARANTEE THE LEGAL DESCRIPTION OF THIS PROPERTY SURVEYED NOR DOES IT REFLECT OR DELINEATE ANY EASEMENTS THAT MAY BE ON SAID PROPERTY.

SURVEY AND TOPOGRAPHY
FOR
KELLY OLIN
BEACH CITIES HEALTH DISTRICT
514 N. PROSPECT AVE.
REDONDO BEACH, CA 90277
310-374-3426 EXT. 141

DRAWN BY: CE CHECKED BY: TS DATE: 03-07-2013

ANY CHANGES OR MODIFICATIONS MADE TO THIS PLAN WITHOUT WRITTEN CONSENT OF DENN ENGINEERS SHALL RELIEVE DENN ENGINEERS FROM ANY LIABILITY OR DAMAGE RESULTING FROM SUCH CHANGES OR MODIFICATIONS, INCLUDING ANY ATTORNEYS FEES OR COSTS INCURRED IN ANY PROCEEDING THAT DENN ENGINEERS MAY BE JOINED.

GARY J. ROEHL R.C.E. 30826

DENN ENGINEERS

3914 DEL AMO BLVD, SUITE 921 • TORRANCE, CA 90503 • (310) 542-9433

JOB NO. 12-444
SHEET 1 OF 1

PROJECT SITE AREA = 452,174 SF
 PERVIOUS AREA = 195,544 SF
 IMP AREA = 256,630 SF
 %IMP = 57%

→ DIRECTION OF SURFACE FLOW

ESTIMATED EARTHWORK QUANTITIES

REMOVAL AND RECOMPACTION:	0 CUBIC YARDS
CUT:	3,010 CUBIC YARDS
FILL: (FROM EXISTING HOSPITAL BASEMENT)	16,760 CUBIC YARDS
NET (FILL/IMPORT):	13,750 CUBIC YARDS

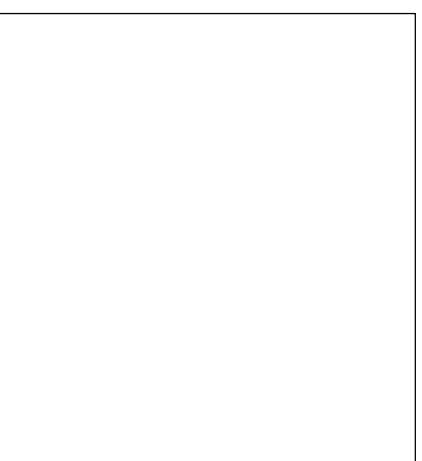
EARTHWORK CALCULATION NOTES:

- ESTIMATED EARTHWORK ABOVE IS BASED ON DESIGN FINISH GRADES TO EXISTING GRADES AND/OR CONTOURS AS PROVIDED ON THE BASE SURVEY. THE ESTIMATED EARTHWORK DOES NOT ACCOUNT FOR THE THICKNESS OF PAVEMENTS, FOUNDATIONS AND SLABS ON GRADE, FOOTINGS, AND CONSTRUCTION MEANS AND METHODS.
- THE ESTIMATED EARTHWORK QUANTITIES DO NOT INCLUDE SHRINKAGE AND/OR EXPANSION FACTORS DUE TO COMPACTION OR OVER EXCAVATION QUANTITIES.
- ESTIMATED EARTHWORK QUANTITIES ABOVE ASSUME THAT ALL ONSITE MATERIALS ARE SUITABLE FOR BACKFILLING. HOWEVER, ACTUAL EXISTING ONSITE MATERIALS AND IMPORTED MATERIALS MUST FIRST BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO INSTALLATION, REMOVAL, REPLACEMENT.
- REMEDIAL GRADING INCLUDES OVEREXCAVATION OF 3' VERTICAL AND 5' HORIZONTAL EXCAVATIONS BELOW ANY PROPOSED FOUNDATION.

▲
 PAUL MURDOCH
 ARCHITECTS

8820 Wilshire Blvd, Suite 330
 Beverly Hills, California 90211
 310 358-0993 F.310 358-9196

THE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE ARCHITECT. NO PART THEREOF SHALL BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT. THESE DRAWINGS OR SPECIFICATIONS SHALL CONSTITUTE CONCLUSIVE EVIDENCE OF THE DESIGN AND SHALL BE RESPONSIBLE FOR ALL DIMENSIONS ON THESE DRAWINGS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS ON THE JOB AND MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS BEFORE PROCEEDING.



319 Main Street
 El Segundo, CA 90245
 Tel: 213.239.9700

JLA Job No. 19725



NO. DATE REVISION

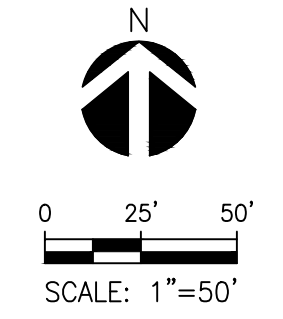
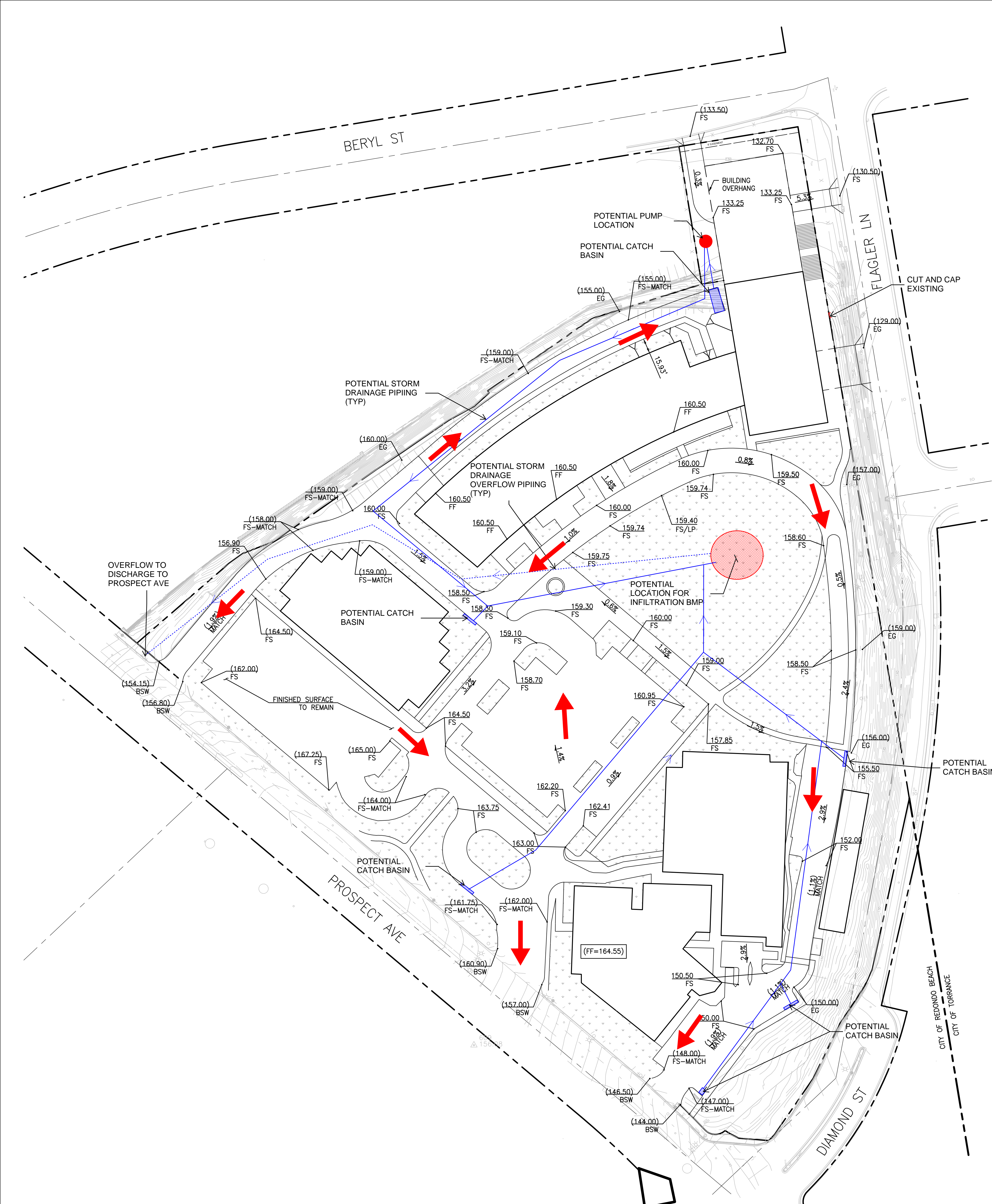
BEACH CITIES HEALTH DISTRICT HEALTHY LIVING CAMPUS

514 NORTH PROSPECT AVE.
 REDONDO BEACH, CA 90277

PMA PROJECT NO.
 19010

DRAWING TITLE
PH1 GRADING AND DRAINAGE PLAN

SCALE
 AS NOTED
 DATE
 01/06/20
 DRAWN CHECKED
 Author Checker
 SHEET NO.



PROJECT SITE AREA = 452,174 SF
 PERVIOUS AREA = 160,430 SF
 IMP AREA = 291,744 SF
 %IMP = 65%

→ DIRECTION OF SURFACE FLOW

ESTIMATED EARTHWORK QUANTITIES

REMOVAL AND RECOMPACTION:	7,580 CUBIC YARDS
CUT:	9,500 CUBIC YARDS
FILL:	0 CUBIC YARDS
NET (CUT/EXPORT):	9,500 CUBIC YARDS

EARTHWORK CALCULATION NOTES:

- ESTIMATED EARTHWORK ABOVE IS BASED ON DESIGN FINISH GRADES TO EXISTING GRADES AND/OR CONTOURS AS PROVIDED ON THE BASE SURVEY. THE ESTIMATED EARTHWORK DOES NOT ACCOUNT FOR THE THICKNESS OF PAVEMENTS, FOUNDATIONS AND SLABS ON GRADE, FOOTINGS, AND CONSTRUCTION MEANS AND METHODS.
- THE ESTIMATED EARTHWORK QUANTITIES DO NOT INCLUDE SHRINKAGE AND/OR EXPANSION FACTORS DUE TO COMPACTION OR OVER EXCAVATION QUANTITIES.
- ESTIMATED EARTHWORK QUANTITIES ABOVE ASSUME THAT ALL ONSITE MATERIALS ARE SUITABLE FOR BACKFILLING. HOWEVER, ACTUAL EXISTING ONSITE MATERIALS AND IMPORTED MATERIALS MUST FIRST BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO INSTALLATION, REMOVAL, REPLACEMENT.
- REMEDIAL GRADING INCLUDES OVEREXCAVATION OF 3' VERTICAL AND 5' HORIZONTAL EXCAVATIONS BELOW ANY PROPOSED FOUNDATION.

PAUL MURDOCH ARCHITECTS

8820 Wilshire Blvd, Suite 330
 Beverly Hills, California 90211
 310 358-0993 F.310 358-9106

THE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE ARCHITECT, AND NO PART THEREOF SHALL BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT. THESE DRAWINGS OR SPECIFICATIONS SHALL CONSTITUTE CONCLUSIVE EVIDENCE OF THE DESIGN AND SHALL BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. CONTRACTORS SHALL VERIFY ALL DIMENSIONS ON THE JOB AND NOTIFY THE ARCHITECT IMMEDIATELY IN WRITING OF ANY DISCREPANCIES. SHOP DETAILS MUST BE SUBMITTED TO THE ARCHITECT FOR APPROVAL BEFORE PROCEEDING.



319 Main Street
 El Segundo, CA 90245
 Tel: 213.239.9700

JLA Job No. 19725



NO. DATE REVISION

BEACH CITIES HEALTH DISTRICT HEALTHY LIVING CAMPUS

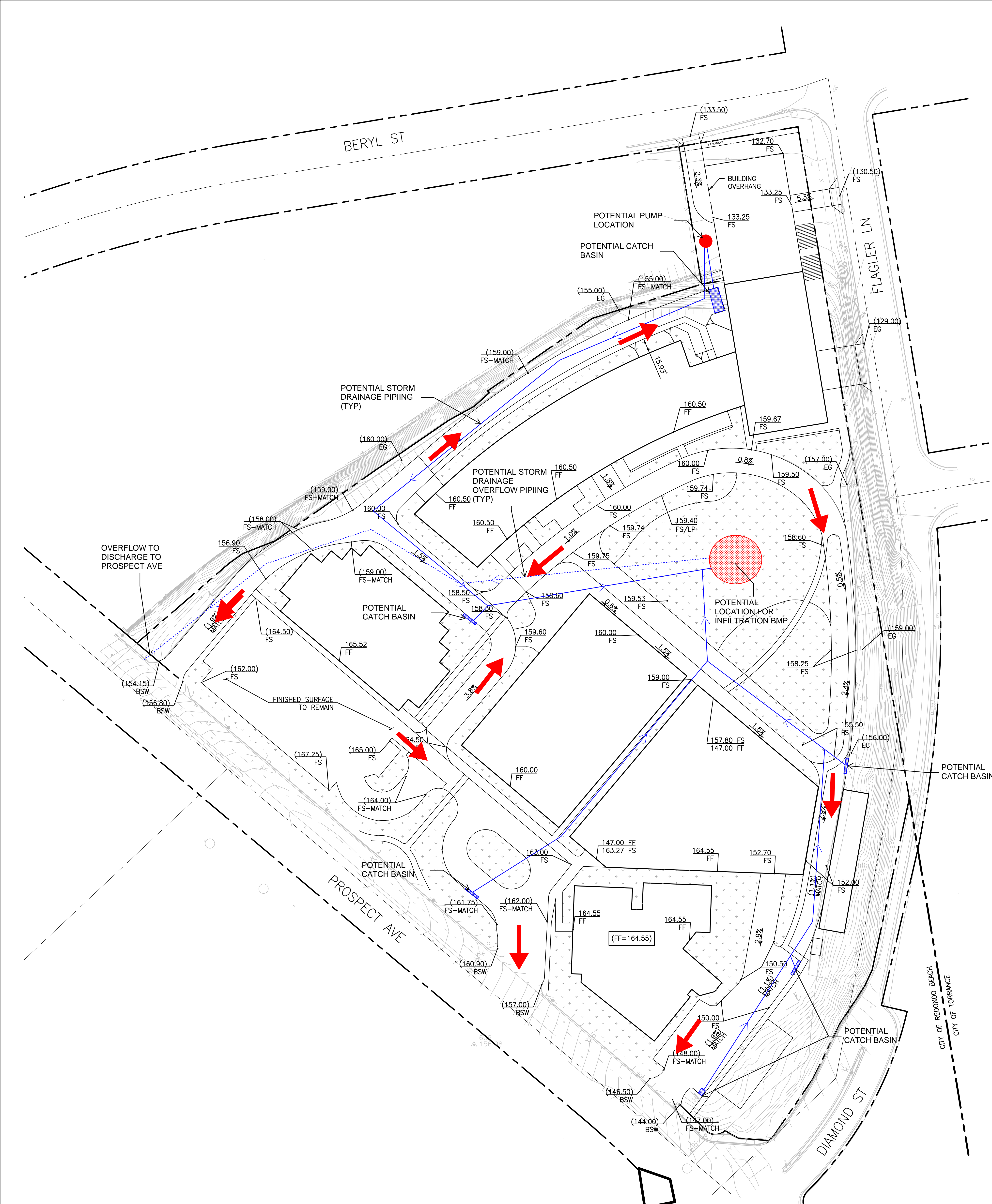
514 NORTH PROSPECT AVE.
 REDONDO BEACH, CA 90277

PMA PROJECT NO.
 19010

DRAWING TITLE
PH2 GRADING AND DRAINAGE PLAN

SCALE
 AS NOTED
 DATE
 01/06/20
 DRAWN CHECKED
 Author Checker
 SHEET NO.

CXXX



APPENDIX B
Hydrology Calculations

Preliminary Hydrology Study
 Beach Cities Health District

Project site Characteristics					
	Total Area	Pervious	Impervious	%Imp	
	[SF]	[SF]	[SF]	-	% Increase
Existing	452,174	82,541	369,633	81.7%	-
Phase 1	452,174	194,426	257,748	57.0%	-30.3%
Phase 2	452,174	158,254	293,920	65.0%	-20.5%

24-Hr Clear Runoff Volume [cu-ft]					
	85th	10 yr	50 yr	100 yr	100 yr %Increase
Existing	21,161	105,038	147,568	165,791	-
Phase 1	15,582	77,720	109,979	123,920	-25.3%
Phase 2	17,377	86,523	122,053	137,370	-17.1%

Clear Peak Flow Rate [cfs]					
	85th	10 yr	50 yr	100 yr	100 yr %Increase
Existing	1.4	12.0	20.0	24.1	-
Phase 1	0.9	8.8	16.3	20.0	-17.0%
Phase 2	1.1	10.0	17.1	20.8	-13.5%

Peak Flow Hydrologic Analysis

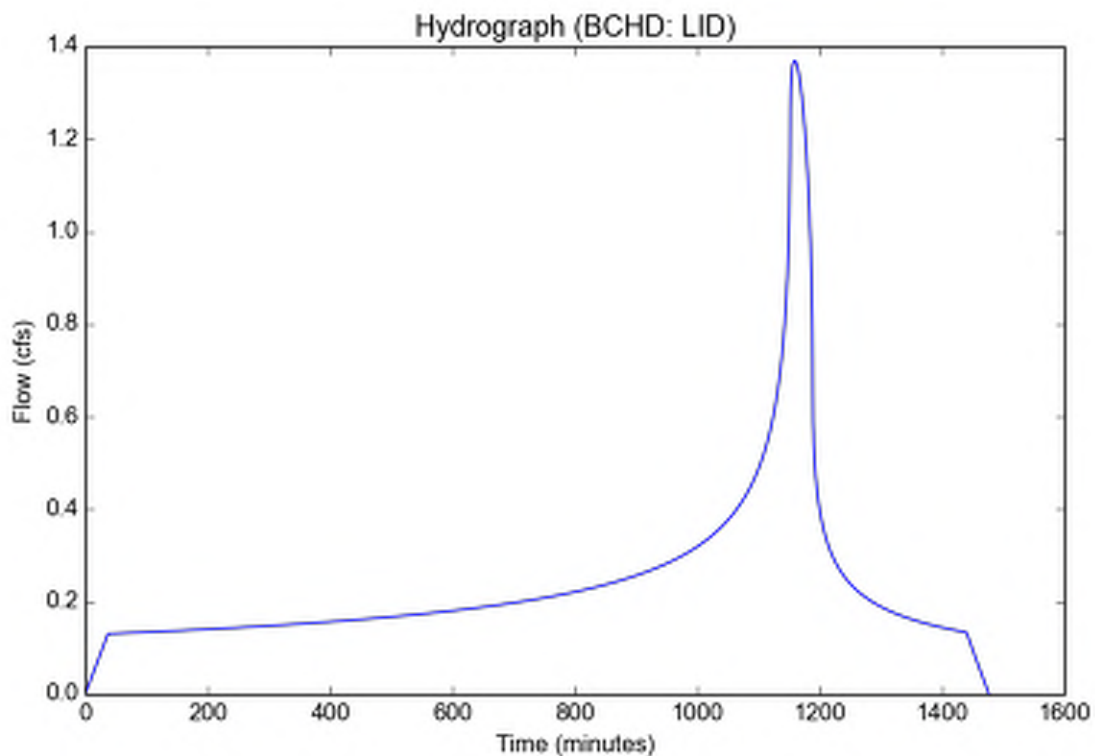
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD
Subarea ID	LID
Area (ac)	10.4
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
85th Percentile Rainfall Depth (in)	0.75
Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1747
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7536
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	1.369
Burned Peak Flow Rate (cfs)	1.369
24-Hr Clear Runoff Volume (ac-ft)	0.4858
24-Hr Clear Runoff Volume (cu-ft)	21161.4593



Peak Flow Hydrologic Analysis

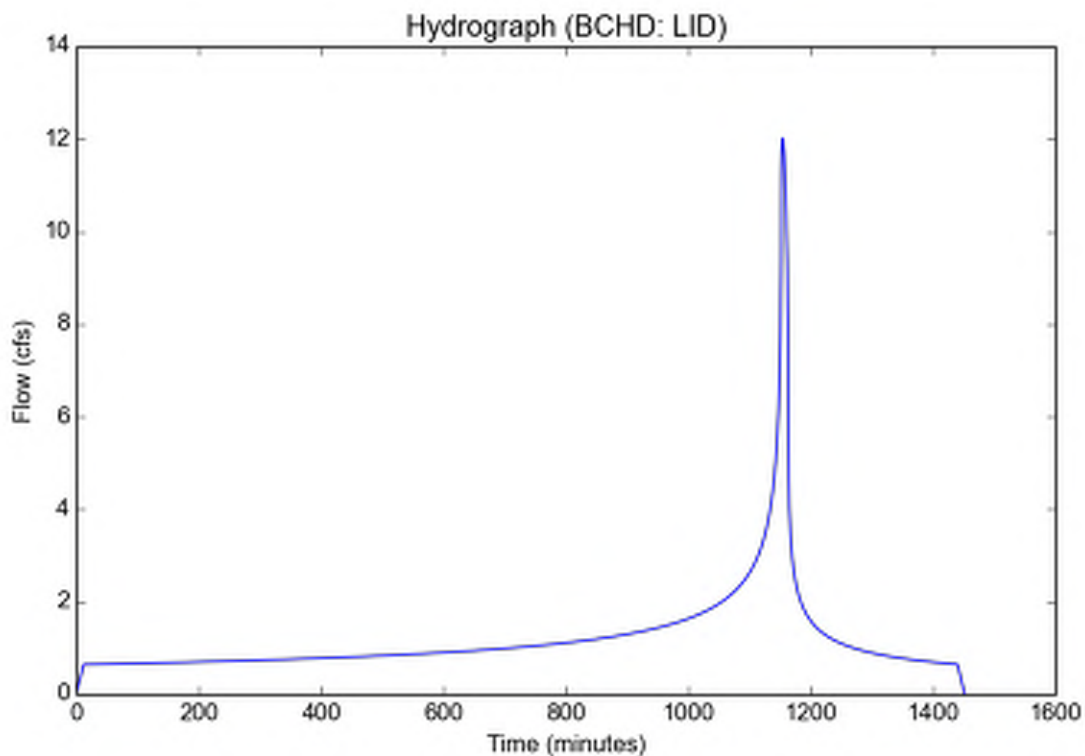
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD
Subarea ID	LID
Area (ac)	10.4
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	1.4679
Undeveloped Runoff Coefficient (Cu)	0.2838
Developed Runoff Coefficient (Cd)	0.7872
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	12.0183
Burned Peak Flow Rate (cfs)	12.0183
24-Hr Clear Runoff Volume (ac-ft)	2.4113
24-Hr Clear Runoff Volume (cu-ft)	105038.2756



Peak Flow Hydrologic Analysis

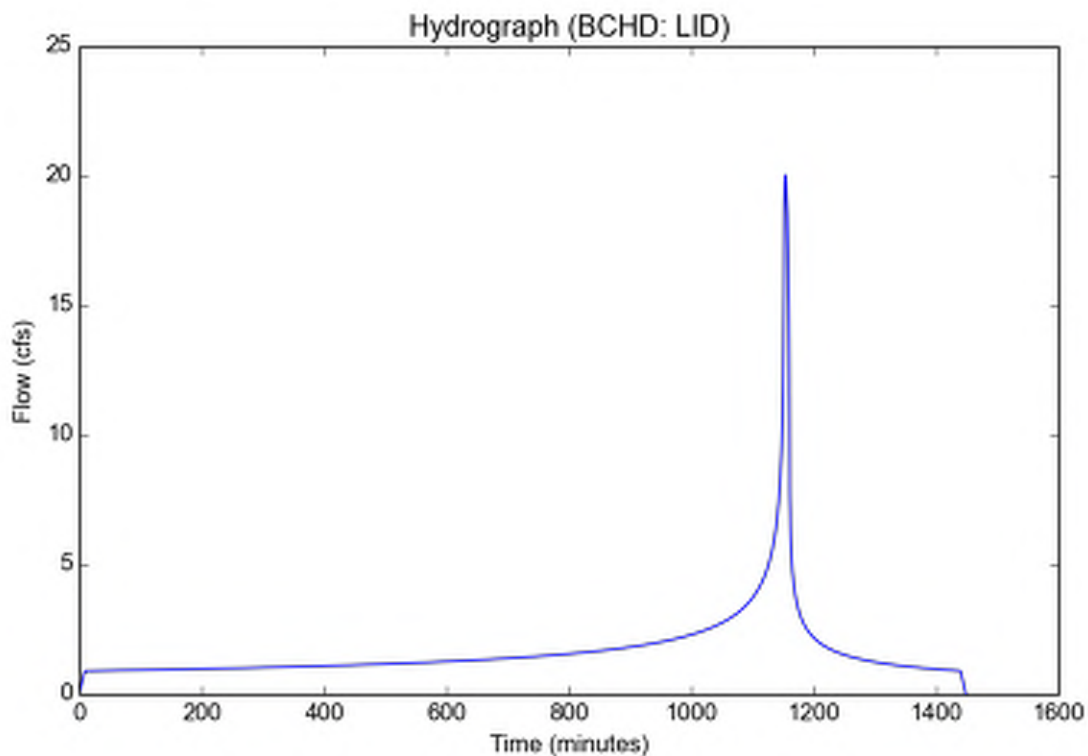
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD
Subarea ID	LID
Area (ac)	10.4
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	2.3536
Undeveloped Runoff Coefficient (Cu)	0.455
Developed Runoff Coefficient (Cd)	0.8186
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	20.0363
Burned Peak Flow Rate (cfs)	20.0363
24-Hr Clear Runoff Volume (ac-ft)	3.3877
24-Hr Clear Runoff Volume (cu-ft)	147568.2838



Peak Flow Hydrologic Analysis

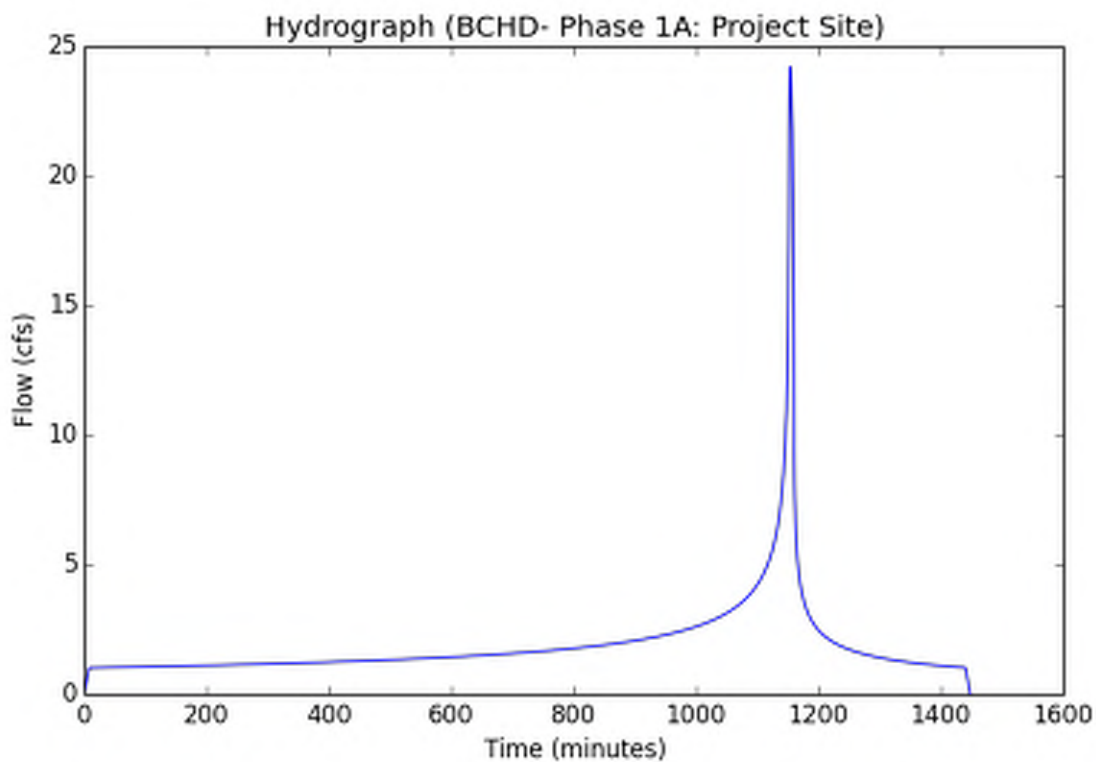
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD- Phase 1A
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.83
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	2.791
Undeveloped Runoff Coefficient (Cu)	0.5222
Developed Runoff Coefficient (Cd)	0.8358
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	24.2129
Burned Peak Flow Rate (cfs)	24.2129
24-Hr Clear Runoff Volume (ac-ft)	3.8489
24-Hr Clear Runoff Volume (cu-ft)	167656.0562



Peak Flow Hydrologic Analysis

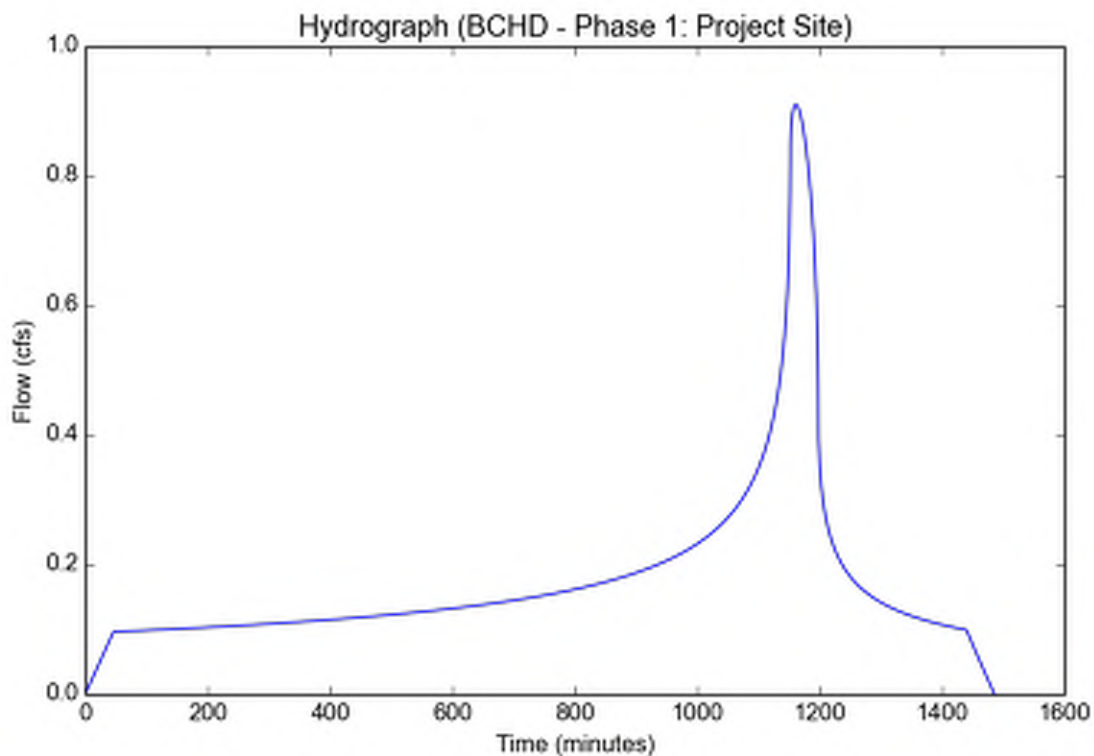
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 1
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
85th Percentile Rainfall Depth (in)	0.75
Percent Impervious	0.57
Soil Type	10
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1577
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.556
Time of Concentration (min)	46.0
Clear Peak Flow Rate (cfs)	0.91
Burned Peak Flow Rate (cfs)	0.91
24-Hr Clear Runoff Volume (ac-ft)	0.3577
24-Hr Clear Runoff Volume (cu-ft)	15582.8811



Peak Flow Hydrologic Analysis

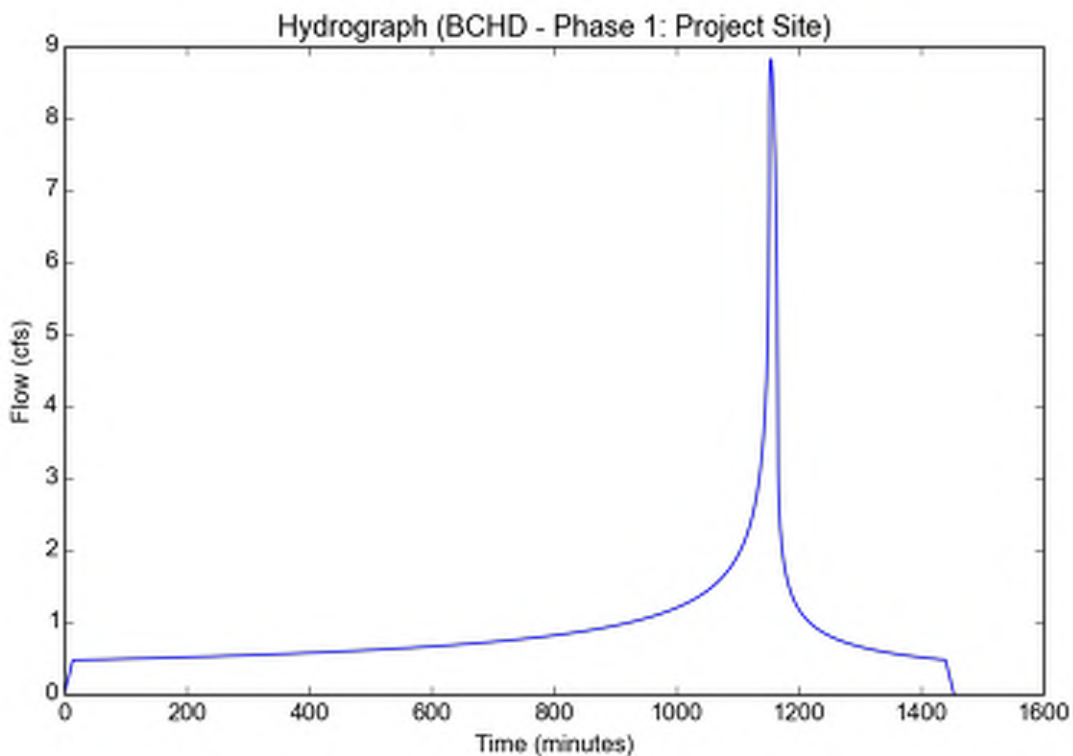
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 1
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.57
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	1.3653
Undeveloped Runoff Coefficient (Cu)	0.2547
Developed Runoff Coefficient (Cd)	0.6225
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	8.8224
Burned Peak Flow Rate (cfs)	8.8224
24-Hr Clear Runoff Volume (ac-ft)	1.7842
24-Hr Clear Runoff Volume (cu-ft)	77719.6786



Peak Flow Hydrologic Analysis

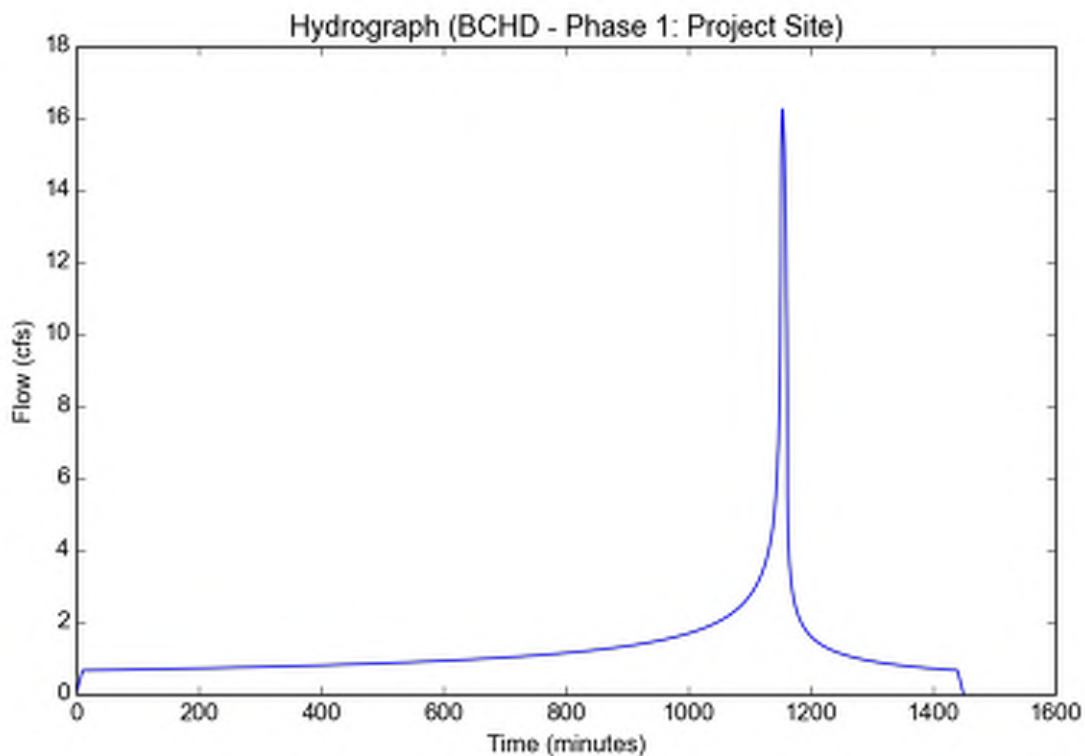
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 1
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.57
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	2.2399
Undeveloped Runoff Coefficient (Cu)	0.4334
Developed Runoff Coefficient (Cd)	0.6994
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	16.2603
Burned Peak Flow Rate (cfs)	16.2603
24-Hr Clear Runoff Volume (ac-ft)	2.5248
24-Hr Clear Runoff Volume (cu-ft)	109978.5328



Peak Flow Hydrologic Analysis

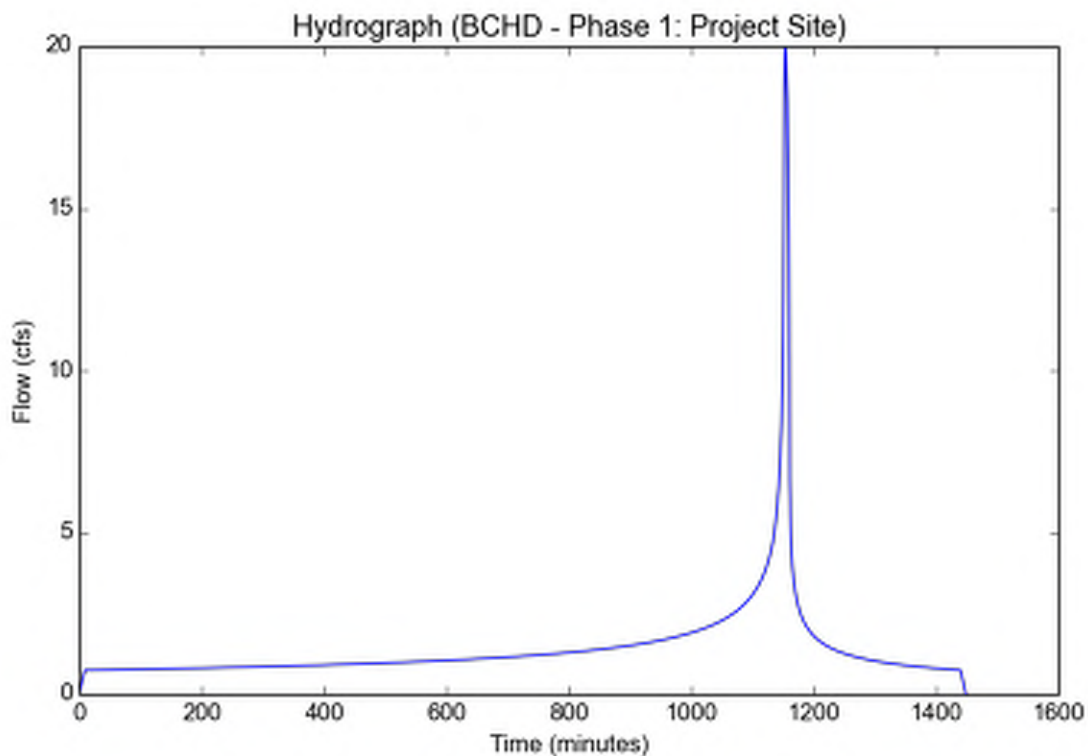
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 1
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.57
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	2.6407
Undeveloped Runoff Coefficient (Cu)	0.5019
Developed Runoff Coefficient (Cd)	0.7288
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	19.9768
Burned Peak Flow Rate (cfs)	19.9768
24-Hr Clear Runoff Volume (ac-ft)	2.8448
24-Hr Clear Runoff Volume (cu-ft)	123919.054



Peak Flow Hydrologic Analysis

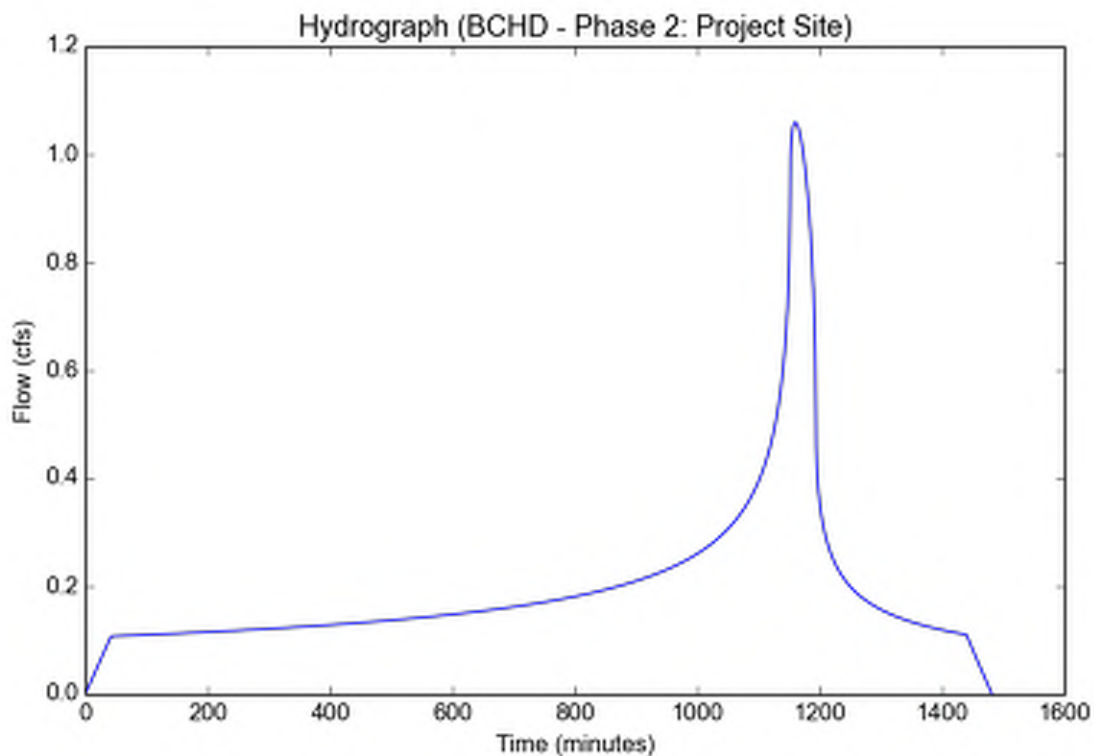
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 2
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
85th Percentile Rainfall Depth (in)	0.75
Percent Impervious	0.65
Soil Type	10
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1646
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.62
Time of Concentration (min)	42.0
Clear Peak Flow Rate (cfs)	1.0591
Burned Peak Flow Rate (cfs)	1.0591
24-Hr Clear Runoff Volume (ac-ft)	0.3989
24-Hr Clear Runoff Volume (cu-ft)	17376.5141



Peak Flow Hydrologic Analysis

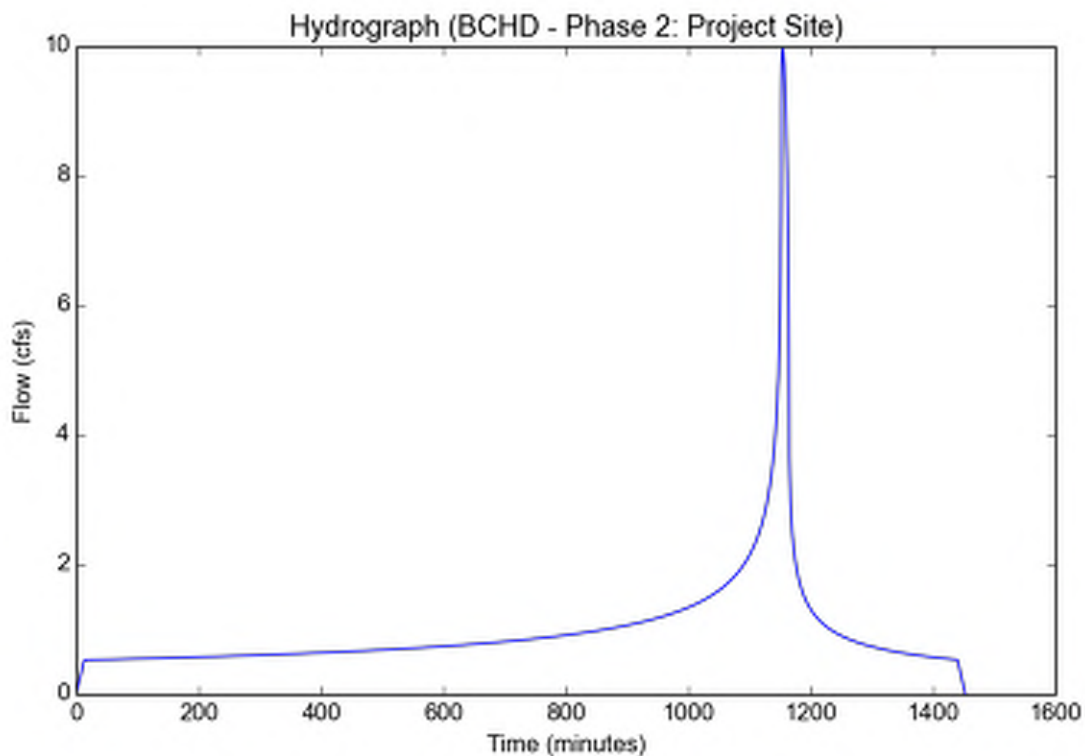
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 2
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.65
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	1.4137
Undeveloped Runoff Coefficient (Cu)	0.2684
Developed Runoff Coefficient (Cd)	0.6789
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	9.9632
Burned Peak Flow Rate (cfs)	9.9632
24-Hr Clear Runoff Volume (ac-ft)	1.9863
24-Hr Clear Runoff Volume (cu-ft)	86523.4521



Peak Flow Hydrologic Analysis

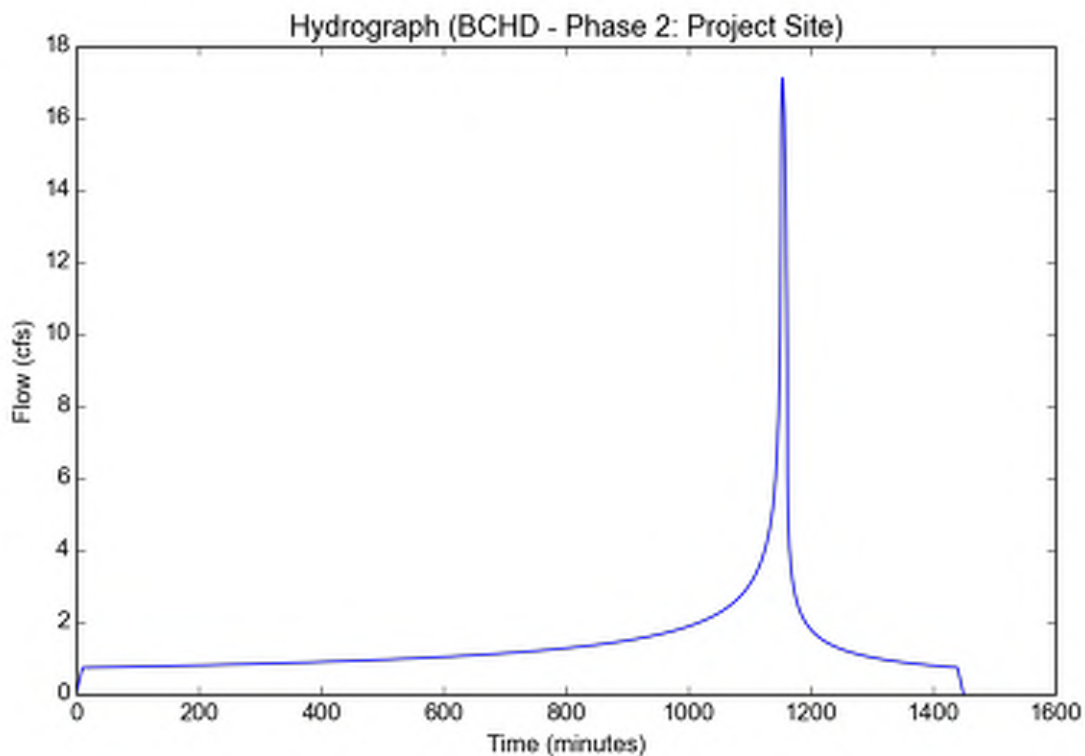
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD - Phase 2
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.65
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	2.2399
Undeveloped Runoff Coefficient (Cu)	0.4334
Developed Runoff Coefficient (Cd)	0.7367
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	17.1281
Burned Peak Flow Rate (cfs)	17.1281
24-Hr Clear Runoff Volume (ac-ft)	2.802
24-Hr Clear Runoff Volume (cu-ft)	122053.6821



Peak Flow Hydrologic Analysis

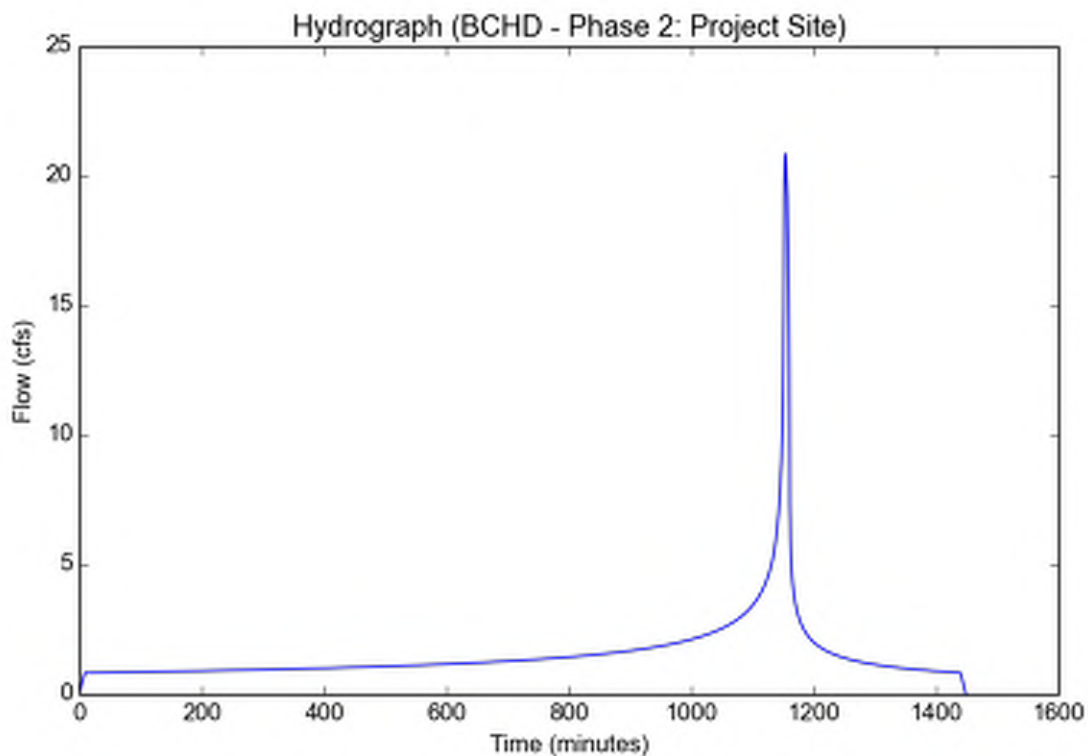
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Input Parameters

Project Name	BCHD - Phase 2
Subarea ID	Project Site
Area (ac)	10.38
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.65
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	2.6407
Undeveloped Runoff Coefficient (Cu)	0.5019
Developed Runoff Coefficient (Cd)	0.7606
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	20.8499
Burned Peak Flow Rate (cfs)	20.8499
24-Hr Clear Runoff Volume (ac-ft)	3.1536
24-Hr Clear Runoff Volume (cu-ft)	137370.0343



Peak Flow Hydrologic Analysis

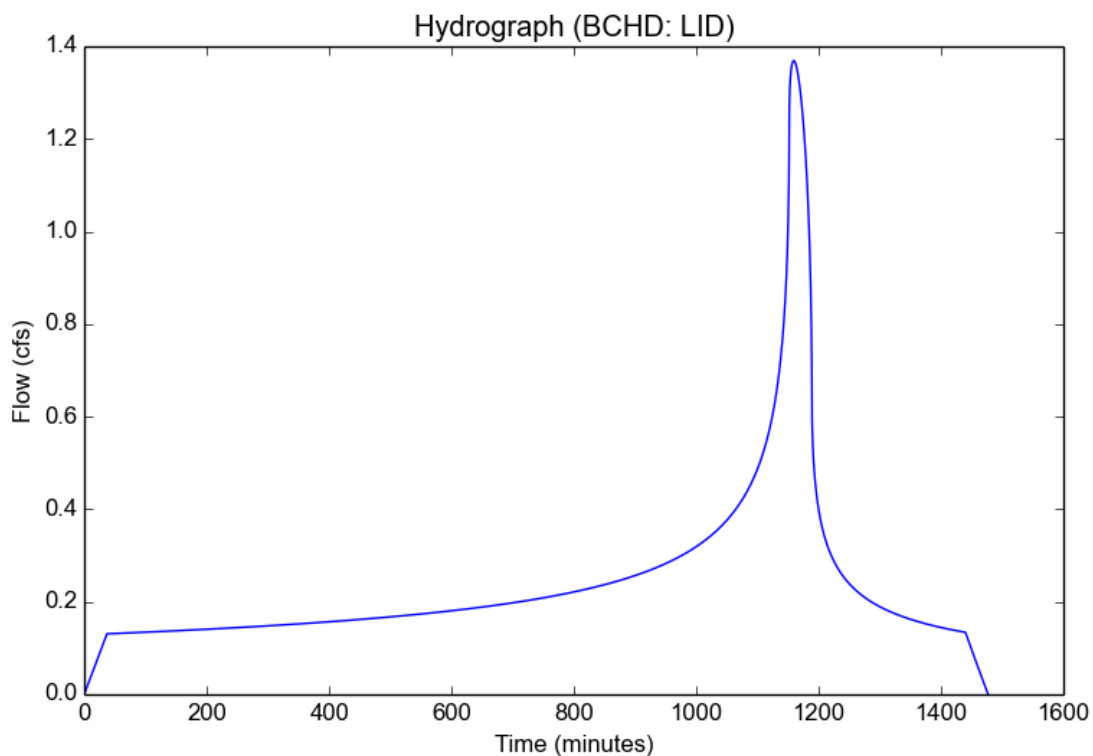
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	BCHD
Subarea ID	LID
Area (ac)	10.4
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
85th Percentile Rainfall Depth (in)	0.75
Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1747
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7536
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	1.369
Burned Peak Flow Rate (cfs)	1.369
24-Hr Clear Runoff Volume (ac-ft)	0.4858
24-Hr Clear Runoff Volume (cu-ft)	21161.4593



Peak Flow Hydrologic Analysis

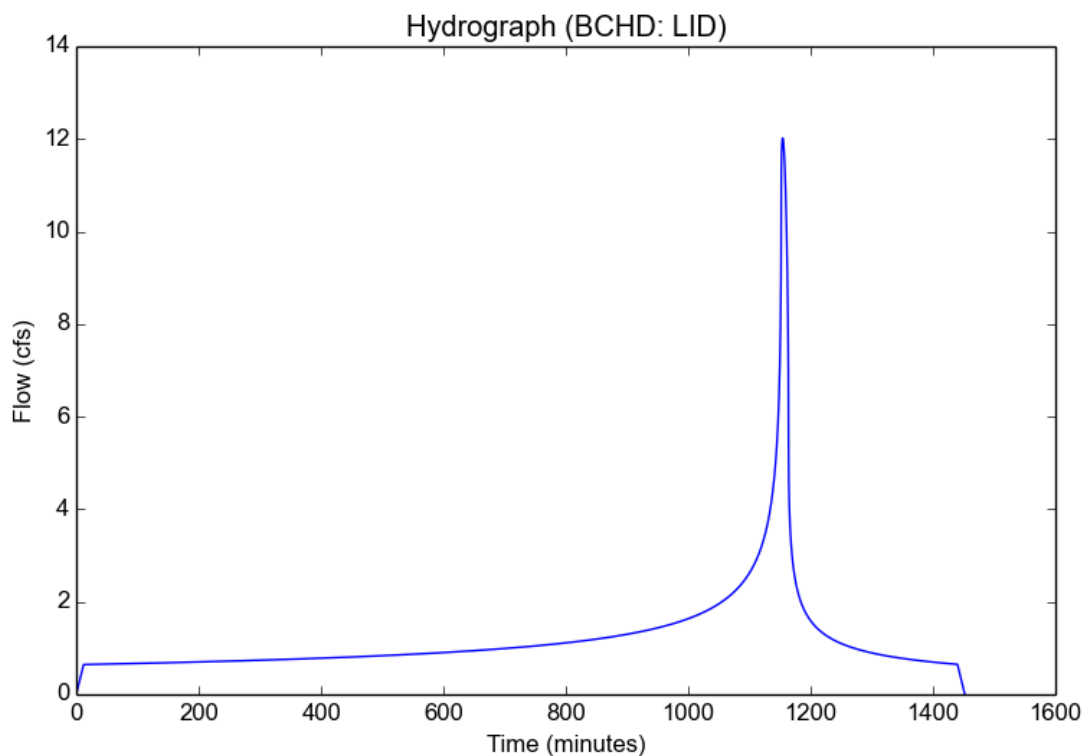
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Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	1.4679
Undeveloped Runoff Coefficient (Cu)	0.2838
Developed Runoff Coefficient (Cd)	0.7872
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Burned Peak Flow Rate (cfs)	12.0183
24-Hr Clear Runoff Volume (ac-ft)	2.4113
24-Hr Clear Runoff Volume (cu-ft)	105038.2756



Peak Flow Hydrologic Analysis

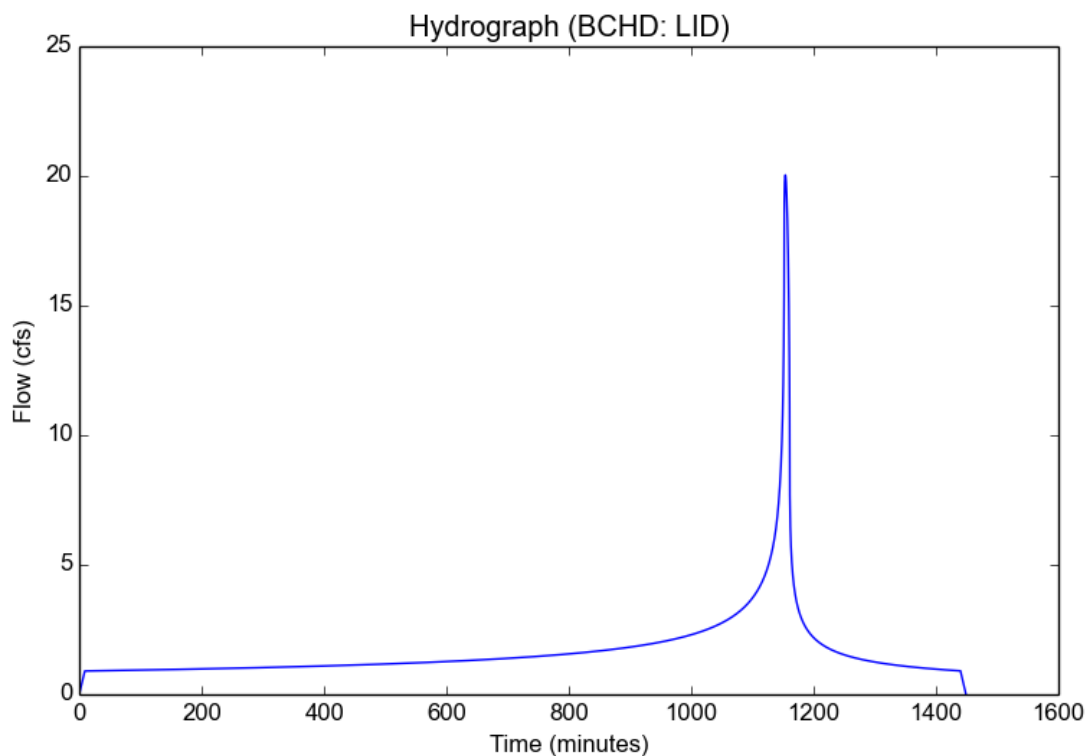
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Input Parameters

Project Name	BCHD
Subarea ID	LID
Area (ac)	10.4
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	2.3536
Undeveloped Runoff Coefficient (Cu)	0.455
Developed Runoff Coefficient (Cd)	0.8186
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	20.0363
Burned Peak Flow Rate (cfs)	20.0363
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24-Hr Clear Runoff Volume (cu-ft)	147568.2838



Peak Flow Hydrologic Analysis

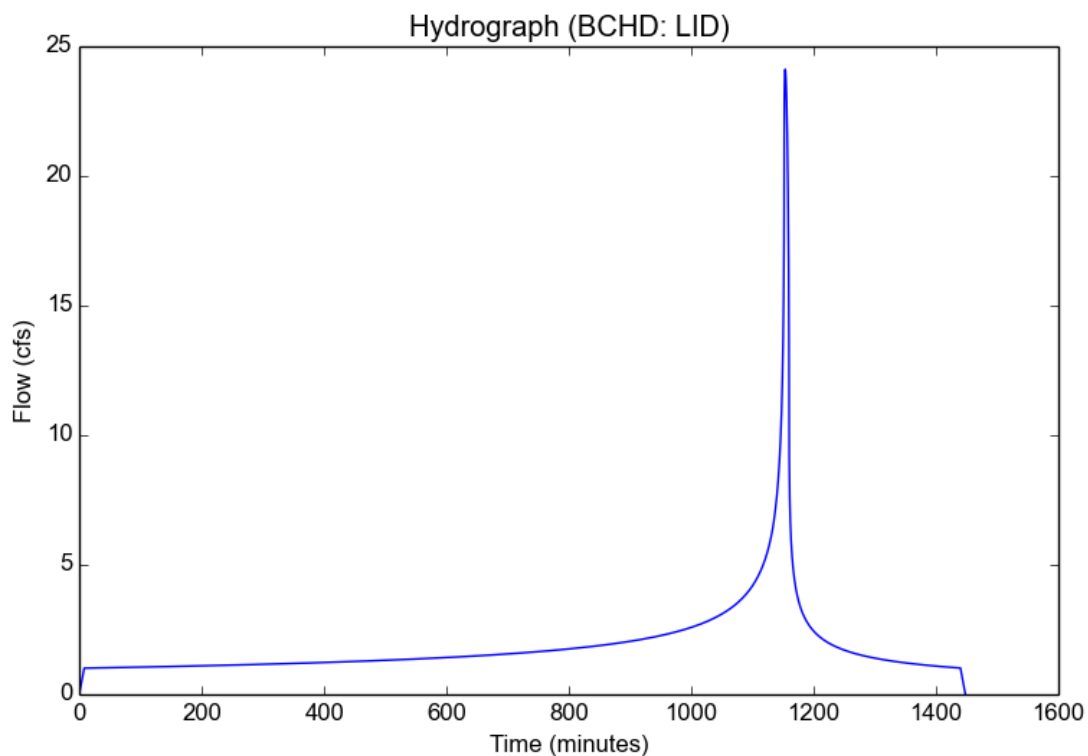
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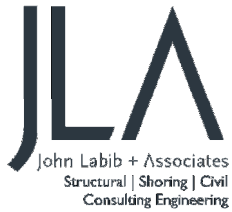
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Subarea ID	LID
Area (ac)	10.4
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.015
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.817
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	2.791
Undeveloped Runoff Coefficient (Cu)	0.5222
Developed Runoff Coefficient (Cd)	0.8309
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	24.117
Burned Peak Flow Rate (cfs)	24.117
24-Hr Clear Runoff Volume (ac-ft)	3.806
24-Hr Clear Runoff Volume (cu-ft)	165790.7335





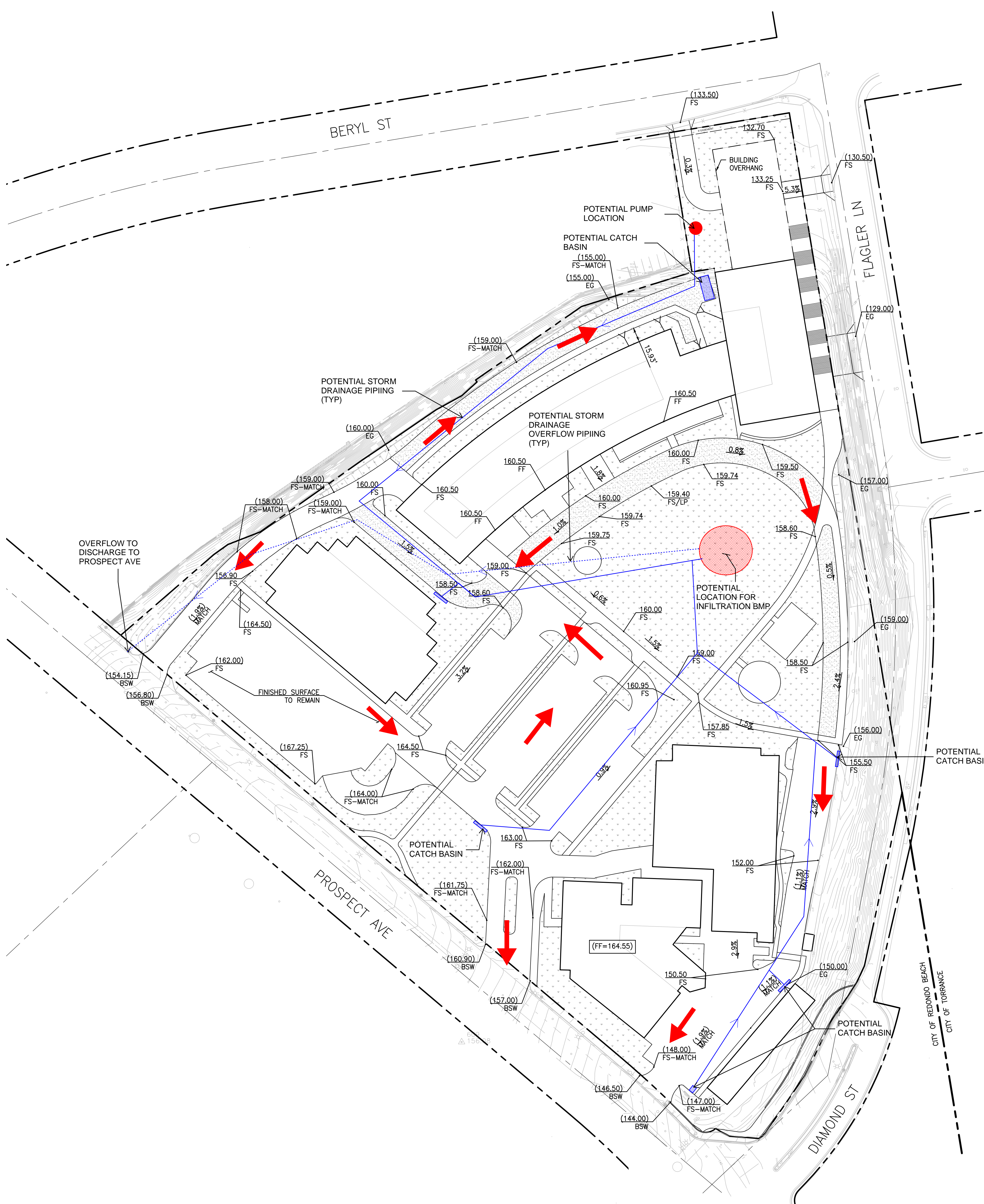
514 Prospect Ave
Beach City Health District
Stormwater Memorandum
February 11, 2021

PREPARED BY:

John Labib & Associates
319 Main Street
El Segundo, CA 90245
(213) 239 - 9700

Additional alternate designs and concepts for site planning have been prepared by Paul Murdoch Architects. They have been reviewed by our office and have been found to propose no potential impacts to the stormwater or the proposed stormwater treatment system. Additional runoff may occur if the impermeable footprint increases from concept to concept, but the infiltration system will be designed to capture, treat, and infiltrate the 85th percentile storm runoff generated by each. By implementing a low impact development BMP the proposed project will decrease the runoff from the existing condition which sheet flows to Prospect Ave or is collected in a catch basin located in the northeast corner of the existing parking lot which directly discharges to Flagler Lane. In any proposed condition, only large storm events more than the 85th percentile storm will enter the municipal storm drain system reducing the projects impact on the existing infrastructure. It is our conclusion that all proposed concepts will reduce the runoff from the existing condition to the proposed condition.

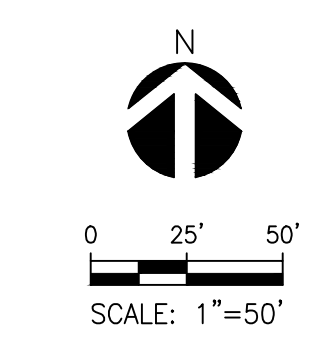
APPENDIX A
Hydrology Maps



LEGEND
 LANDSCAPE AREA
 PERMEABLE PAVEMENT

PROJECT SITE AREA = 452,174 SF
 PERVIOUS AREA = 154,650 SF
 IMP AREA = 297,524 SF
 %IMP = 66%

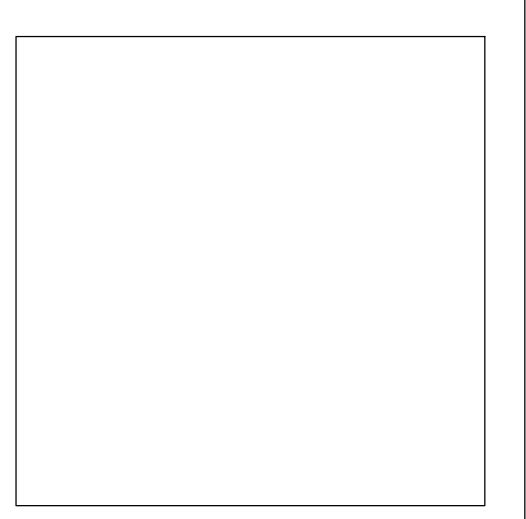
DIRECTION OF SURFACE FLOW



PAUL MURDOCH ARCHITECTS

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 Beverly Hills, California 90211
 310 358-0993 F.310 358-9196

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LFA

Labib Funk + Associates
 Structural | Civil Engineers
 319 Main Street
 El Segundo, CA 90245
 Tel: 213.239.9700

JLA Job No. 19725



NO. DATE REVISION

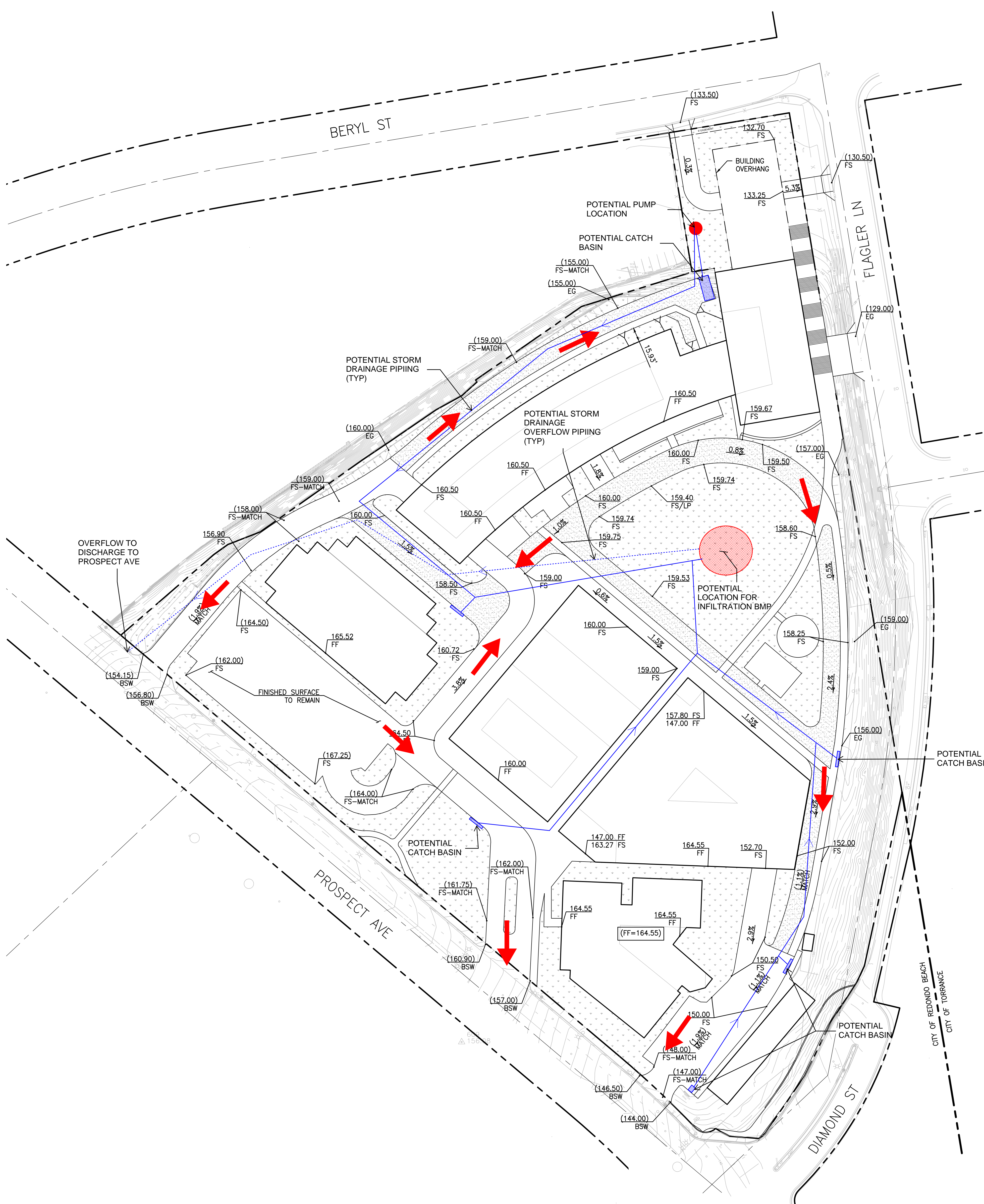
BEACH CITIES HEALTH DISTRICT HEALTHY LIVING CAMPUS

514 NORTH PROSPECT AVE.
 REDONDO BEACH, CA 90277

PLAN PROJECT NO.
 19010

DRAWING TITLE
PH1A HYDROLOGY

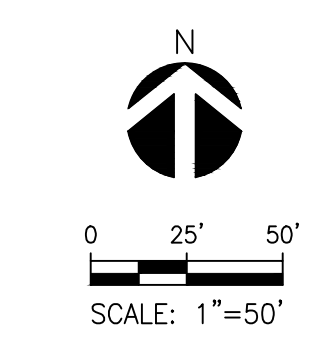
SCALE
 AS NOTED
 DATE
 01/06/20
 DRAWN CHECKED
 Author Checker
 SHEET NO.



LEGEND
 [Pattern] LANDSCAPE AREA
 [Pattern] PERMEABLE PAVEMENT

PROJECT SITE AREA = 452,174 SF
 PERVIOUS AREA = 145,545 SF
 IMP AREA = 306,629 SF
 %IMP = 68%

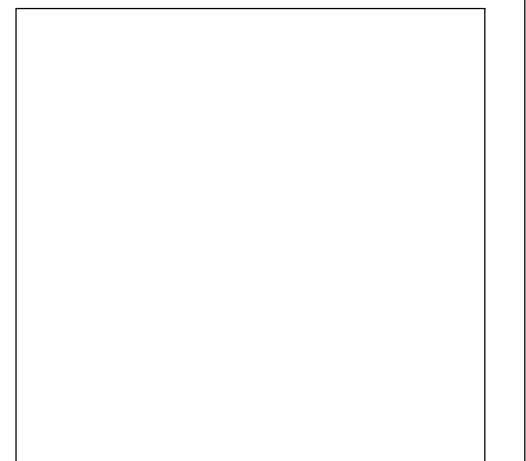
→ DIRECTION OF SURFACE FLOW



PAUL MURDOCH ARCHITECTS

8820 Wilshire Blvd, Suite 330
 Beverly Hills, California 90211
 310 358-0993 F.310 358-9196

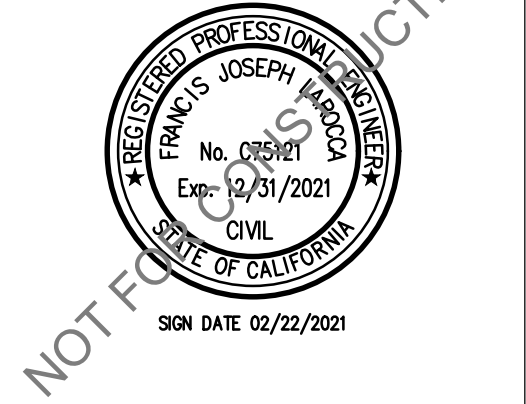
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