Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: All Peoples Church

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)**	☐ Included ☐ Not applicable

**OMITTED FOR DISCRETIONARY. WILL BE INCLUDED WITH FUTURE MINISTERIAL SUBMITTAL.

Project Name: All Peoples Church

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: All Peoples Church

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☑ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☑ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☑ Details and specifications for construction of structural BMP(s)
- ☑ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☑ How to access the structural BMP(s) to inspect and perform maintenance
- ☑ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☑ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☑ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☑ Recommended equipment to perform maintenance
- ☑ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☑ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☑ All BMPs must be fully dimensioned on the plans
- ☑ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

SITE PLAN
SITE DEVELOPMENT PERMIT NO. 2292338
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH

BASIS OF BEARINGS:
THE BASIS OF BEARING FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM 1983 (CCS83), ZONE 6, 2011.00 EPOCH, AND IS DETERMINED BY G.P.S. MEASUREMENTS TAKEN ON FEBRUARY 24, 2015 AND ESTABLISHED FROM CONTINUOUSLY OPERATING REFERENCE STATIONS P472 AND P473 DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) AND/OR NATIONAL GEODETIC SURVEY (NGS), RESPECTIVELY. BEARING N 39°42'24" W

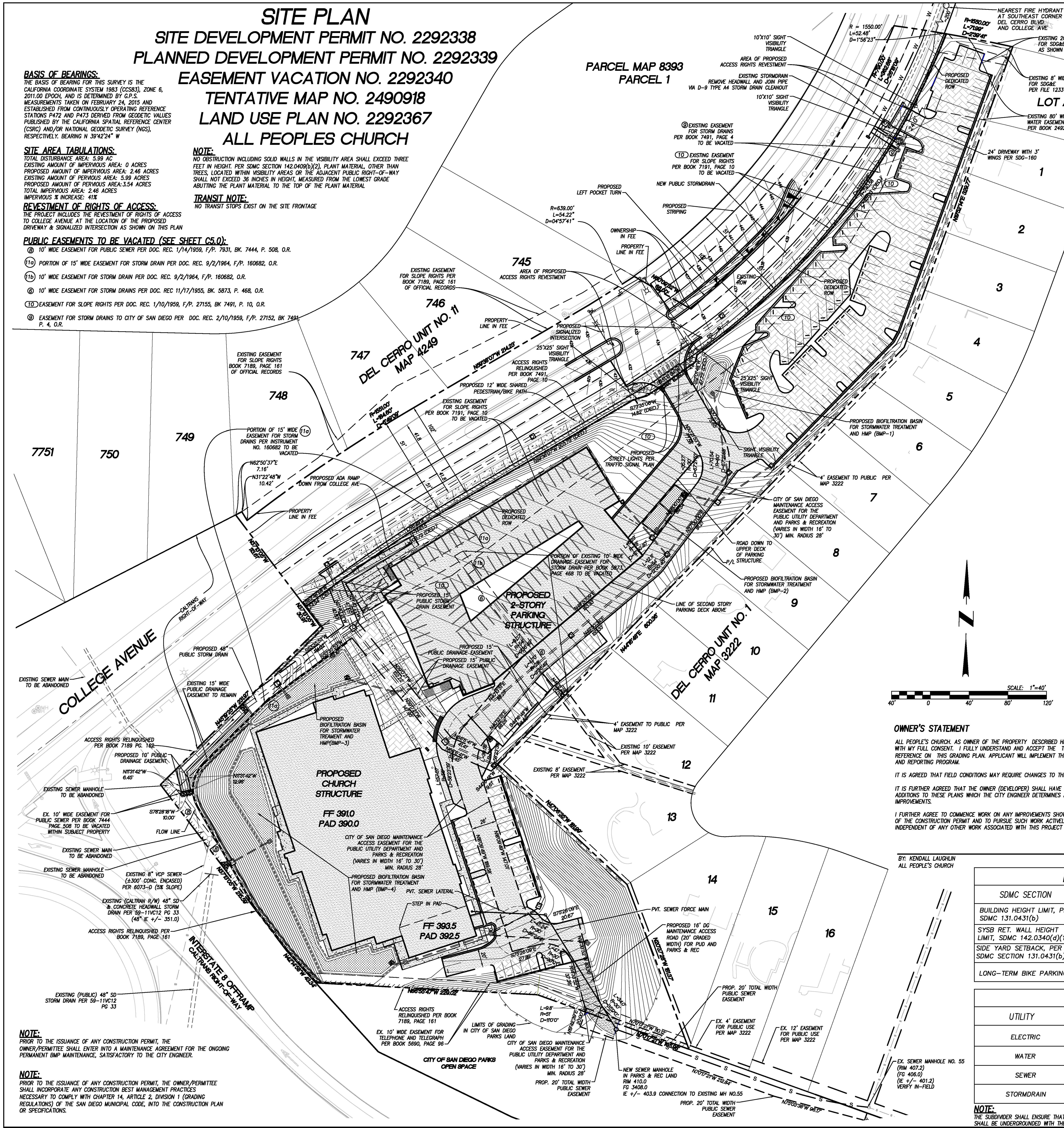
SITE AREA TABULATIONS:
TOTAL DISTURBANCE AREA: 5.99 AC
EXISTING AMOUNT OF IMPERVIOUS AREA: 0 ACRES
PROPOSED AMOUNT OF IMPERVIOUS AREA: 2.46 ACRES
EXISTING AMOUNT OF PERVIOUS AREA: 5.99 ACRES
PROPOSED AMOUNT OF PERVIOUS AREA: 3.54 ACRES
TOTAL IMPERVIOUS AREA: 2.46 ACRES
IMPERVIOUS % INCREASE: 41%

REVESTMENT OF RIGHTS OF ACCESS:
THE PROJECT INCLUDES THE REVESTMENT OF RIGHTS OF ACCESS TO COLLEGE AVENUE AT THE LOCATION OF THE PROPOSED DRIVEWAY & SIGNALIZED INTERSECTION AS SHOWN ON THIS PLAN

NOTE:
NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED THREE FEET IN HEIGHT. PER SDMC SECTION 142.0409(b)(2), PLANT MATERIAL, OTHER THAN TREES, LOCATED WITHIN VISIBILITY AREAS OR THE ADJACENT PUBLIC RIGHT-OF-WAY SHALL NOT EXCEED 36 INCHES IN HEIGHT, MEASURED FROM THE LOWEST GRADE ABUTTING THE PLANT MATERIAL TO THE TOP OF THE PLANT MATERIAL

TRANSIT NOTE:
NO TRANSIT STOPS EXIST ON THE SITE FRONTAGE

PUBLIC EASEMENTS TO BE VACATED (SEE SHEET C5.0):
- (8) 10' WIDE EASEMENT FOR PUBLIC SEWER PER DOC. REC. 1/14/1959, F/P. 7931, BK. 7444, P. 508, O.R.
- (11a) PORTION OF 15' WIDE EASEMENT FOR STORM DRAIN PER DOC. REC. 9/2/1964, F/P. 160682, O.R.
- (11b) 10' WIDE EASEMENT FOR STORM DRAIN PER DOC. REC. 9/2/1964, F/P. 160682, O.R.
- (6) 10' WIDE EASEMENT FOR STORM DRAINS PER DOC. REC 11/17/1955, BK. 5873, P. 468, O.R.
- (10) EASEMENT FOR SLOPE RIGHTS PER DOC. REC. 1/10/1959, F/P. 27155, BK 7491, P. 10, O.R.
- (9) EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 2/10/1959, F/P. 27152, BK 7491, P. 4, O.R.



NOTE:
PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.

NOTE:
PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLAN OR SPECIFICATIONS.

NOTE:
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/APPLICANT TO ENSURE THAT THE CURRENT STORM WATER BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.

PARCEL NOTE:
THIS IS A MAP OF A PARCEL AS DEFINED IN SECTION 8700-8704 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT.

GRADING QUANTITIES

AMOUNT OF CUT:	16,500 CUBIC YARDS
MAXIMUM DEPTH OF CUT OUTSIDE OF BUILDING:	25.5' FEET
MAXIMUM DEPTH OF CUT UNDER THE BUILDING:	7.5 FEET
AMOUNT OF FILL:	39,000 CUBIC YARDS
MAXIMUM DEPTH OF FILL OUTSIDE OF BUILDING:	28' FEET
MAXIMUM DEPTH OF FILL UNDER THE BUILDING:	10 FEET
NET IMPORT: 22,500 CUBIC YARDS	

LEGEND
PROPERTY LINE
DEDICATED RIGHT-OF-WAY
RIGHT OF WAY
EXISTING LOT LINE
STREET CENTERLINE
EXISTING EASEMENT
PROPOSED EASEMENT
LIMITS OF ACCESS RELINQUISHMENT
PROPOSED BUILDING FOOTPRINT
PROPOSED BMP
PROPOSED STORMDRAIN
EXISTING STORMDRAIN LINE
PROPOSED TRAFFIC SIGNAL
PROPOSED PERMEABLE PAVEMENT
PROPOSED HARDSCAPE
CUT/FILL SLOPE
PROPOSED D-75 BROW DITCH

OWNER'S STATEMENT
ALL PEOPLE'S CHURCH. AS OWNER OF THE PROPERTY DESCRIBED HEREIN ACKNOWLEDGE THESE PLANS HAVE BEEN PREPARED AT MY DIRECTION WITH MY FULL CONSENT. I FULLY UNDERSTAND AND ACCEPT THE TERMS AND CONDITIONS CONTAINED HEREIN AND AS ATTACHED BY REFERENCE ON THIS GRADING PLAN. APPLICANT WILL IMPLEMENT THE SPECIFIC HISTORICAL RESOURCES (ARCHAEOLOGY) MITIGATION, MONITORING AND REPORTING PROGRAM.

IT IS AGREED THAT FIELD CONDITIONS MAY REQUIRE CHANGES TO THESE PLANS.

IT IS FURTHER AGREED THAT THE OWNER (DEVELOPER) SHALL HAVE A REGISTERED CIVIL ENGINEER MAKE SUCH CHANGES, ALTERATIONS OR ADDITIONS TO THESE PLANS WHICH THE CITY ENGINEER DETERMINES ARE NECESSARY AND DESIRABLE FOR THE PROPER COMPLETION OF THE IMPROVEMENTS.

I FURTHER AGREE TO COMMENCE WORK ON ANY IMPROVEMENTS SHOWN ON THESE PLANS WITHIN EXISTING CITY RIGHT-OF-WAY WITHIN 60 DAYS OF THE CONSTRUCTION PERMIT AND TO PURSUE SUCH WORK ACTIVELY ON EVERY NORMAL WORKING DAY UNTIL COMPLETED, IRRESPECTIVE AND INDEPENDENT OF ANY OTHER WORK ASSOCIATED WITH THIS PROJECT OR UNDER MY CONTROL.

BY: KENDALL LAUGHLIN
ALL PEOPLE'S CHURCH
DATE:

DEVIATIONS TABLE

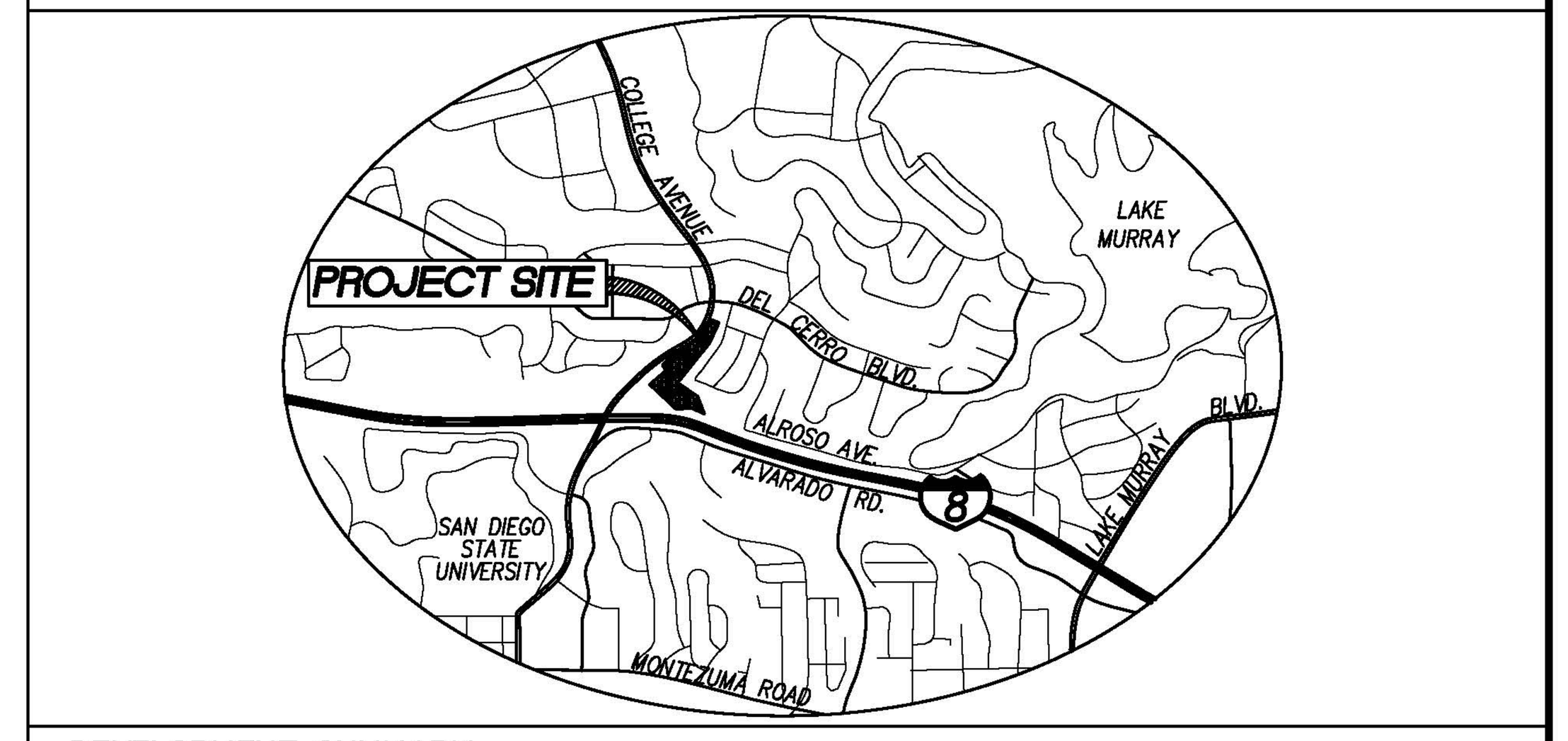
SDMC SECTION	REQUIRED	PROPOSED
BUILDING HEIGHT LIMIT, PER SDMC 131.0431(b)	30 FEET	53 FEET
SYSB RET. WALL HEIGHT LIMIT, SDMC 142.0340(d)(1)	6 FEET	20 FEET
SIDE YARD SETBACK, PER SDMC SECTION 131.0431(b)	84 FEET, 2 INCHES	14 FEET
LONG-TERM BIKE PARKING	16	2

UTILITY TABLE

UTILITY	EXISTING	PROPOSED
ELECTRIC	N/A	UNDERGROUND
WATER	N/A	UNDERGROUND
SEWER	UNDERGROUND	UNDERGROUND
STORMDRAIN	UNDERGROUND/ SURFACE FLOW	UNDERGROUND

NOTE:
THE SUBDIVIDER SHALL ENSURE THAT ALL ONSITE UTILITIES SERVING THE SUBDIVISION SHALL BE UNDERGROUNDED WITH THE APPROPRIATE PERMITS.

VICINITY MAP



DEVELOPMENT SUMMARY
THE PROJECT CONSISTS OF THE DEVELOPMENT OF SIX-ACRE UNDEVELOPED SITE SITUATED NORTH OF INTERSTATE 8 AND EAST OF COLLEGE AVENUE IN THE NAVAJO COMMUNITY PLAN AREA.
- A 54,476 SF SANCTUARY/MULTIPURPOSE BUILDING TO ACCOMMODATE 900 SEATS (APPROXIMATELY 587 FIXED SEATS AND 3690 S.F. OF NON-FIXED SEATING) WITH SUNDAY SCHOOL, CLASSROOMS, OFFICES AND A MULTIPURPOSE ROOM/GYM.
- A 71,000 SF TWO LEVEL PARKING GARAGE WITH 203 SPACES
- SURFACE PARKING FOR 153 SPACES
- SITE UTILITIES AND LANDSCAPING
- OFFSITE IMPROVEMENTS TO COLLEGE AVENUE TO CREATE A MEDIAN BREAK AND A SIGNALIZED INTERSECTION FOR THE MAIN DRIVEWAY
- ON-SITE WATER QUALITY BASINS TO TREAT STORM WATER RUNOFF AND SEWER AND STORM WATER CONNECTIONS TO EXISTING CITY FACILITIES.
- PROPOSED DEVIATIONS TO EXCEED THE BUILDING HEIGHT LIMITS FROM 30' TO 53', TO REDUCE SIDE YARD SETBACKS FROM 84.17' TO 14', TO REDUCE LONG-TERM BIKE PARKING FROM 16 TO 2, SIDE-YARD SETBACK WALL HEIGHT TO EXCEED HEIGHT LIMITS FROM 6' TO 20'
- REQUIRED APPROVALS; THE PROJECT WOULD REQUIRE CITY APPROVAL OF A COMMUNITY PLAN AMENDMENT TO MODIFY THE NAVAJO COMMUNITY PLAN, A PLANNED DEVELOPMENT PERMIT, A SITE DEVELOPMENT PERMIT, A TENTATIVE MAP AND VARIOUS EASEMENT VACATIONS & REVESTMENT OF ACCESS RIGHTS ON COLLEGE AVENUE (PROCESS 5).

SITE DESCRIPTION
APN: 463-010-10-00 SITE AREA: 5.99 ACRES
ABBREVIATED LEGAL DESCRIPTION:
PORTION OF LOT 67 OF RANCHO MISSION OF SAN DIEGO, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS DESCRIBED IN GRANT DEED RECORDED NOVEMBER 3, 1975 AS DOCUMENT 75-306249, O.R.

SURVEY NOTES:
1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.
2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.
3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.
4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.

LAMBERT COORDINATES: NAD27 224-1750 CCS83 COORDINATES: NAD83 1864-6311

PROJECT INFORMATION
TOTAL PROJECT OWNERSHIP: 5.99 ACRES
TOTAL GRADED AREA: 5.60 ACRES
PERCENT OF SITE TO BE GRADED: 93%
TYPE OF CONSTRUCTION: TYPE III-B
EXISTING USE: VACANT LAND
PROPOSED USE: RELIGIOUS ASSEMBLY
NUMBER OF EXISTING LOTS: 1
NUMBER OF PROPOSED LOTS: 1

EXISTING ZONE: RS-1-7
COMMUNITY PLAN: NAVAJO COMMUNITY PLAN AREA
OCCUPANCY TYPE: SINGLE FAMILY RESIDENTIAL
GEOLOGIC HAZARD CATEGORY: 52

GROSS SITE AREA: 260,944 SF
FLOOR AREA MAXIMUM: 45% (117,416 SF)
FLOOR AREA RATIO: 42% (108,654 SF)
SANCTUARY-1ST FLOOR 37,357 SF
SANCTUARY-2ND FLOOR 14,802 SF
SANCTUARY-PHANTOM FLOOR 22,555 SF
PARKING- 1ST FLOOR 33,940 SF
COVERAGE MAX ALLOWED: 50% (130,462 SF)
COVERAGE PROPOSED: 28% (72,822 SF)
SANCTUARY-1ST FLOOR 37,357 SF
PARKING-1ST FLOOR 35,465 SF

PARKING REQUIRED: 319 SPACES
PARKING PROVIDED: 356 AUTOMOBILE SPACES
319 STANDARD SPACES
2 VAN ACCESSIBLE SPACES
6 ACCESSIBLE SPACES
29 CLEAN AIR VEHICLE SPACES
21 FUTURE EV CHARGING STATIONS
(37 CARPOOL SPACES INCLUDED IN COUNT ABOVE)
7 MOTORCYCLE SPACES
17 SHORT-TERM BICYCLE SPACES
2 LONG-TERM BICYCLE STORAGE

LANDSCAPE AREA: 153,757 SF

MONTGOMERY FIELD AIRPORT LAND USE COMPATIBILITY OVERLAY ZONE
AIRPORT INFLUENCE AREA (REVIEW AREA 2)
PARKING IMPACT OVERLAY ZONE (CAMPUS)

SHEET INDEX

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C 2.0 PRELIMINARY GRADING PLAN
C 3.0 PRELIMINARY UTILITY PLAN
C 4.0 SECTIONS AND DETAILS
C 5.0 EXISTING CONDITIONS EXHIBIT
C 6.0 OFFSITE IMPROVEMENTS
C 7.0 TRAFFIC SIGNAL INSTALLATION PLAN
ARCHITECTURAL (19)
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A.2a SETBACK SITE PLAN
A.2b FIRE ACCESS PLAN
A.3 COLORED SITE PLAN
A.3b ENLARGED COLORED SITE
A.4 FIRST FLOOR
A.5 SECOND FLOOR
A.5b AREA SCHEDULE
A.6 STADIUM SEATING
A.7 ELEVATIONS
A.8 ELEVATIONS
A.9 SECTIONS
A.10 ROOF
A.11 PARKING GARAGE GROUND LEVEL
A.12 PARKING GARAGE SECOND LEVEL
A.13 PARKING GARAGE ELEVATIONS
A.14 CARPORT
A.15 SITE SECTIONS
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PUBLIC SERVICES
GAS AND ELECTRIC: SDG&E
TELEPHONE: AT&T
CABLE TELEVISION: COX COMMUNICATIONS
SEWER AND WATER: CITY OF SAN DIEGO
DRAINAGE SYSTEM: CITY OF SAN DIEGO
FIRE DEPARTMENT: CITY OF SAN DIEGO
SCHOOL DISTRICT: SAN DIEGO UNIFIED SCHOOL DISTRICT

PROJECT TEAM

OWNER/DEVELOPER:
ALL PEOPLES CHURCH
5577 UNIVERSITY AVENUE
SAN DIEGO, CA 92105

CIVIL ENGINEER/SURVEY:
PASCO LARET SUITER AND ASSOCIATES
535 N HWY 101, SUITE A
SOLANA BEACH, CALIFORNIA 92075
T: (858) 259-8212 FAX: (858) 259-4812

ARCHITECT:
KENNETH D SMITH ARCHITECT &ASSOCIATES
500 FESLER STREET, SUITE 102
EL CAJON, CALIFORNIA 92020
T: (619) 444-2182

TRAFFIC ENGINEER:
LOS ENGINEERING, INC.
11622 EL CAMINO REAL, SUITE 100
SAN DIEGO, CA 92130
T: (619) 890-1253
LANDSCAPE ARCHITECT:

LANDSCAPE ARCHITECT:
AHLES LANDSCAPE ARCHITECTURE
2410 MANCHESTER AVENYE
RANCHO SANTA FE, CA 92091
T: (858) 756-8693

GEOTECHNICAL:
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 CORPORATE DR, SUITE B
ESCONDIDO, CA 92029
T: (619) 850-3980

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2022
DATE

PROJECT NAME: ALL PEOPLES CHURCH
PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120
PROJECT TRACKING SYSTEM NUMBER: 636444
INTERNAL ORDER NUMBER: PENDING
SHEET TITLE: SITE PLAN
SHEET NUMBER: C 1.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019
REVISIONS:
1. 03-17-2020
2. 08-28-2020
3. 2-12-2020
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PLSA 2936

PRELIMINARY GRADING PLAN

SITE DEVELOPMENT PERMIT NO. 2292338 ,PLANNED DEVELOPMENT PERMIT NO. 2292339, EASEMENT VACATION NO. 2292340, TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION

TOPOGRAPHY:

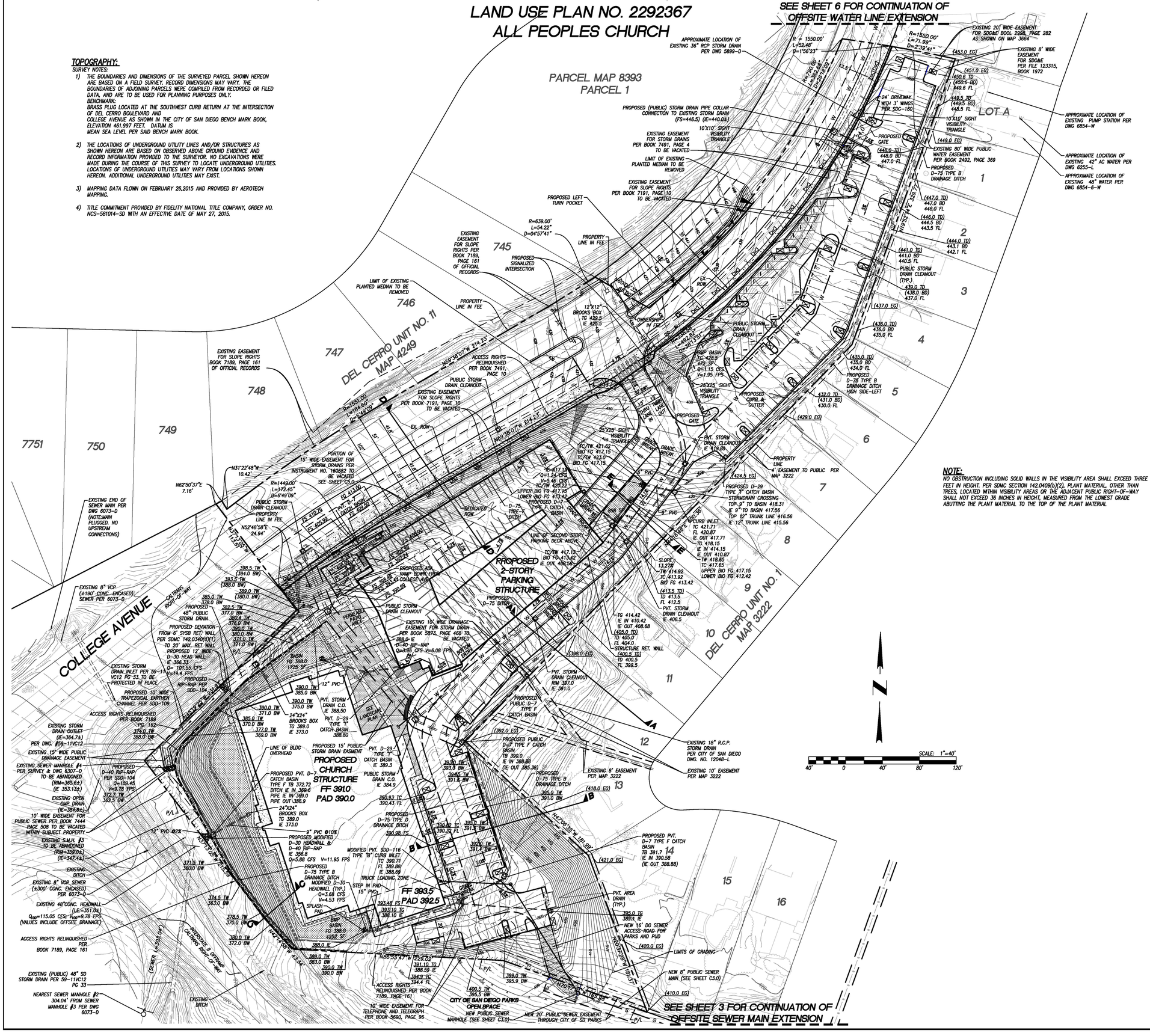
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4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.



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LEGEND

- BOUNDARY LINE
- ADJACENT PROPERTY LINE
- EASEMENT LINE
- RIGHT OF WAY
- EXISTING STREET CENTERLINE
- EXISTING IMPROVEMENTS:
- EXISTING CONTOUR
- EXISTING CURB & GUTTER
- EXISTING SEWER MAIN
- EXISTING STORM DRAIN MAIN
- EXISTING CURB INLET
- EXISTING WATER MAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING STRUCTURE
- EXISTING VEGETATION
- PROPOSED IMPROVEMENTS:
- PROPOSED ROAD CENTERLINE
- LIMIT OF WORK LINE
- CURB AND GUTTER
- 24' RESIDENTIAL DRIVEWAY
- PROPOSED CONTOURS
- PROPOSED SPOT ELEVATION
- RETAINING WALL
- SDRSD D-75 BROW DITCH
- BIORETENTION BASIN
- STORM DRAIN HEADWALL
- STORM DRAIN CLEANOUT
- AREA DRAIN
- STORM DRAIN INLET
- TYPE F CATCH BASIN
- RIP RAP ENERGY DISSIPATOR PER SDD-104
- PVC STORM DRAIN (SIZE VARIES)
- WATER SERVICE
- TRAFFIC SIGNAL
- PARKING GARAGE WALL
- CUT/FILL SLOPE
- PERMEABLE PAVERS
- PROPOSED RIP-RAP
- TREE PER LANDSCAPE PLANS

PREPARED BY:

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REGISTERED PROFESSIONAL ENGINEER — WILLIAM GREGG MACK — No. 73620 — CIVIL — STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 — DATE
EXPIRATION: 12/31/2022

PROJECT NAME: ALL PEOPLES CHURCH	DRAWN BY: GJK
PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120	CHECKED BY: W. MACK
PROJECT TRACKING SYSTEM NUMBER: 636444	ORIGINAL DATE: 04-22-2019
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SHEET TITLE: PRELIMINARY GRADING PLAN	
SHEET NUMBER: C 2.0 OF 7	

PLSA 2936

PRELIMINARY UTILITY PLAN
SITE DEVELOPMENT PERMIT NO. 2292338
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION

SEE SHEET C 2.0 FOR SEPARATE PRELIMINARY GRADING PLAN

SCALE: 1"=40'

40' 0 40' 80' 120'

PARCEL MAP 8393

PARCEL 1

DEL CERRO UNIT NO. 11 MAP 4249

DEL CERRO UNIT NO. 1 MAP 3222

COLLEGE AVENUE

INTERSTATE 8 OFF RAMP (CALTRANS RIGHT-OF-WAY)

CALTRANS RIGHT OF WAY PER 59-11VC 12

CONNECT PROPOSED PUBLIC 8" PVC WATER MAIN TO EXISTING WATER MAIN IN DEL CERRO BLVD. (APPROXIMATELY 300')

PROPOSED PUBLIC WATER LINE EXTENSION SEE SHEET C6.0

WATER CROSSING FS 449.38 , 8" E 444.71 (EX. 42" WATER TOP PIPE +/- 440.88) (IE +/- 437.38)

WATER CROSSING FS 448.00 , 8" E 443.33 (EX. 48" WATER TOP PIPE +/- 440.00) (IE +/- 436.00)

PROPOSED (PUBLIC) STORM DRAIN PIPE COLLAR CONNECTION TO EXISTING STORM DRAIN (FS=446.5) (IE=440.0±)

PROPOSED 2" PUBLIC DOMESTIC WATER SERVICE PER SDW-149 W/ METER PER SDW-113 & WS-07 AND PRIVATE BFPD PER SDW-155

END OF WATER MAIN EXTENSION WITH END CAP ASSEMBLY AND BLOW OFF

EXISTING 20' WIDE EASEMENT TO REMAIN FOR SDG&E BOOL 2998, PAGE 282 AS SHOWN ON MAP 3664

EXISTING 8' WIDE EASEMENT FOR SDG&E TO REMAIN PER FILE 123315, BOOK 1972

APPROX. LOCATION OF EX. 36" RCP STORM DRAIN PER DWG. 5899-L

APPROXIMATE LOCATION OF EXISTING PUMP STATION PER DWG 6854-W

APPROXIMATE LOCATION OF EXISTING 42" AC WATER PER DWG 6255-L

APPROXIMATE LOCATION OF EXISTING 48" WATER PER DWG 6854-6-W

EXISTING 80' WIDE PUBLIC WATER EASEMENT TO REMAIN PER BOOK 2492, PAGE 369

PROPOSED D-75 TYPE B DRAINAGE DITCH

NOTE: NO APPROVED IMPROVEMENTS OR LANDSCAPING, PRIVATE WATER, SEWER AND STORM DRAIN FACILITIES, GRADING OR ENHANCED PAVING SHALL BE INSTALLED IN OR OVER ANY WATER OR SEWER EASEMENT PRIOR TO THE APPLICANT OBTAINING AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT

1" PUBLIC IRRIGATION WATER SERVICE PER SDW-150

PROPOSED PRIVATE FIRE RPDA PER SDW-120

EXISTING EASEMENT FOR STORM DRAINS PER BOOK 7491, PAGE 4 TO BE VACATED

EXISTING 4.0' EASEMENT PER MAP NO. 3222

PROPOSED 2" DOMESTIC & IRRIGATION WATER LINE IN DRAINAGE DITCH HIGH SIDE-LEFT

PUBLIC STORM DRAIN CLEANOUT RIM ● FS 436.4 IE 429.9

PUBLIC STORM DRAIN CLEANOUT RIM ● FS 425.2 IE 418.7

PROPOSED PVT. D-7 TYPE F CATCH BASIN TB 407.12 IE IN 406.0 IE OUT 389.2

EXISTING EASEMENT FOR SLOPE RIGHTS BOOK 7189, PAGE 161 OF OFFICIAL RECORDS

PORTION OF 15' WIDE EASEMENT FOR STORM DRAINS PER INSTRUMENT NO. 160682 TO BE VACATED

SDRSD D-75 TYPE-F DITCH

PUBLIC STORM DRAIN CLEANOUT RIM ● FS 409.0 IE IN 402.5 IE OUT 397.0

EXISTING END OF SEWER MAIN PER DWG 6073-D (NOTE:MAIN PLUGGED, NO UPSTREAM CONNECTIONS)

EXISTING 10' WIDE DRAINAGE EASEMENT FOR STORM DRAIN PER BOOK 5873, PAGE 469 TO BE VACATED

SWMP BASIN TC 428.5 473 SF Q=1.15 CFS V=1.95 FPS

TC/TW 421.62 BIO FG 412.15 TC/TW 423.0 BIO FG 417.15

IE=417.15 Q=1.24 CFS V=5.46 CFS PROPOSED PF-7 TYPE F CATCH BASIN TB 418.00 IE IN 416.85 (IE OUT 414.0)

TC/TW 420.22 UPPER BIO TG 417.15 LOWER BIO FG 413.42 TC/TW 417.12 BIO FG 413.42

IE OUT 408.38

PVT. STORM DRAIN CLEANOUT IE 419.09

PROPOSED D-29 TYPE "I" CATCH BASIN 428.00 TG 423.17 IE

12"X12" BROOKS BOX TG 429.5 IE 425.5

STORMDRAIN CROSSING TOP 9" TO BASIN 418.31 IE 9" TO BASIN 417.56 TOP 12" TRUNK LINE 416.56 IE EXISTING LINE 415.56

CURB INLET TC 421.71 FL 420.87 IE OUT 417.71 24" X 24" BROOKS BOX TG 417.0 IE 413.0

24" X 24" BROOKS BOX TG 417.0 IE 413.0

TG 418.15 IE IN 414.15 IE OUT 410.87

PVT. STORM DRAIN CLEANOUT IE 406.5

TG 414.42 IE IN 410.42 IE OUT 408.68

TW 418.65 TC 417.65 UPPER BIO FG 417.15 LOWER BIO FG 412.42

EX. 18" R.C.P. STORM DRAIN TO BE REMOVED

PROPOSED D-75 DITCH

PUBLIC STORM DRAIN CLEANOUT RIM ● FS 390.0 IE 382.0

388.0 IE D-40 RIP-RAP Q=3.96 CFS V=6.08 FPS

PROPOSED 15' PUBLIC DRAINAGE EASEMENT W/ 18" SD PIPE

PROPOSED 15' PUBLIC S.D. EASEMENT

PROPOSED D-75 TYPE D DRAINAGE DITCH

PROPOSED PUBLIC D-7 TYPE F CATCH BASIN TB 393.19 IE IN 392.07 (IE OUT 389.0)

EXISTING 18" R.C.P. SD PER CITY OF SAN DIEGO DWG. NO. 12048-L

EXISTING 10' EASEMENT PER MAP 3222

EXISTING 8' EASEMENT PER MAP 3222

PROPOSED FIRE HYDRANT PER SDW-104

PROPOSED PVT. D-7 TYPE F CATCH BASIN TB 390.0 IE IN 388.68 (IE OUT 386.3)

PROPOSED D-75 TYPE B DRAINAGE DITCH

CITY OF SAN DIEGO MAINTENANCE ACCESS EASEMENT FOR THE PUBLIC UTILITY DEPARTMENT AND PARKS & RECREATION (VARIES IN WIDTH 16' TO 30') MIN. RADIUS 28'

ROOF DRAINAGE NOTE: IT IS ACKNOWLEDGED THAT ALL ROOF/BALCONY DRAINS WILL BE ROUTED DIRECTLY TO BMP BASINS TO MEET HYDROLOGY, WATER QUALITY, AND HYDROMODIFICATION PURPOSES. ROOF DRAINS WILL BE SPECIFIED AND LOCATED ON CONSTRUCTION DOCUMENTS IN THE FUTURE.

PROPOSED CHURCH STRUCTURE FF 391.0 PAD 390.0

FF 393.5 PAD 392.5

PROPOSED PVT. D-7 TYPE F CATCH BASIN TB 391.7 IE IN 390.58 (IE OUT 388.88)

PVT. SEWER FORCE MAIN 395.0 TG 389.1 IE

PROPOSED 16' DG MAINTENANCE ACCESS ROAD (20' GRADED WIDTH) FOR PUD AND PARKS & REC

PROP. 20' TOTAL WIDTH PUBLIC SEWER EASEMENT

EX. 4' EASEMENT FOR PUBLIC USE PER MAP 3222 LIMIT OF ACCESS RELINQUISHMENT TO INTERSTATE 8

EX. 12' EASEMENT FOR PUBLIC USE PER MAP 3222

PROPOSED 8" PUBLIC PVC SEWER MAIN 1% SLOPE

EX. SEWER MANHOLE NO. 55 (RIM 407.2) (FG 406.0) (IE +/- 401.2) VERIFY IN-FIELD

NEW SEWER MANHOLE IN PARKS & REC LAND RIM 410.0 FG 3408.0 IE +/- 403.9 CONNECTION TO EXISTING MH NO.55

PROP. 20' TOTAL WIDTH PUBLIC SEWER EASEMENT

CITY OF SAN DIEGO MAINTENANCE ACCESS EASEMENT FOR THE PUBLIC UTILITY DEPARTMENT AND PARKS & RECREATION (VARIES IN WIDTH 16' TO 30') MIN. RADIUS 28'

PROP. 20' TOTAL WIDTH PUBLIC SEWER EASEMENT

CITY OF SAN DIEGO PARKS OPEN SPACE

PROPOSED MODIFIED D-30 HEADWALL & D-40 RIP-RAP IE 356.8 Q=5.88 CFS V=11.95 FPS

MODIFIED D-30 HEADWALL (TYP.) Q=3.68 CFS V=4.53 FPS

388.0 IE

MODIFIED PVT. SDD-116 TYPE "B" CURB INLET TC 390.71 FL 389.88 IE 388.69

15" PVC

393.10 TG 388.10 IE

391.10 TG 388.59 IE

SPLASH PAD

ACCESS RIGHTS RELINQUISHED PER BOOK 7189, PAGE 161

10' WIDE EASEMENT FOR TELEPHONE AND TELEGRAPH PER BOOK 5690, PAGE 96

PVT. SEWER LATERAL

PROPOSED D-75 TYPE D DRAINAGE DITCH

PROPOSED PVT. D-7 TYPE F CATCH BASIN TB 372.72 DITCH IE IN 369.6 PIPE IE IN 369.0 PIPE OUT 356.9

PROPOSED PUBLIC C.O. RIM 371.5 IE 367.09

PUBLIC STORM DRAIN C.O. FG 390.9 IE 384.9

24"X24" PVT. BROOKS BOX TG 389.0 IE 373.0

9" PVC @10%

PROPOSED PVT. D-7 CATCH BASIN TYPE F TB 371.36 DITCH IE IN 370.23 PIPE IE IN 369.0 PIPE OUT 356.9

12" PVC @2%

24" X 24" PVT. BROOKS BOX RIM 389.0 IE 373.3

PVT. STORM DRAIN C.O. FS 390.76 IE 388.50

PVT. D-29 TYPE "I" CATCH BASIN 391.77 388.80

PVT. D-29 TYPE "I" CATCH BASIN FG 392.1 IE 388.3

PROPOSED 10' WIDE TRAPEZOIDAL EARTHEN CHANNEL PER SDD-109

EXISTING 15' WIDE PUBLIC DRAINAGE EASEMENT

PROPOSED 10' DRAINAGE EASEMENT

PROPOSED D-40 RIP-RAP PER SDD-104 Q=109.45 CFS V=9.78 FPS

EXISTING SEWER MANHOLE #4 PER SURVEY & DWG 6307-D TO BE ABANDONED (RIM=365.6±) (IE 353.13±)

10' WIDE EASEMENT FOR PUBLIC SEWER PER BOOK 7444 PAGE 508 TO BE VACATED WITHIN SUBJECT PROPERTY

EXISTING S.M.H. #3 TO BE ABANDONED (RIM=359.0±) (IE=347.4±)

EXISTING DITCH

EXISTING 8" PUBLIC SEWER MAIN (±300' CONC. ENCASED) PER 6073-D

EXISTING 48"CONC. HEADWALL (I.E.=351.0±) Q_{100}=115.05 CFS; V_{100}=9.78 FPS (VALUES INCLUDE OFFSITE DRAINAGE)

EXISTING (PUBLIC) 48" SD STORM DRAIN PER 59-11VC12 PG 33

(SEWER L=303.04')

PROPOSED D-75 TYPE B DRAINAGE DITCH

EXISTING DITCH

EXISTING 8" VCP (±190' CONC. ENCASED) SEWER PER 6073-D

PROPOSED 48" PUBLIC S.D.

PROPOSED 12' WIDE D-30 HEAD WALL IE 366.33 Q= 101.55 CFS V=14.4 FPS

PROPOSED RIP-RAP PER SDD-104

EXISTING STORM DRAIN INLET PER 59-11 VC12 PG 33 TO BE PROTECTED IN PLACE

EXISTING STORM DRAIN INLET PER 59-11 VC12 PG 33 TO BE PROTECTED IN PLACE

EXISTING STORM DRAIN OUTLET (IE=364.7±) PER DWG. #59-11VC12

EXISTING STORM DRAIN OUTLET (IE=364.7±) PER DWG. #59-11VC12

EXISTING 15' WIDE PUBLIC DRAINAGE EASEMENT

BASIN FG 388.0 1728 SF

PROPOSED PUBLIC C.O. RIM 371.5 IE 367.09

PROPOSED PVT. D-7 CATCH BASIN TYPE F TB 372.72 DITCH IE IN 369.6 PIPE IE IN 369.0 PIPE OUT 356.9

24"X24" PVT. BROOKS BOX TG 389.0 IE 373.0

BASIN FG 388.0 4252 SF

PROPOSED D-75 TYPE B DRAINAGE DITCH

EXISTING 10' EASEMENT FOR STORM DRAINS PER BOOK 7491, PAGE 4 TO BE VACATED

EXISTING 4.0' EASEMENT PER MAP NO. 3222

PROPOSED 2" DOMESTIC & IRRIGATION WATER LINE IN DRAINAGE DITCH HIGH SIDE-LEFT

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24"X24" PVT. BROOKS BOX TG 389.0 IE 373.0

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PROPOSED D-75 TYPE B DRAINAGE DITCH

LEGEND

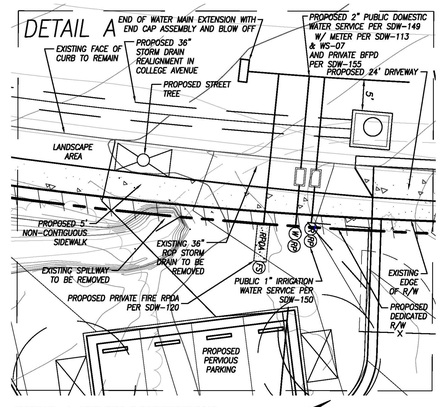
EXISTING IMPROVEMENTS

- BOUNDARY LINE
- EXISTING CONTOURS (139)
- EXISTING CURB AND GUTTER
- EXISTING STREET CENTERLINE
- EXISTING SEWER MAIN (S)
- EXISTING STORM DRAIN MAIN
- EXISTING CURB INLET
- EXISTING WATER MAIN (W)
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING VEGETATION

PROPOSED IMPROVEMENTS

- SITE BOUNDARY
- ROW
- PUBLIC RIGHT-OF-WAY CENTERLINE
- CURB AND GUTTER
- RESIDENTIAL DRIVEWAY (WIDTH VARIES)
- PROPOSED CONTOURS (146)
- PROPOSED SPOT ELEVATION FS=145.0
- RETAINING WALL
- TYPE "B" BROW DITCH
- STORM DRAIN HEADWALL
- STORM DRAIN (SIZE PER PLAN)
- STORM DRAIN CLEANOUT
- 2" PUBLIC WATER SERVICE & METER W/ PRIVATE BFPD (W) (RP)
- 8" PVC WATER MAIN (PUBLIC) (W)
- 8" FIRE SERVICE WITH RPDA (PUBLIC) (RPDA) (FS)
- 1" IRRIGATION SERVICE (PUBLIC) (IR)
- RIP RAP ENERGY DISSIPATOR PER SDD-104
- PROPOSED PERMABLE PAVEMENT PARKING
- TREE PER LANDSCAPE PLANS
- PROPOSED SEWER ACCESS

DETAIL A



DETAIL A: UTILITY CONNECTIONS

SCALE: 1"=10'

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 EXPIRATION: 12/31/2022 DATE

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: PRELIMINARY UTILITY PLAN

SHEET NUMBER: C 3.0 OF 7

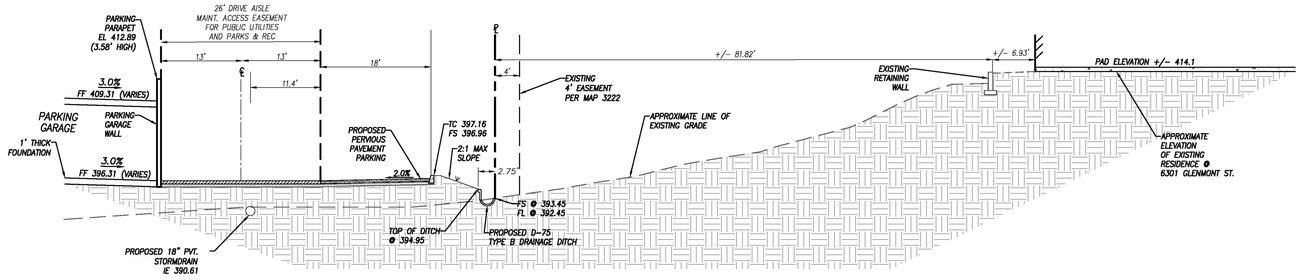
DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019

REVISIONS:

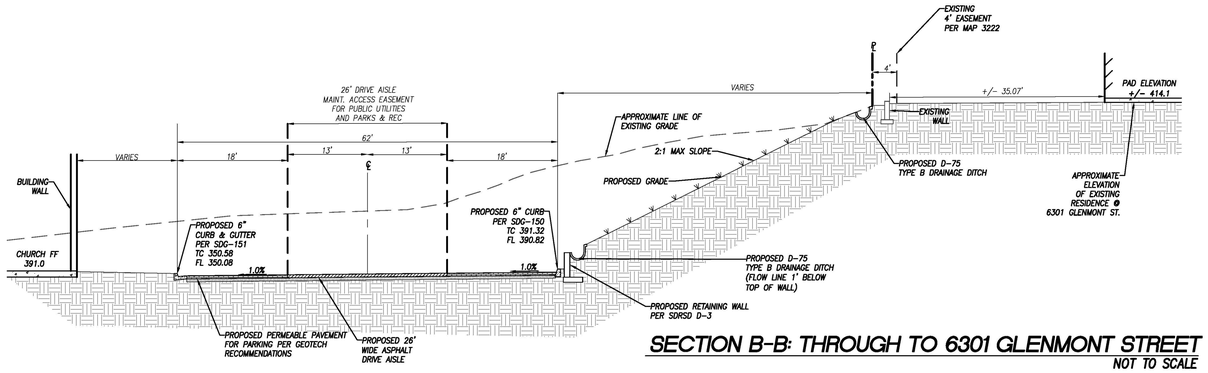
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2. 08-28-2020
3. 2-12-2020
4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.

SECTIONS AND DETAILS

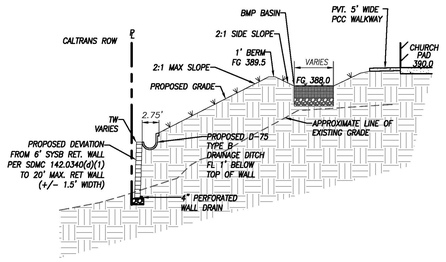
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PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH



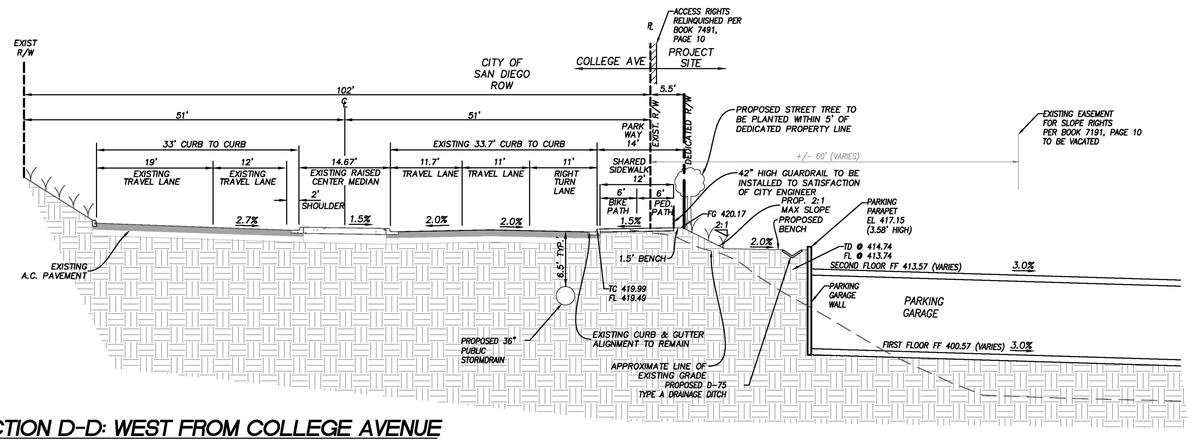
SECTION A-A: THROUGH TO 5608 MARNE AVE
NOT TO SCALE



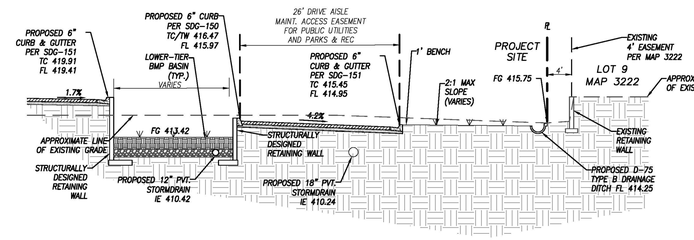
SECTION B-B: THROUGH TO 6301 GLENMONT STREET
NOT TO SCALE



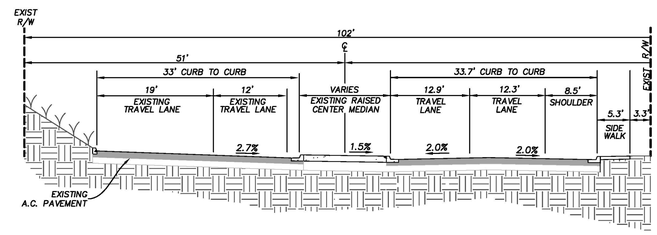
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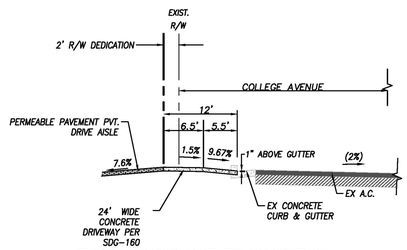
SECTION D-D: WEST FROM COLLEGE AVENUE
NOT TO SCALE



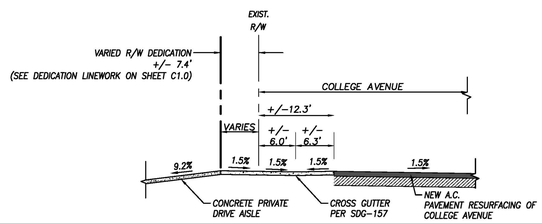
SECTION E-E: EASTERLY BOUNDARY BASIN
NOT TO SCALE



TYPICAL SECTION: COLLEGE AVENUE
NOT TO SCALE



TYPICAL SECTION: NORTHERN 24' DRIVEWAY
NOT TO SCALE



TYPICAL SECTION: 30' SIGNALIZED INTERSECTION
NOT TO SCALE

PREPARED BY:

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REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 DATE
EXPIRATION: 12/31/2022

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PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: SECTIONS & DETAILS

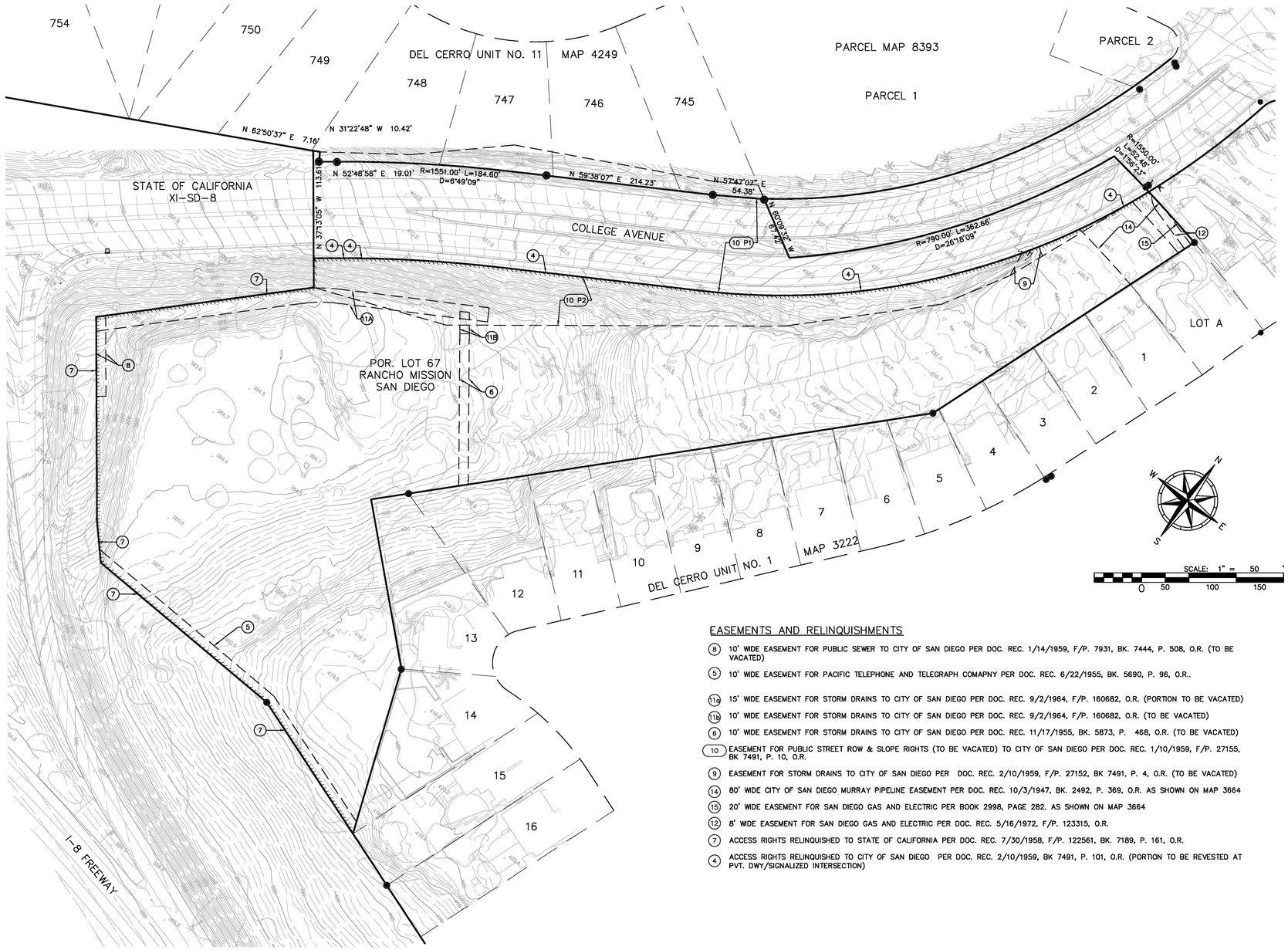
SHEET NUMBER: C 4.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019

REVISIONS:
1. 03-17-2020
2. 08-28-2020
3. 2-12-2020
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PLSA 2936

EXISTING CONDITIONS EXHIBIT
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PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH



EASEMENTS AND RELINQUISHMENTS

(8) 10' WIDE EASEMENT FOR PUBLIC SEWER TO CITY OF SAN DIEGO PER DOC. REC. 1/14/1959, F/P. 7931, BK. 7444, P. 508, O.R. (TO BE VACATED)

(5) 10' WIDE EASEMENT FOR PACIFIC TELEPHONE AND TELEGRAPH COMAPNY PER DOC. REC. 6/22/1955, BK. 5690, P. 96, O.R..

(11a) 15' WIDE EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 9/2/1964, F/P. 160682, O.R. (PORTION TO BE VACATED)

(11b) 10' WIDE EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 9/2/1964, F/P. 160682, O.R. (TO BE VACATED)

(6) 10' WIDE EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 11/17/1955, BK. 5873, P. 468, O.R. (TO BE VACATED)

(10) EASEMENT FOR PUBLIC STREET ROW & SLOPE RIGHTS (TO BE VACATED) TO CITY OF SAN DIEGO PER DOC. REC. 1/10/1959, F/P. 27155, BK 7491, P. 10, O.R.

(9) EASEMENT FOR STORM DRAINS TO CITY OF SAN DIEGO PER DOC. REC. 2/10/1959, F/P. 27152, BK 7491, P. 4, O.R. (TO BE VACATED)

(14) 80' WIDE CITY OF SAN DIEGO MURRAY PIPELINE EASEMENT PER DOC. REC. 10/3/1947, BK. 2492, P. 369, O.R. AS SHOWN ON MAP 3664

(15) 20' WIDE EASEMENT FOR SAN DIEGO GAS AND ELECTRIC PER BOOK 2998, PAGE 282. AS SHOWN ON MAP 3664

(12) 8' WIDE EASEMENT FOR SAN DIEGO GAS AND ELECTRIC PER DOC. REC. 5/16/1972, F/P. 123315, O.R.

(7) ACCESS RIGHTS RELINQUISHED TO STATE OF CALIFORNIA PER DOC. REC. 7/30/1958, F/P. 122561, BK. 7189, P. 161, O.R.

(4) ACCESS RIGHTS RELINQUISHED TO CITY OF SAN DIEGO PER DOC. REC. 2/10/1959, BK 7491, P. 101, O.R. (PORTION TO BE REVESTED AT PVT. DWY/SIGNALIZED INTERSECTION)

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT ON MARCH 16, 2015.

GARY D. MELLOM, PLS 8537 12-31-2022

PROFESSIONAL LAND SURVEYOR
GARY D. MELLOM
LS 8537
STATE OF CALIFORNIA

PROJECT INFORMATION

CLIENT: ALL PEOPLE'S CHURCH
ADDRESS: COLLEGE AVE AND I-8 FREEWAY, SAN DIEGO, CA
APN: 463-010-10

ABBREVIATED LEGAL DESCRIPTION

PORTION OF LOT 67 OF RANCHO MISSION OF SAN DIEGO, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS DESCRIBED IN GRANT DEED RECORDED NOVEMBER 3, 1975 AS DOCUMENT NO. 75-306249, O.R.

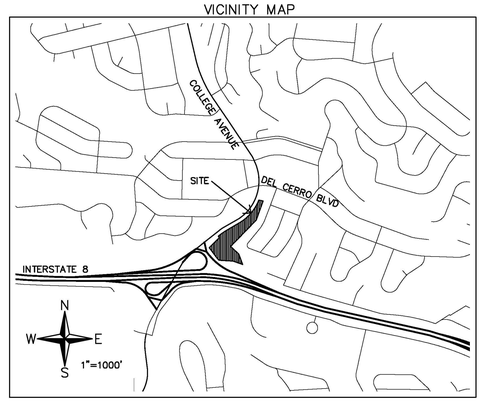
SURVEY NOTES

1. THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL(S) SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY. BENCHMARK:
   BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.
2. THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.
3. MAPPING DATA FLOWN ON FEBRUARY 26, 2015 AND PROVIDED BY AEROTECH MAPPING.
4. TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. 996-23035459-PPI WITH AN EFFECTIVE DATE OF AUGUST 19, 2013.

LEGEND

- FOUND MONUMENT
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- CENTER LINE
- ADJOINING PROPERTY LINE
- EXISTING EASEMENT
- FENCE LINE
- WALL
- INDEX CONTOUR LINE
- INTERMEDIATE CONTOUR LINE
- VEGETATION LINE
- ACCESS RIGHTS RELENQUISHED
- SWIMMING POOL
- PALM TREE
- SINGLE TREE
- PEDESTRIAN SIGNAL
- POST- MISC
- SPOT ELEVATION
- BRIDGE SIGNS
- FIRE HYDRANT
- METER / UTILITY
- MANHOLE
- STREET LIGHT
- LIGHT POLE
- SIGNS
- GATE
- TRAFFIC SIGNAL
- VALVE
- BUILDING ROOFLINE

VICINITY MAP



PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER
WILLIAM GREGG MACK
No. 73620
CIVIL
STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 DATE
EXPIRATION: 12/31/2022

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8
SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444


INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: EXISTING CONDITIONS EXHIBIT

SHEET NUMBER: C 5.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019

REVISIONS:
1. 03-17-2020
2. 08-28-2020
3. 2-12-2020
4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.



OFFSITE IMPROVEMENTS
SITE DEVELOPMENT PERMIT NO. 2292338
PLANNED DEVELOPMENT PERMIT NO. 2292339
EASEMENT VACATION NO. 2292340
TENTATIVE MAP NO. 2490918
LAND USE PLAN NO. 2292367
ALL PEOPLES CHURCH
LEGEND
DEDICATED PROPERTY LINE
EXISTING PROPERTY LINE/ROW
NEW 6" CURB
EXISTING STRIPING
PROPOSED STRIPING
NEW NON-CONTIGUOUS SIDEWALK A=6968 SF
SIGHT DISTANCE
LIMITS OF GRIND & OVERLAY
RETAINING WALL PER INFO BULLETIN 222
PROPOSED TRAFFIC SIGNAL
PROPOSED TYPE-A CURB RAMP PER SDG-133
PROPOSED FILL SLOPE
PROPOSED CROSSWALK SDM-116
STREET TREE PER SDL-101
DEL CERRO BLVD
COLLEGE AVENUE
PROPOSED 2-STORY PARKING STRUCTURE
SECTION A-A: COLLEGE AVENUE SOUTH OF PVT. ROAD (12' SHARED SIDEWALK)
NOT TO SCALE
SECTION B-B: COLLEGE AVENUE SOUTH OF PVT. ROAD (12' SHARED SIDEWALK)
NOT TO SCALE
SECTION C-C: COLLEGE AVENUE AT MIDDLE OF INTERSECTION
NOT TO SCALE
SECTION D-D: COLLEGE AVENUE NORTH OF PVT. ROAD W/ 6' BIKE LANE
NOT TO SCALE
SECTION F-F: NORTHERLY DRIVEWAY
NOT TO SCALE
DETAIL A
DETAIL A: 12' SHARED SIDEWALK TRANSITION
SCALE: 1"=10'
DETAIL B
DETAIL B: SIGNALIZED INTERSECTION AND RESURFACING
SCALE: 1"=20'
SCALE: 1"=30'
PREPARED BY:
PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
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ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com
REGISTERED PROFESSIONAL ENGINEER
WILLIAM GREGG MACK
No. 73620
CIVIL
STATE OF CALIFORNIA
WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2022
DATE
PROJECT NAME:
ALL PEOPLES CHURCH
PROJECT ADDRESS:
NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8
SAN DIEGO, CALIFORNIA 92120
PROJECT TRACKING SYSTEM NUMBER:
636444
INTERNAL ORDER NUMBER:
PENDING
SHEET TITLE:
SHEET NUMBER:
C 6.0 OF 7
DRAWN BY: GJK
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ORIGINAL DATE: 04-22-2019
REVISIONS:
1. 03-17-2020
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3. 2-12-2020
PLSA 2936

TRAFFIC SIGNAL INSTALLATION PLAN

SITE DEVELOPMENT PERMIT NO. 92338
PLANNED DEVELOPMENT PERMIT NO. 92339
EASEMENT VACATION NO. 92340
TENTATIVE MAP NO._____
ALL PEOPLES CHURCH

TRAFFIC SIGNAL GENERAL NOTES *

1. PULL BOXES SHALL BE NO. 6 AND CONDUIT 3"UNLESS NOTED OTHERWISE.
2. LOCATIONS OF ALL UNDERGROUND UTILITIES ARE APPROXIMATE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND VERIFY THE EXACT LOCATIONS AND CONDITIONS ON THE JOB SITE.
3. THE TRAFFIC SIGNAL CONTRACTOR SHALL OBTAIN A TRAFFIC CONTROL PLAN PERMIT FROM THE CITY OF SAN DIEGO DEVELOPMENT SERVICES DEPARTMENT PERMIT CENTER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO START OF WORK.
4. ALL TRAFFIC SIGNAL POLE FOUNDATIONS SHALL HAVE A 3" CONDUIT INSTALLED TO THE ADJACENT NO. 6 PULL BOX. THE CONTROLLER FOUNDATION SHALL HAVE A SPARE 3"CONDUIT INSTALLED TO THE ADJACENT NO. 6 PULL BOX FOR FUTURE USE AS SHOWN ON CONDUIT SCHEDULE. (NEEDS TO BE ADDED AS A NOTE AT THE BOTTOM OF THE CONDUIT SCHEDULE)
   A. ALL CONDUIT CROSSINGS SHALL INCLUDE A MINIMUM OF TWO (2) 3" CONDUITS.
5. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF LOOP DETECTORS, TRAFFIC STRIPING, PAVEMENT MARKINGS, PARKING REMOVAL AND TRAFFIC SIGNING (EXCEPT "G" SERIES STREET NAME SIGNS) AS SHOWN ON THESE PLANS.
   A. THE TRAFFIC SIGNAL CONTRACTOR SHALL OBTAIN THE APPROVAL OF CITY RESIDENT TRAFFIC ENGINEER (ETS DIVISION) OF THE LOOP LOCATIONS PRIOR TO CUTTING, AS WELL AS, PRIOR TO ANY INSTALLATION AND/OR REMOVAL OF STRIPING, PAVEMENT MARKING, PARKING REMOVAL AND SIGN LOCATIONS.
   B. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL UNNECESSARY AND CONFLICTING STRIPING AND PAVEMENT MARKINGS.
   C. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL PAVEMENT MARK-OUTS.
6. THE TRAFFIC SIGNAL CONTRACTOR SHALL NOT ERECT ANY SIGNAL STANDARDS MORE THAN THREE (3) WEEKS PRIOR TO SCHEDULED TRAFFIC SIGNAL TURN-ON.
7. CONTRACTOR SHALL PROVIDE ALL CABLING AND CONDUCTORS NECESSARY TO PERFORM ALL FUNCTIONS SHOWN ON THESE PLANS.
8. ALL POLES, CONDUIT, PULL BOXES, STRIPING AND LOOP DETECTOR LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATE. ACTUAL LOCATIONS SHALL BE DETERMINED BY FIELD CONDITIONS AT THE TIME ON CONSTRUCTION AND AS DIRECTED BY THE CITY OF SAN DIEGO.
9. ROUTING AND LOCATIONS OF UNDERGROUND ELECTRICAL SYSTEM IS DIAGRAMMATIC AND SUBJECT TO APPROVAL OF THE CITY ELECTRICAL ENGINEER. UNDERGROUND ELECTRICAL LINES AND SUBSURFACE STRUCTURES MAY BE RELOCATED IF NECESSARY TO CLEAR OTHER EXISTING UNDERGROUND FACILITIES.
10. ALL TREES AND SHRUBS SHALL BE TRIMMED OR REMOVED AS DETERMINED BY THE CITY RESIDENT ENGINEER AS REQUIRED TO MAINTAIN SIGNAL HEAD VISIBILITY AND SIGHT DISTANCE.
11. ALL VEHICLE HEADS SHALL BE 12" L.E.D. WITH AN INCANDESCENT LOOK AND BACKPLATES.
12. ALL VEHICLE DETECTOR LOOPS SHALL BE TYPE "E" AS SHOWN ON THIS PLAN.
   A. DETECTOR LOOPS SHALL BE 6' DIAMETER WITH 10' SPACING AND POSITIONED IN CENTER OF LANE UNLESS OTHERWISE SHOWN.
   B. FRONT DETECTOR LOOPS SHALL BE TYPE "E" MODIFIED LOOPS PER SDE – 104.
   C. ALL LOOP LAYOUTS SHALL INCLUDE LAYOUT OF HOMERUN LINES, WHICH MUST BE APPROVED PRIOR TO INSTALLATION.
   D. BICYCLE DETECTOR LOOPS SHALL BE TYPE Q.
13. PEDESTRIAN SIGNAL INDICATIONS AND PUSH BUTTONS SHALL BE INTERNATIONAL SYMBOLS. PEDESTRIAN SIGNAL INDICATIONS SHALL BE 16"X18" L.E.D. COUNTDOWN TIMER WITH AN INCANDESCENT LOOK. PEDESTRIAN PUSH BUTTONS SHALL BE 2" PER ADA REQ.
14. ALL CROSSWALKS SHALL BE CONTINENTAL TYPE PER SDM-116.
15. PEDESTRIAN PUSH BUTTON HOUSING COLOR SHALL MATCH COLOR NO. 33538 OF FED-STD-595 WHEN PEDESTRIAN PUSH BUTTONS ARE PLACED ON A TRAFFIC SIGNAL POLE.
16. PEDESTRIAN PUSH BUTTON LOCATIONS SHALL FOLLOW THE CA MUTCD STANDARDS AND THE THE ADA REQUIREMENTS.

SIGN LEGEND


R9-3a


R3-4


R73-2(CA)



R61-19(CA)

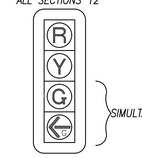

R3-18

CONDUCTOR TABLE *

AWG SIZE OR CABLE TYPE	PHASE	POLE OR CIRCUIT	CONDUIT SIZE & RUN 3" ①	3" ②	3" ③	3" ④	3" ⑤	3" ⑥	3" ⑦	3" ⑧	2-3" ⑨
CONDUCTORS / PPB 3 12	CONDUCTORS	POLE - A	–	–	–	–	–	–	–	–	–
		POLE - B	–	–	–	–	–	–	–	–	–
		POLE - C	–	–	–	–	–	–	–	–	–
		POLE - D	–	–	–	–	–	–	–	–	–
		POLE - E	–	–	–	–	–	–	–	–	–
		POLE - F	–	–	–	–	–	–	–	–	–
		-	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–
TOTAL CABLES		3 CONDUCTOR/12 CONDUCTOR	–	–	–	–	–	–	–	–	–
NO 6		SIGNAL SERVICE	–	–	–	–	–	–	–	–	–
NO 8		GROUND	–	–	–	–	–	–	–	–	–
NO 10		LIGHTING	–	–	–	–	–	–	–	–	–
6 PAIR NO.22		INTERCONNECT CABLE	–	–	–	–	–	–	–	–	–
TYPE "B" DLC	1	LOOP DETECTOR	–	–	–	–	–	–	–	–	–
	2	" "	–	–	–	–	–	–	–	–	–
	3	" "	–	–	–	–	–	–	–	–	–
	4	" "	–	–	–	–	–	–	–	–	–
	5	" "	–	–	–	–	–	–	–	–	–
	6	" "	–	–	–	–	–	–	–	–	–
	7	" "	–	–	–	–	–	–	–	–	–
	8	" "	–	–	–	–	–	–	–	–	–
TOTAL DLC			–	–	–	–	–	–	–	–	–
EMERGENCY VEHICLE DETECTOR (EV-DLC)			–	–	–	–	–	–	–	–	–
TOTAL			–	–	–	–	–	–	–	–	–
PERCENT FILL			–	–	–	–	–	–	–	–	–

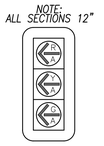
NOTES:
1. USE ALL NEW SIGNAL CABLE AND/OR CONDUCTORS.
2. INSTALL 1 UNBROKEN GROUND FROM MP TO CONTROLLER.

NOTE: ALL SECTIONS 12"



DETAIL "B"

NOTE: ALL SECTIONS 12"


DETAIL "A"

POLE SCHEDULE *

NO.	TYPE	HGT	SIG. M.A.	LUM. M.A.	LUMINARE LED	PLACEMENT A	PLACEMENT B	SIGNAL MOUNTING VEHICLE	PEDESTRIAN SIGNAL	PEDESTRIAN PB	QUAD	REMARKS
(A)	15 TS	30'	-	15'	Z14	-	-	-	-	-	Ø2	8	
(B)	1A	10'	-	-	-	-	-	-	TV-2-T	SP-1-T	-	-	4
(C)	26-4-100	30'	40'	15'	Z14	-	4'	2-MAS	SV-2-T	–	-	-	ALL PEOPLE'S CHURCH
(D)	26-3-100	30'	25'	15'	Z14	-	4'	MAS	SV-2-T	-	-	-	COLLEGE AVE.
(E)	19-4-100	30'	30'	15'	Z14	-	-	MAS	SV-2-T	SP-1-T	-	-	ALL PEOPLE'S CHURCH 4
(F)	1A	10'	-	-	-	-	-	–	TV-1-T	–	Ø2	8	

ALL VEHICLE HEADS SHALL BE 12" WITH BACKPLATES AND GLASS LENSES. ANCHOR BOLT NUT COVERS SHALL BE PROVIDED.

1. PED PUSH BUTTONS SHALL BE 2-WIRE ACCESSIBLE PEDESTRIAN SIGNALS (APS) PER CITY SPECIFICATIONS.

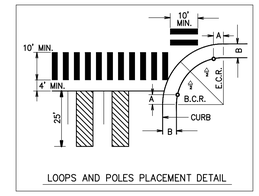
LEGEND

– VIDEO DETECTION CAMERA

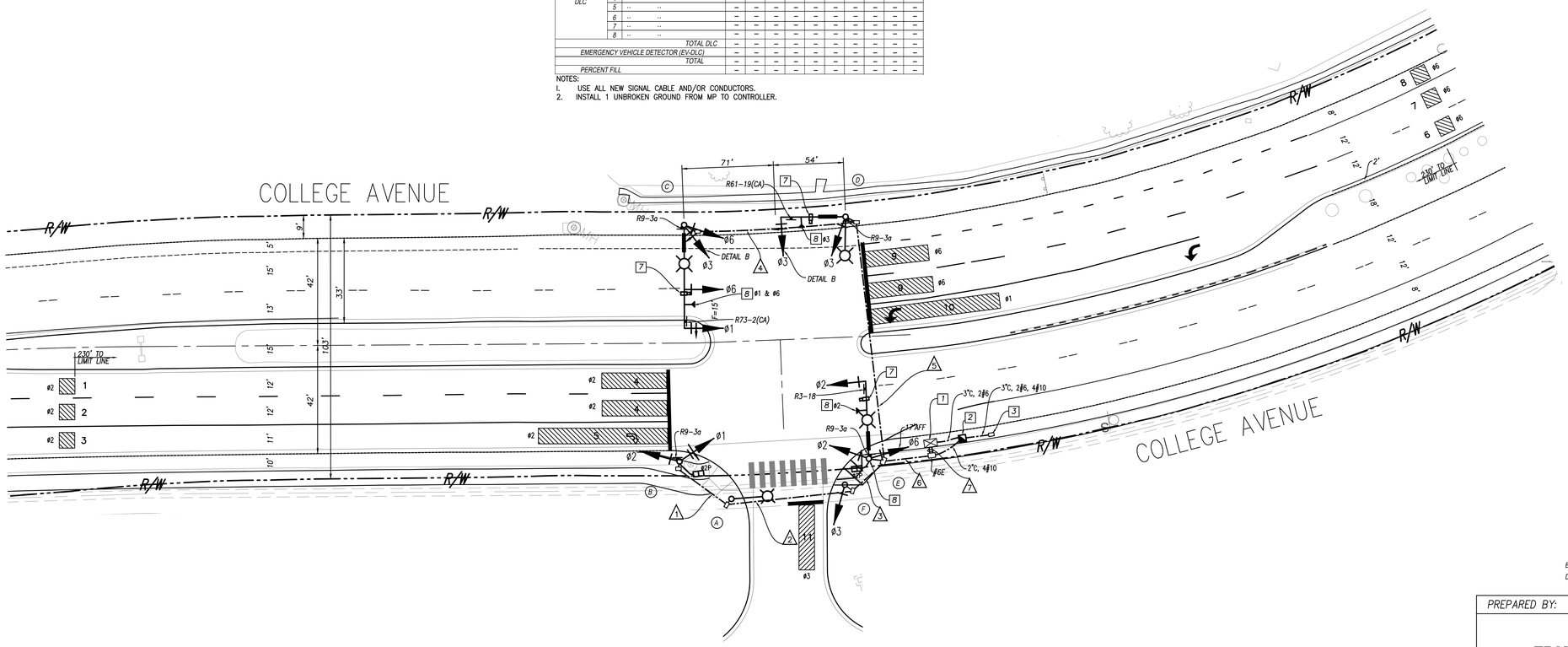
– VIDEO DETECTION ZONE (SIZE AND LOCATION TO BE DETERMINED IN FIELD)



PPB LOCATION



LOOPS AND POLES PLACEMENT DETAIL



DETECTOR ASSIGNMENT *

DETECTOR	PHASE	SLOT	FIELD TERMINAL
PPB	2P	I12U	T8-4 & COM 6
EVA	2	J12U	T9-4 & COM 6
EVC	1+6	J12L	T9-5 & COM 6
EVD	8	J14U	T9-8 & COM 9
FLASH SENSE		I14U	T8-10 & COM 12
STOP TIMING		I14L	T8-11 & COM 12
RR1 FLASH		J14U	T9-10 & COM 12
RR2 LTD OPE		J14L	T9-11 & COM 12

THE LOCATIONS OF EXISTING UTILITY INSTALLATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE. THERE MAY BE OTHER UNDERGROUND UTILITY INSTALLATIONS WITHIN THE PROJECT AREA THAT ARE NOT SHOWN.

TRAMES SOLUTIONS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES, LIABILITY OR COSTS RESULTING FROM CHANGES OR ALTERATIONS MADE TO THIS PLAN WITHOUT THE EXPRESSED WRITTEN CONSENT OF TRAMES SOLUTIONS, INC.

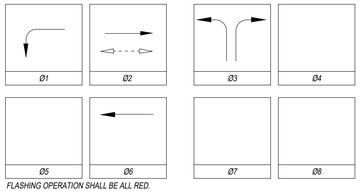
ENGINEERING PERMIT NO:_____

DISCRETIONARY PERMIT NO:_____

SCALE 1"=20'

20 10 0 20 40 60

PHASE DIAGRAM *



FLASHING OPERATION SHALL BE ALL RED.

TRAFFIC SIGNAL CONSTRUCTION NOTES *

1. FURNISH AND INSTALL 2770 CONTROLLER IN A TYPE 332 CABINET, EQUIPPED WITH ONE MODEL 412C SYSTEM MEMORY MODULE, ONE MODEL 404 MODEM FOR 8-PHASE CAPABILITY AND CITY APPROVED BATTERY BACKUP.
2. FURNISH AND INSTALL TYPE III SERVICE PEDESTAL AND CABINET WITH 50A-1P CIRCUIT BREAKER AND 30A-1P BREAKER FOR STREET LIGHTS.
3. CONTRACTOR TO VERIFY SERVICE REQUIREMENTS WITH SDG&E.
4. FURNISH AND INSTALL COUNTDOWN PEDESTRIAN SIGNAL HEADS PER CITY OF SAN DIEGO REQUIREMENTS.
5. FURNISH AND INSTALL CCTV CAMERA ON POLE G WITH ALL APPURTENANT EQUIPMENT, CONTRACTOR SHALL SUPPLY ALL NECESSARY HARDWARE PER CITY REQUIREMENTS.
6. INSTALL #6 PULL BOX. NO SPLICING IN HANDHOLE.
7. FURNISH AND INSTALL VIDEO DETECTION CAMERA ON TELSPAR WITH ALL EQUIPMENT, CONTRACTOR SHALL SUPPLY ALL NECESSARY HARDWARE PER CITY REQUIREMENTS.
8. FURNISH AND INSTALL 5228I-DIRECTIONAL DUAL CHANNEL EVPE DETECTOR PER CITY OF SAN DIEGO REQUIREMENTS.

The City of SAN DIEGO

DEVELOPMENT SERVICES DEPARTMENT

STREET DATA TABLE

STREET NAME	CLASSIFICATION	SPEED (MPH)	ADT (VEHICLES)	R/W (FT)
COLLEGE AVENUE	4 LANE MAJOR	40	????	102
PRIVATE DRIVE	2 LANE LOCAL	25	????	0

PRELIMINARY
NOT FOR CONSTRUCTION

PREPARED BY:

TRAMES SOLUTIONS INC.
4225 OCEANSIDE BLVD, #354 H
OCEANSIDE, CA 92056
TEL: 760-291-1400
TRAFFIC DESIGN ★ TRAFFIC IMPACT ANALYSIS ★ TRANSPORTATION PLANNING

REGISTERED PROFESSIONAL ENGINEER SOROUSH KHADEM No. 72472 CIVIL STATE OF CALIFORNIA

SOROUSH KHADEM R.C.E. 72472 DATE
EXPIRATION: 6/30/2020

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: TRAFFIC SIGNAL INSTALLATION PLAN

SHEET NUMBER: _____ OF 7

DRAWN BY: BEW
CHECKED BY: .

ORIGINAL DATE: 3-17-20

REVISIONS:
1. 03-17-2020
2. _____
3. _____
4. _____
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13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

3-17-2020

PLSA 2936

Attachment 5
Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

PRELIMINARY DRAINAGE STUDY

All People's Church

PTS#: 636444 _

APN: 463-010-10-00
Northeast Corner of Interstate 8 and College Avenue
San Diego, California 92120

Prepared By:

William Gregg Mack, P.E. RCE 73620 EXP: 12-31-22
Pasco Laret Suiter & Associates, Inc.
535 N. Highway 101, Suite A
Solana Beach, CA 92075

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

Prepared for:
All Peoples Church
5577 University Avenue
San Diego, CA 92105

February 8, 2020

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1.2 Existing Conditions 1
1.3 Proposed Conditions 1

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4. CONCLUSION 7

Appendix 1 ..... Pre & Post Hydrology Calculations
Appendix 2 ..... Existing and Proposed Drainage Exhibits
Appendix 3 ..... Caltrans Headwall Calculations

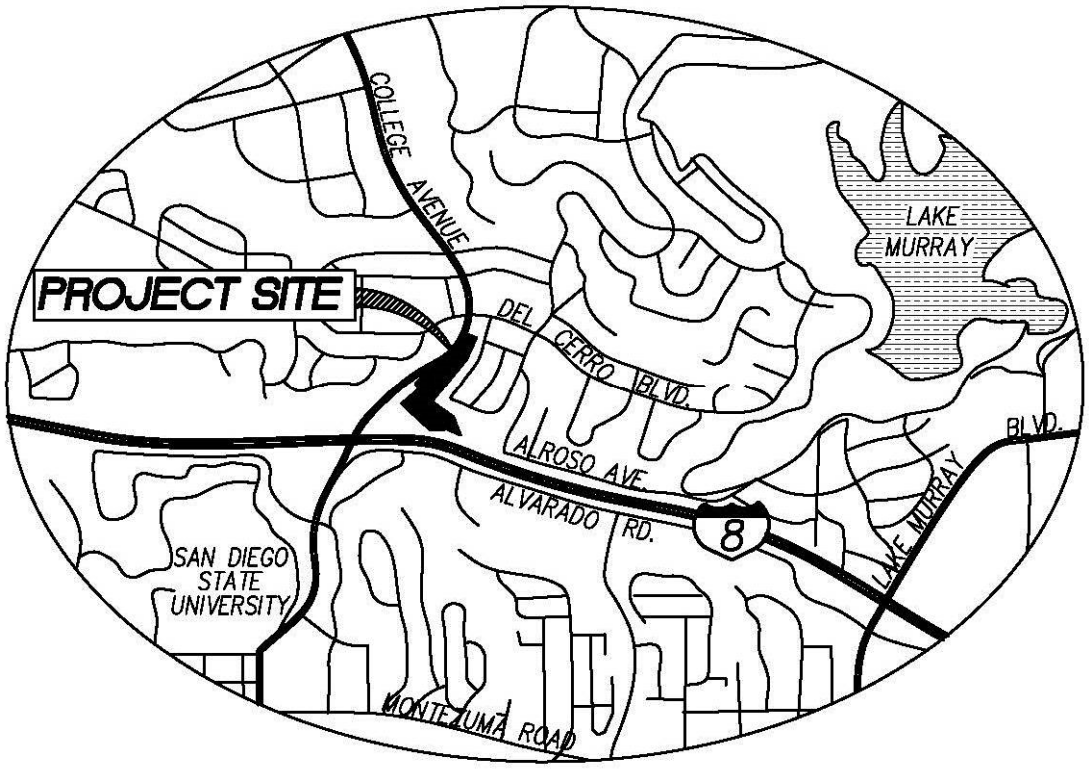


Figure 1 Vicinity Map

1. INTRODUCTION

1.1 Project Description

The All Peoples Church project is a church and associated parking garage located on a vacant 5.99 acre parcel at the northeast corner of Interstate 8 and College Avenue in the City of San Diego, California, and is currently undeveloped in its existing condition. The APN for the project site is 463-010-10-00. The subject property is a corner parcel within the City of San Diego and is bordered to the west by College Avenue, to the south by Interstate 8, to the east by Single-Family Residential Homes, and to the north by a Chevron Gas Station. All of the surrounding area has been developed and is mainly comprised of Single-Family Residential and Commercial land uses. The FEMA Map shows that the subject property is not located in an existing floodplain.

The project is designed in accordance with the January 2017 Edition of the Drainage Design Manual, the 2018 San Diego Storm Water Standards Manual and complies with the Regional Water Quality Control Board Region 9 MS4 Permit, Order No. R9-2015-0100. The project does not propose work adjacent regulated waters therefore 401 and 404 permits are not applicable. There are no negative impacts to any adjacent properties.

1.2 Existing Conditions

The project site is currently vacant, undeveloped land in the existing condition. There are three locations where offsite run-on enters the project site. An existing 36-inch reinforced concrete pipe (RCP) public storm drain main enters the project site at the northern boundary of the property. Runoff is conveyed in a southerly direction through the project site in an earthen drainage channel prior to discharging to an existing 48-inch RCP which conveys flow under the Interstate 8 off-ramp. An existing 18-inch RCP discharges storm water onto the project site at the eastern boundary of the project site. Runoff flows westerly, confluences with the earthen drainage channel and continues in a southerly direction. An existing 30-inch RCP discharges storm water onto the project site at the southwestern boundary of the project site. Runoff flows southeasterly and confluences with the earthen drainage channel which at this location begins flowing southeasterly prior to discharging to the existing Caltrans 48-inch RCP which continues under the I-8 off-ramp.

All of the existing onsite storm water that is generated by the project site flows toward the existing 48-inch storm drain near the southwest corner of the project site.

Refer to the Existing Hydrology Exhibit in Appendix 2 for further information regarding the drainage patterns of the project site and adjacent properties.

1.3 Proposed Conditions

The project proposes to fill in a portion the existing drainage channel to create 1 building PAD for a church, a 2-story parking garage, a private drive with two access driveways from College Avenue, permeable pavement parking and drive aisles, public and private utilities and associated improvements, with 4 biofiltration basins that will provide storm water mitigation of the 100-year storm event peak flow rate.

A 36-inch public offsite storm drain main is proposed to connect to the existing 36-inch RCP stormdrain, that discharges into the site at the northern portion of the lot currently, but that will be rerouted down College Avenue. This main 36-inch trunk line in College Avenue will transition to a public 48” RCP line after it turns on-site near the Caltrans ROW. Additionally, an 18-inch public storm drain is proposed along

the eastern property line to re-route a portion of the existing 18-inch RCP stormdrain (per the City of San Diego) and convey offsite storm runoff from the existing 18-inch RCP to the existing 48-inch public storm drain outlet, via a connection to the proposed 48-inch public stormdrain trunk line, mentioned above. Approximately 4.91 acres of the developed site will drain to the 4 proposed biofiltration basins located throughout the project site, to detain and mitigate the 100-year storm event post-development. The 4 biofiltration basins will provide mitigation of the 100-year storm event peak flow rate prior to discharging on-site before the stormwater moves further downstream to the existing off-site Caltrans 48-inch public storm drain system at the south end of the project site. The remaining 1.08 acres of slopes and self-mitigated areas will follow natural drainage paths or be conveyed via concrete brow ditches to the ultimate discharge site at the south end of the project site as well.

The new 48-inch public RCP will capture and convey off-site storm runoff that is discharged onto the project site in the existing condition, as well as transport treated water from the new proposed development (via private drainage structures and pipe networks) to Biofiltration Basins 1-3 into an engineered earthen channel per SDD-109 that will run along the existing drainage route (adjacent to the proposed wall) at the southwest corner of the site, before it discharges and picks up the treated stormwater of Biofiltration Basin 4, and follows natural overland drainage pathways and is picked up via the existing stormdrain in Caltrans ROW that flows beneath Interstate 8. All on-site and off-site runoff will have an ultimate discharge point at the off-site 48-inch RCP Caltrans stormdrain that goes under the I-8 offramp to College Avenue, which matches the existing condition.

Refer to the Proposed Hydrology Exhibit in Appendix 2 for further information regarding the drainage patterns of the project site and adjacent properties.

2. METHODOLOGY

The proposed project has been analyzed to determine the peak runoff flow for 100 year, 6 hour rainfall event using the Rational Method per the City of San Diego Drainage Design Manual (Section 1-102.3). The Runoff Coefficient, C, for the existing and proposed conditions were selected using Table 2 of page 82 of the City of San Diego Drainage Design Manual, Revised C Method. The time of concentration for all existing and proposed drainage areas were calculated using the minimum TC of 5 min which yields an intensity of 4.4 inches per hour.

The proposed LID best management practices have been sized and located such that all runoff will be directed to landscape planters or through pervious areas where feasible before ultimately discharging to the downstream storm drain system.

2.1 Rational Method

As mentioned above, runoff from the project site was calculated for the 100-year storm events. Runoff was calculated using the Rational Method which is given by the following equation:
$Q = C \times I \times A$

Where:
Q = Flow rate in cubic feet per second (cfs)
C = Runoff coefficient (Determined from Table A-1, P.A-3 in the City of San Diego Drainage Design Manual)
I = Rainfall Intensity in inches per hour (in/hr)
A = Drainage basin area in acres, (ac)
Rational Method calculations were performed using the City of San Diego Drainage Design Manual (Section 1-102.3)

2.2 Runoff Coefficient

The runoff coefficients for the hydrologic analysis were calculated using Table A-1 from the City of San Diego Drainage Design Manual January 2017. A natural/rural land coefficient of 0.45 was used. A coefficient of 0.85 has still been used per Table A-1 of the Drainage Design Manual.

Runoff Coefficient:

Pervious	C = 0.45
Commercial	C = 0.85

Table 2.1 below summarizes the onsite percent impervious and runoff coefficient, "C", in the existing and proposed condition.

Table 3.2 – Summary of Onsite Impervious Area

	Total Impervious Area (ac)	Total Pervious Area (ac)	Total Project Area (ac)	Percent Impervious (%)	Percent Permeable Pavement (%)	Runoff Coefficient "C"
Existing	0.00	5.99	5.99	0%	0%	0.45
Proposed	2.46	3.53	5.99	41%	19%	0.50

Weighted runoff coefficients were calculated where appropriate and are calculated as shown on the Post-Hydrology Exhibit in Appendix 2.

2.3 Rainfall Intensity

Rainfall intensity was determined using the Rainfall Intensity Duration Frequency Curves from page 83 of the City of San Diego Drainage Design Manual (April, 1984). Based on a 5 min time of concentration, an intensity of 4.4 inches per hour is used.

2.4 Tributary Areas

Drainage basins are delineated in the Post-Project Hydrology Exhibit in Appendix 2 and graphically portray the tributary area for each drainage basin.

3. HYDROLOGIC RESULTS

3.1 Existing and Proposed Peak Flow Rate Comparison

Table 3.1 below summarizes the overall (offsite and onsite) existing and proposed hydrologic results at the outfall of the project site, Node 160. Detailed AES computer output is provided in the Appendix 2.

Table 3.1 – Summary of the Overall 100-Year Storm Event Peak Flow Rates

Overall		Existing Condition			Proposed Condition (Unmitigated)			Proposed Condition (Mitigated)		
Basin	Node	Total Drainage Area Offsite and Onsite	Q100 (cfs)	Tc (min)	Total Drainage Area Offsite and Onsite (ac)	Q100 (cfs)	Tc (min)	Total Drainage Area Offsite and Onsite (ac)	Q100 (cfs)	Tc (min)
	160	64.4	118.26	13.07	64.4	116.62	13.06	64.4	115.05	13.06
			V100 (fps)			V100 (fps)			V100 (fps)	
			13.92			9.86			9.78	

For the proposed unmitigated and mitigated condition, AES models were created to analyze only the onsite and offsite proposed drainage areas that end at the same POC (the Caltrans headwall and 48" RCP line that flows beneath Interstate-8). The onsite proposed unmitigated condition consists of analysis of the proposed project drainage characteristics without considering the detention provided by the 4 biofiltration basins. The onsite proposed unmitigated results were then input into the overall AES model to create the overall unmitigated proposed condition. Combined onsite and offsite unmitigated condition AES output is located in Appendix 1.

For the onsite proposed mitigated condition, the effects of the detention provided by the 4 biofiltration basins was included in the analysis. Because the proposed condition has a peak flow Q100 that is less than the existing condition Q100, the site meets the hydrology requirements without even taking into account the mitigated condition. However, the mitigated Q is even lower once the routing of the basins is taken into account. The longer routing of the proposed condition, in conjunction with utilizing permeable pavement, leads to a proposed condition with a similar time of concentration and a lower overall peak flow. Therefore, the site has brought the proposed condition to a peak flow beneath that of the existing condition, thus meeting required drainage standards for the 100-year storm.

3.2 Existing Downstream System

In the existing and proposed condition, storm water runoff from the project site flows to an existing Caltrans 48-inch RCP which continues under the I-8 off-ramp. Please see Appendix 3 for the pre-developed and post-developed headwall calculations for the Caltrans receiving headwall off-site.

The headwall calculation results are as follows:
Existing Condition: Pre-AES 118.26 CFS – Headwall Height 6.13' (EL 357.09)
Post-Mitigated: Post-Mitigated AES 115.05 CFS – Headwall Height 5.95' (EL 356.91)

The headwater level lowers in the developed condition and does not reach the bottom of wall elevation of FG 357 (the lowest FG for the entire wall length), thus the headwater will not impact the retaining wall (15'+ distance away).

In addition, the headwall height (Post-Mitigated) divided by the diameter of receiving pipe should be less than 1.5 for the 100-year design flows (to avoid pressurizing the pipe and ensuring the flow can adequately enter the pipe). Per calculation below, this works.

HW/D= 5.95'/ 4'=1.4875 < 1.5

The proposed biofiltration basins will provide mitigation for increased runoff and detain the 100-year storm event peak flow rate back below to the existing condition. Therefore, the proposed project has no adverse impacts to the existing downstream system.

4. CONCLUSION

This report presents the drainage analysis for the proposed All Peoples Church project located at the northeast corner of Interstate 8 and College Avenue in the City of San Diego. The project consists of the construction of 1 church, 1 two-story parking garage, a private drive and associated permeable parking area, public and private utilities and associated improvements, and 4 biofiltration basins which will provide mitigation of the 100-year storm event peak flow. As a result of the detention provided by the 4 proposed biofiltration basins and the vault, the proposed All Peoples Church project mitigates the 100-year storm event peak flow rate back below the existing condition. The proposed storm drain mainline is sized to sufficiently convey the onsite and offsite 100-year storm event peak flow rate in the post development condition. There are no negative impacts to any adjacent properties.

Appendix 1
Pre and Post Hydrology Calculations

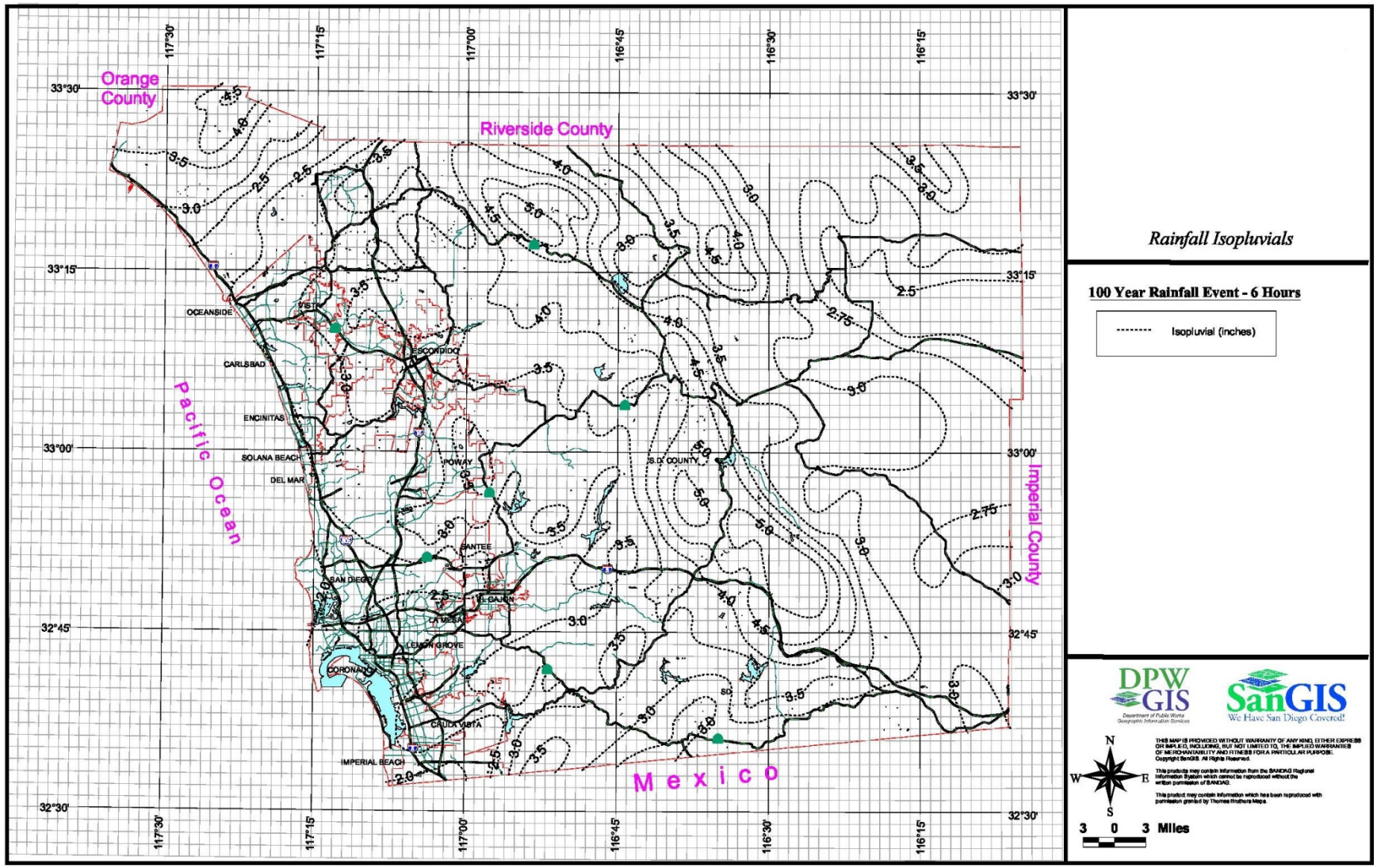


Figure B-2. 100-Year 6-Hour Isopluvials.



Map Scale: 1:2,050 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 22, 2018—Aug 31, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DcF	Diablo-Urban land complex, 15 to 50 percent slopes	D	1.5	21.8%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	5.1	76.4%
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	D	0.1	1.8%
Totals for Area of Interest			**6.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ALL PEOPLES CHURCH
J-2936
2/9/2021

100 YR ON-SITE PRE-PROJECT HYDROLOGY

Drainage Area	Area Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious		Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
EX-1	Existing Site	5.99	260944	0	0%	100%		0.45	11.96	24464

100 YR ON-SITE POST-PROJECT HYDROLOGY

BMP Location	Basin Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	%Permeable Pavement	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
Basin-1	WESTERLY UPPER PARKING TO BASIN #1	0.55	**23775.00**	**0.00**	0%	100%	52%	0.50	1.21	2477
Basin-2	EASTERLY UPPER PARKING TO BASIN#2	0.63	**27352.00**	**1709.00**	6%	94%	80%	0.50	1.39	2849
Basin-3	ROAD, PARKING GARAGE, AND PLAZA AREA TO MWS#3	1.30	**56780.00**	**40542.00**	71%	29%	14%	0.75	4.34	8872
Basin-4	CHURCH, ROAD TO BASIN #4	2.44	**106108.00**	**64936.00**	61%	39%	7%	0.65	7.02	14369
Basin-5	SELF-RETAINING	1.08	**46929.00**	**0.00**	0%	100%	0%	0.45	2.15	4400
Totals:		**5.99**	**260944**	**107187**	**41%**	**38%**	**31%**	**0.50**	**16.12**	**32966**

Note:
1

100 Yr Storm at 5 Min TC		
Intensity:	4.40	in/hr
Precip:	2.50	in

Runoff Coefficient	
Impervious	0.85
Permeable Pavement	0.45
Existing C Coefficient	0.45

Runoff Detention Calculations:	
Pre-project Volume (cu-ft)	24464
Post-Project Volume (cu-ft)	32966
BMP Volume (cu-ft)	10230
Net volume retained (cu-ft)	**1727**
Post-Project Vol (adjusted)	**22736**

Results: 22736cf < 24464cf
Therefore, detention requirements are met.

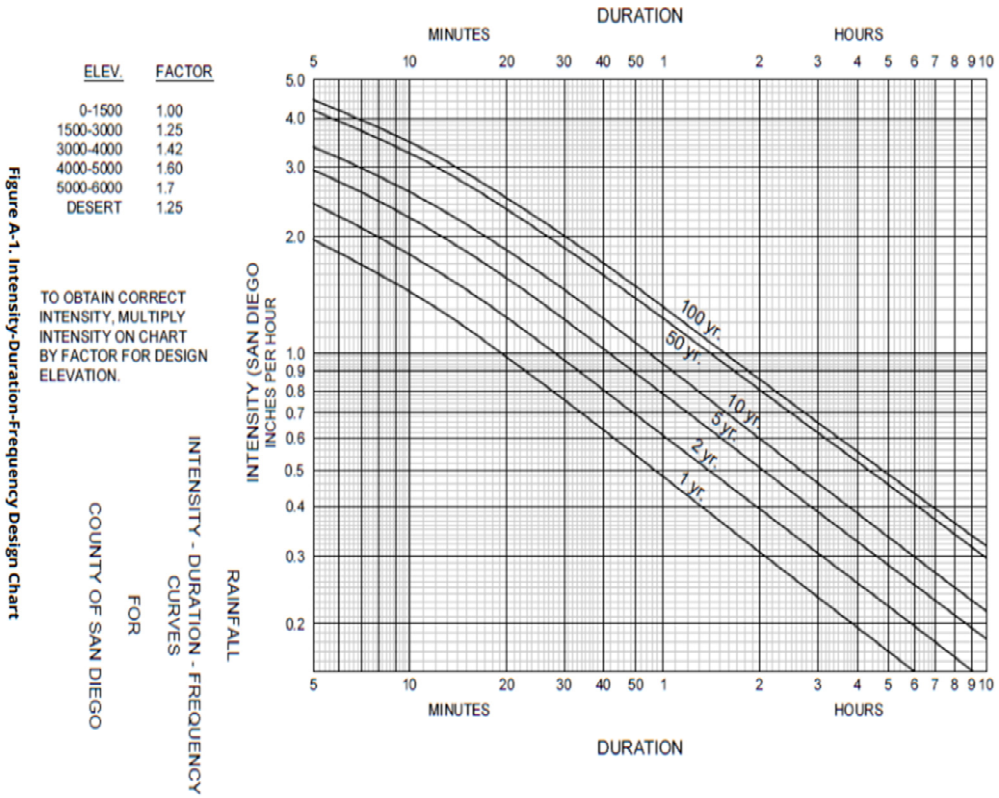


Figure A-1. Intensity-Duration-Frequency Design Chart

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A-1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                              Analysis prepared by:

                         PASCO LARET SUITER & ASSOCIATES
                           535 N. HIGHWAY 101, SUITE A
                              SOLANA BEACH, CA 92075
                                   858.259.8212

 ************************* DESCRIPTION OF STUDY *************************
* 2936 ALL PEOPLES CHURCH PRE-DEVELOPMENT CONDITION 100-YEAR              *
* FEBRUARY 2, 2021                                                        *
* C=0.45 PERVIOUS C=0.85 COMMERCIAL                                       *
 *************************************************************************

  FILE NAME: 1075EX.DAT
  TIME/DATE OF STUDY: 13:50 02/02/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   13.0      8.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180
  3   15.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180
  4   30.0     25.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    720.00
  DOWNSTREAM ELEVATION(FEET) =    716.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.713
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.265
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1010.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    716.00  DOWNSTREAM(FEET) =    648.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   315.00   CHANNEL SLOPE =  0.2159
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.851
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.41
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   2.18
  Tc(MIN.) =    7.89
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.69
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.483
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.12
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =     405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1015.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  648.00  DOWNSTREAM ELEVATION(FEET) =  616.00
  STREET LENGTH(FEET) =   415.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =    9.34
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.575
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.554
  SUBAREA AREA(ACRES) =    6.80      SUBAREA RUNOFF(CFS) =   13.61
  TOTAL AREA(ACRES) =        7.4        PEAK FLOW RATE(CFS) =      14.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.21
  FLOW VELOCITY(FEET/SEC.) =  5.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.80
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1020.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  616.00  DOWNSTREAM ELEVATION(FEET) =  542.00
```

```
  STREET LENGTH(FEET) =   572.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.83
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.14
  STREET FLOW TRAVEL TIME(MIN.) =   1.40   Tc(MIN.) =   10.74
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.369
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.553
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    2.78
  TOTAL AREA(ACRES) =        8.9        PEAK FLOW RATE(CFS) =      16.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.59
  FLOW VELOCITY(FEET/SEC.) =  6.87   DEPTH*VELOCITY(FT*FT/SEC.) =   2.18
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =    1392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1025.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  542.00  DOWNSTREAM ELEVATION(FEET) =  464.00
  STREET LENGTH(FEET) =   938.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.68
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   16.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.07
  STREET FLOW TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =   12.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.127
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.552
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    6.19
  TOTAL AREA(ACRES) =       12.5        PEAK FLOW RATE(CFS) =      21.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  16.96
  FLOW VELOCITY(FEET/SEC.) =  7.28   DEPTH*VELOCITY(FT*FT/SEC.) =   3.24
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =    2330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.94
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    12.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.58

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1035.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
  UPSTREAM ELEVATION(FEET) =    508.00
  DOWNSTREAM ELEVATION(FEET) =    502.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.358
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.332
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1040.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  502.00  DOWNSTREAM ELEVATION(FEET) =  464.00
  STREET LENGTH(FEET) =   768.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =    8.72
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.694
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.550
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =   11.99
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      12.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.52
  FLOW VELOCITY(FEET/SEC.) =  4.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE   1030.00 TO NODE   1040.00 =     866.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1025.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   460.90  DOWNSTREAM(FEET) =   458.90
  FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
```

```
 AT DEPTH = 0.94 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.59
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    9.02
 LONGEST FLOWPATH FROM NODE   1030.00 TO NODE   1025.00 =    1004.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.02
 RAINFALL INTENSITY(INCH/HR) =   3.64
 TOTAL STREAM AREA(ACRES) =     6.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.59

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       21.58    12.94        3.127         12.50
     2       12.59     9.02        3.635          6.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       27.65     9.02       3.635
     2       32.42    12.94       3.127

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      32.42   Tc(MIN.) =   12.94
 TOTAL AREA(ACRES) =       18.7
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =    2330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1025.00 TO NODE   1042.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   457.10  DOWNSTREAM(FEET) =   452.60
 FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.18
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
```

```
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.42
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1042.00 =    2406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1042.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.02
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =    18.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.42

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1050.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    468.00
  DOWNSTREAM ELEVATION(FEET) =    464.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.597
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1060.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  464.00  DOWNSTREAM ELEVATION(FEET) =  457.80
  STREET LENGTH(FEET) =   690.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.57
    HALFSTREET FLOOD WIDTH(FEET) =   27.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.68
  STREET FLOW TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =    6.53
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.109
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.781
  SUBAREA AREA(ACRES) =    9.90      SUBAREA RUNOFF(CFS) =   31.73
  TOTAL AREA(ACRES) =       10.1        PEAK FLOW RATE(CFS) =      32.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   HALFSTREET FLOOD WIDTH(FEET) =  39.76
  FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   2.28
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  690.0 FT WITH ELEVATION-DROP =   6.2 FT, IS   34.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1060.00
  LONGEST FLOWPATH FROM NODE   1045.00 TO NODE   1060.00 =     780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1042.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   452.00  DOWNSTREAM(FEET) =   448.30
  FLOW LENGTH(FEET) =   751.90   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.30
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.43
  PIPE TRAVEL TIME(MIN.) =   2.36    Tc(MIN.) =    8.89
  LONGEST FLOWPATH FROM NODE   1045.00 TO NODE   1042.00 =    1531.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1042.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.89
  RAINFALL INTENSITY(INCH/HR) =   3.66
  TOTAL STREAM AREA(ACRES) =    10.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       32.42    13.02        3.118         18.70
      2       32.43     8.89        3.660         10.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       60.04     8.89       3.660
      2       60.04    13.02       3.118

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      60.04   Tc(MIN.) =    8.89
  TOTAL AREA(ACRES) =       28.8
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1042.00 =    2406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1065.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   448.30  DOWNSTREAM(FEET) =   441.10
  FLOW LENGTH(FEET) =   315.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.32
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    9.26
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1065.00 =    2721.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1070.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    441.10  DOWNSTREAM(FEET) =    374.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   835.00   CHANNEL SLOPE =  0.0804
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      62.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.99
  AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   1.55
  Tc(MIN.) =   10.81
  SUBAREA AREA(ACRES) =     3.50       SUBAREA RUNOFF(CFS) =    5.29
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.612
  TOTAL AREA(ACRES) =       32.3         PEAK FLOW RATE(CFS) =      66.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   9.12
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1070.00 =    3556.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1070.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1090.00 TO NODE   1095.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    460.00
  DOWNSTREAM ELEVATION(FEET) =    457.50
  ELEVATION DIFFERENCE(FEET) =      2.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.913
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    82.78
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.50
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE   1095.00 TO NODE   1100.00 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  457.50  DOWNSTREAM ELEVATION(FEET) =  419.50
  STREET LENGTH(FEET) =  1815.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.65
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.41   FLOOD WIDTH(FEET) =   15.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.39
    SPLIT DEPTH(FEET) =    0.37   SPLIT FLOOD WIDTH(FEET) =   13.16
    SPLIT FLOW(CFS) =    5.72   SPLIT VELOCITY(FEET/SEC.) =    3.14
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   8.91   Tc(MIN.) =   11.83
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.579
  SUBAREA AREA(ACRES) =   12.50      SUBAREA RUNOFF(CFS) =   23.15
  TOTAL AREA(ACRES) =       12.9        PEAK FLOW RATE(CFS) =      24.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  4.01   DEPTH*VELOCITY(FT*FT/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1100.00 =    1905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   407.50  DOWNSTREAM(FEET) =   406.00
  FLOW LENGTH(FEET) =    95.10   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.83
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.25
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.03
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1105.00 =    2000.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.03
  RAINFALL INTENSITY(INCH/HR) =   3.23
  TOTAL STREAM AREA(ACRES) =    12.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.25

****************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1115.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    463.00
  DOWNSTREAM ELEVATION(FEET) =    461.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.793
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.00  DOWNSTREAM ELEVATION(FEET) =  417.00
  STREET LENGTH(FEET) =  1157.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.79
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.41   FLOOD WIDTH(FEET) =   15.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    4.57
    SPLIT DEPTH(FEET) =    0.14   SPLIT FLOOD WIDTH(FEET) =    1.53
    SPLIT FLOW(CFS) =    0.11   SPLIT VELOCITY(FEET/SEC.) =    0.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.85
  STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.) =    6.01
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.208
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.584
  SUBAREA AREA(ACRES) =    8.50      SUBAREA RUNOFF(CFS) =   20.75
  TOTAL AREA(ACRES) =        8.6        PEAK FLOW RATE(CFS) =      21.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  4.57   DEPTH*VELOCITY(FT*FT/SEC.) =   1.85
  LONGEST FLOWPATH FROM NODE   1110.00 TO NODE   1105.00 =    1257.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.01
  RAINFALL INTENSITY(INCH/HR) =   4.21
  TOTAL STREAM AREA(ACRES) =     8.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.15

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       24.25    12.03        3.227         12.90
      2       21.15     6.01        4.208          8.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       33.26     6.01       4.208
      2       40.47    12.03       3.227

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      40.47   Tc(MIN.) =   12.03
  TOTAL AREA(ACRES) =       21.5
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1105.00 =    2000.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   291.60   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.10
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.47
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.24
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1120.00 =    2291.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE   1070.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    382.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.0500
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.154
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.92
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =   12.69
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.579
  TOTAL AREA(ACRES) =       21.8         PEAK FLOW RATE(CFS) =      40.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   5.89
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1070.00 =    2451.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1070.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       40.47    12.69       3.154       21.80
  LONGEST FLOWPATH FROM NODE   1090.00 TO NODE   1070.00 =    2451.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       66.48    10.81       3.361       32.30
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1070.00 =    3556.90 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     100.95      10.81        3.361
      2     102.85      12.69        3.154

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     102.85   Tc(MIN.) =   12.69
  TOTAL AREA(ACRES) =       54.1

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1070.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1140.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =    361.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0695
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.125
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     103.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.75
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =   12.96
  SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    1.83
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.595
  TOTAL AREA(ACRES) =       55.4         PEAK FLOW RATE(CFS) =     103.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =  11.70
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1140.00 =    3743.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.96
  RAINFALL INTENSITY(INCH/HR) =   3.12
  TOTAL STREAM AREA(ACRES) =    55.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.09

****************************************************************************
  FLOW PROCESS FROM NODE   1125.00 TO NODE   1127.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
  UPSTREAM ELEVATION(FEET) =    476.00
  DOWNSTREAM ELEVATION(FEET) =    468.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.156
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
```

```
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE   1127.00 TO NODE   1130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    452.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.1143
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.23
  AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =    3.20
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.03
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1130.00 =     235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1130.00 TO NODE   1135.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    452.00  DOWNSTREAM(FEET) =    388.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   930.00   CHANNEL SLOPE =  0.0688
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.68
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   1.79
  Tc(MIN.) =    4.99
  SUBAREA AREA(ACRES) =     4.00       SUBAREA RUNOFF(CFS) =    8.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.517
```

```
  TOTAL AREA(ACRES) =        4.2         PEAK FLOW RATE(CFS) =       9.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =  10.53
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1135.00 =    1165.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1135.00 TO NODE   1140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.00  DOWNSTREAM(FEET) =   361.00
  FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.08
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.55
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.08
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1140.00 =    1281.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.08
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =     4.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.55

****************************************************************************
  FLOW PROCESS FROM NODE   1175.00 TO NODE   1176.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    467.00
  DOWNSTREAM ELEVATION(FEET) =    461.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.477
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1176.00 TO NODE   1140.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  461.00  DOWNSTREAM ELEVATION(FEET) =  393.00
  STREET LENGTH(FEET) =  1280.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 33.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.00
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.11
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   5.52   Tc(MIN.) =    8.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.830
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.21
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       5.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.62
  FLOW VELOCITY(FEET/SEC.) =  4.44   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE   1175.00 TO NODE   1140.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1176.00 TO NODE   1140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.00
  RAINFALL INTENSITY(INCH/HR) =   3.83
```

```
  TOTAL STREAM AREA(ACRES) =     1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      103.09    12.96        3.125         55.40
      2        9.55     5.08        4.384          4.20
      3        5.53     8.00        3.830          1.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       53.51     5.08       4.384
      2       77.51     8.00       3.830
      3      114.41    12.96       3.125

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     114.41   Tc(MIN.) =   12.96
  TOTAL AREA(ACRES) =       61.3
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1140.00 =    3743.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1075.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    361.00  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    97.00   CHANNEL SLOPE =  0.1031
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.112
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     114.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.92
  AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   0.12
  Tc(MIN.) =   13.07
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.56
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.596
  TOTAL AREA(ACRES) =       61.7         PEAK FLOW RATE(CFS) =     114.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.13   FLOW VELOCITY(FEET/SEC.) =  13.92
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1075.00 =    3840.90 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1180.00 TO NODE   1075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.112
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5901
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    3.78
  TOTAL AREA(ACRES) =       64.4   TOTAL RUNOFF(CFS) =     118.26
  TC(MIN.) =   13.07
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       64.4  TC(MIN.) =     13.07
  PEAK FLOW RATE(CFS)   =     118.26
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                              Analysis prepared by:

                         PASCO LARET SUITER & ASSOCIATES
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                              SOLANA BEACH, CA 92075
                                   858.259.8212

 ************************* DESCRIPTION OF STUDY *************************
* 2936 ALL PEOPLES CHURCH POST HYDROLOGY 100 YEAR UNMITIGATED             *
* FEBRUARY 2, 2021                                                        *
* C=0.45 PERV C=0.85 IMPERVIOUS                                           *
 *************************************************************************

  FILE NAME: 2936P100.DAT
  TIME/DATE OF STUDY: 15:27 02/02/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1065.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.26   RAIN INTENSITY(INCH/HOUR) =  3.59
  TOTAL AREA(ACRES) =    28.80   TOTAL RUNOFF(CFS) =     60.04

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE    100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   439.90  DOWNSTREAM(FEET) =   429.90
  FLOW LENGTH(FEET) =   255.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.72
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    100.00 =     255.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.90  DOWNSTREAM(FEET) =   418.70
  FLOW LENGTH(FEET) =   226.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.08
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    120.00 =     482.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   418.70  DOWNSTREAM(FEET) =   402.50
  FLOW LENGTH(FEET) =   245.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    9.89
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    130.00 =     728.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.00  DOWNSTREAM(FEET) =   382.10
  FLOW LENGTH(FEET) =    66.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.99
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.465
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5802
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =       28.9   TOTAL RUNOFF(CFS) =      60.04
  TC(MIN.) =    9.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   156.70
  UPSTREAM ELEVATION(FEET) =    449.00
  DOWNSTREAM ELEVATION(FEET) =    440.30
  ELEVATION DIFFERENCE(FEET) =      8.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.962
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.217
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.30  DOWNSTREAM(FEET) =    428.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   232.80   CHANNEL SLOPE =  0.0507
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.839
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.99
  Tc(MIN.) =    7.95
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     389.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   425.50  DOWNSTREAM(FEET) =   419.90
  FLOW LENGTH(FEET) =    80.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.31
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.15
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.10
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    510.00 =     469.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   419.90  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =   100.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.94
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.15
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.24
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    520.00 =     570.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.24
  RAINFALL INTENSITY(INCH/HR) =   3.78
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.15

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =    453.00
  DOWNSTREAM ELEVATION(FEET) =    446.90
  ELEVATION DIFFERENCE(FEET) =      6.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.777
```

```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.16
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.252
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    446.90  DOWNSTREAM(FEET) =    428.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   407.80   CHANNEL SLOPE =  0.0463
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.563
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.87
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.63
  Tc(MIN.) =    9.41
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     506.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   423.20  DOWNSTREAM(FEET) =   417.70
  FLOW LENGTH(FEET) =    64.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.95
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.07
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    9.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     571.10 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.542
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
 TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.24
 TC(MIN.) =    9.51

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   417.70  DOWNSTREAM(FEET) =   417.20
 FLOW LENGTH(FEET) =    31.80   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.24
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.61
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    216.00 =     602.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    216.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.524
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
 TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.41
 TC(MIN.) =    9.61

****************************************************************************
 FLOW PROCESS FROM NODE    225.00 TO NODE    226.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   408.70  DOWNSTREAM(FEET) =   408.60
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.011
```

```
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.41
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    9.62
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    226.00 =     607.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    521.00 TO NODE    226.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.521
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4900
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       1.73
  TC(MIN.) =    9.62

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.50  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =    17.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.24
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.73
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.65
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.65
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.73

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.15     8.24        3.785          0.60
      2        1.73     9.65        3.517          1.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        2.62     8.24       3.785
      2        2.80     9.65       3.517

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.80   Tc(MIN.) =    9.65
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.50  DOWNSTREAM(FEET) =   391.00
  FLOW LENGTH(FEET) =   124.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.52
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.80
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.79
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    525.00 =     750.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =   169.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.80
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   10.10
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   538.50
  UPSTREAM ELEVATION(FEET) =    452.90
  DOWNSTREAM ELEVATION(FEET) =    423.00
  ELEVATION DIFFERENCE(FEET) =     29.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.459
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.123
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    423.00  DOWNSTREAM(FEET) =    392.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   289.40   CHANNEL SLOPE =  0.1068
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   0.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.980
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =    7.21
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.554
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   7.68
```

```
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.10

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.24   RAIN INTENSITY(INCH/HOUR) =  3.20
  TOTAL AREA(ACRES) =    21.50   TOTAL RUNOFF(CFS) =     40.47

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.24
  RAINFALL INTENSITY(INCH/HR) =   3.20
  TOTAL STREAM AREA(ACRES) =    21.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.10     7.21        3.980          0.50
      2       40.47    12.24        3.204         21.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       24.95     7.21       3.980
      2       41.36    12.24       3.204
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      41.36   Tc(MIN.) =   12.24
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.00  DOWNSTREAM(FEET) =   386.30
  FLOW LENGTH(FEET) =    95.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.36
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =     923.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.191
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5850
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.43
  TOTAL AREA(ACRES) =       22.3   TOTAL RUNOFF(CFS) =      41.63
  TC(MIN.) =   12.35

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.20  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =    52.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.52
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.63
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    530.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       41.63    12.42       3.184       22.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        2.80    10.10       3.439        1.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      36.67      10.10        3.439
      2      44.22      12.42        3.184

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      44.22   Tc(MIN.) =   12.42
  TOTAL AREA(ACRES) =       23.9

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   384.80  DOWNSTREAM(FEET) =   382.20
  FLOW LENGTH(FEET) =   146.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.15
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.22
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.62
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       44.22    12.62       3.162       23.90
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       60.04     9.92       3.465       28.90
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      94.81       9.92        3.465
      2      99.01      12.62        3.162

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      99.01   Tc(MIN.) =   12.62
  TOTAL AREA(ACRES) =       52.8

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.31
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      99.01
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.66
  RAINFALL INTENSITY(INCH/HR) =   3.16
  TOTAL STREAM AREA(ACRES) =    52.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.01

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   172.20
  UPSTREAM ELEVATION(FEET) =    434.00
  DOWNSTREAM ELEVATION(FEET) =    416.30
  ELEVATION DIFFERENCE(FEET) =     17.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.924
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    416.30  DOWNSTREAM(FEET) =    392.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   254.30   CHANNEL SLOPE =  0.0924
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =    4.12
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =     426.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.30  DOWNSTREAM(FEET) =   388.90
  FLOW LENGTH(FEET) =    38.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.23
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =     465.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.80  DOWNSTREAM(FEET) =   388.50
  FLOW LENGTH(FEET) =    36.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.35
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.96
  TC(MIN.) =    4.35

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =    47.80   MANNING'S N =  0.011
```

```
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    4.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =     549.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    360.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =    4.48

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.30  DOWNSTREAM(FEET) =   367.10
  FLOW LENGTH(FEET) =    12.50   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.39
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    4.49
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    145.00 =     561.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    4.49
  RAINFALL INTENSITY(INCH/HR) =   4.40
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.29
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       99.01    12.66        3.157         52.80
      2        4.29     4.49        4.400          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       39.38     4.49       4.400
      2      102.09    12.66       3.157

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     102.09   Tc(MIN.) =   12.66
  TOTAL AREA(ACRES) =       54.1
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    147.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   366.30
  FLOW LENGTH(FEET) =    42.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.14
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     102.09
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.71
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    147.00 =    1255.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    147.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.152
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5827
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =       54.5   TOTAL RUNOFF(CFS) =     102.09
  TC(MIN.) =   12.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    366.20  DOWNSTREAM(FEET) =    363.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.10   CHANNEL SLOPE =  0.0333
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.133
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     102.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.34
  AVERAGE FLOW DEPTH(FEET) =   1.51   TRAVEL TIME(MIN.) =   0.17
  Tc(MIN.) =   12.88
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.28
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.582
  TOTAL AREA(ACRES) =       54.7         PEAK FLOW RATE(CFS) =     102.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.51   FLOW VELOCITY(FEET/SEC.) =   9.32
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.88
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    54.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    102.09

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.08   RAIN INTENSITY(INCH/HOUR) =  4.38
  TOTAL AREA(ACRES) =     5.90   TOTAL RUNOFF(CFS) =     11.32

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.08
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =     5.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.32

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      102.09    12.88        3.133         54.70
      2       11.32     5.08        4.385          5.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       84.27     5.08       4.385
      2      110.18    12.88       3.133

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     110.18   Tc(MIN.) =   12.88
  TOTAL AREA(ACRES) =       60.6
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    360.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =    21.60   CHANNEL SLOPE =  0.1019
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     110.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.18
  AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   0.03
  Tc(MIN.) =   12.90
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.568
```

```
  TOTAL AREA(ACRES) =       60.7         PEAK FLOW RATE(CFS) =     110.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =  14.17
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    155.00 =    1370.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.80  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    90.80   CHANNEL SLOPE =  0.1079
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     110.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.86
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.15
  Tc(MIN.) =   13.06
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.567
  TOTAL AREA(ACRES) =       61.0         PEAK FLOW RATE(CFS) =     110.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.84
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.06
  RAINFALL INTENSITY(INCH/HR) =   3.11
  TOTAL STREAM AREA(ACRES) =    61.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    110.18

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   193.70
  UPSTREAM ELEVATION(FEET) =    431.60
  DOWNSTREAM ELEVATION(FEET) =    408.00
  ELEVATION DIFFERENCE(FEET) =     23.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.760
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    407.90  DOWNSTREAM(FEET) =    389.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   483.90   CHANNEL SLOPE =  0.0372
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.60
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.10
  Tc(MIN.) =    6.86
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =     677.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    420.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.68
  TC(MIN.) =    6.86

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   106.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.68
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    7.25
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     783.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.972
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       6.97
  TC(MIN.) =    7.25

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    450.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.00  DOWNSTREAM(FEET) =   369.00
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.89
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.97
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    450.00 =     823.50 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    451.00 TO NODE    450.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.964
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6362
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       7.31
  TC(MIN.) =    7.29

****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    460.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   356.90  DOWNSTREAM(FEET) =   356.80
  FLOW LENGTH(FEET) =     2.20   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.47
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.31
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    7.30
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    460.00 =     825.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    461.00 TO NODE    460.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.964
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6136
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       8.03
  TC(MIN.) =    7.30

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    351.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    20.40   CHANNEL SLOPE =  0.3922
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.954
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.06
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =    7.35
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.609
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       8.19

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   7.13
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    160.00 =     846.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.35
  RAINFALL INTENSITY(INCH/HR) =   3.95
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      110.18    13.06        3.114         61.00
      2        8.19     7.35        3.954          3.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       94.94     7.35       3.954
      2      116.62    13.06       3.114

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     116.62   Tc(MIN.) =   13.06
  TOTAL AREA(ACRES) =       64.4
```

```
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       64.4  TC(MIN.) =     13.06
  PEAK FLOW RATE(CFS)   =     116.62
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                              Analysis prepared by:

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                                   858.259.8212

 ************************* DESCRIPTION OF STUDY *************************
* 2936 ALL PEOPLES CHURCH HYDROLOGY 100-YEAR MITIGATED                    *
* FEBRUARY 2,2021                                                         *
* C=0.45 PERV C=0.85 IMPERVIOUS                                           *
 *************************************************************************

  FILE NAME: 2936P100.DAT
  TIME/DATE OF STUDY: 11:11 02/03/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1065.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.26   RAIN INTENSITY(INCH/HOUR) =  3.59
  TOTAL AREA(ACRES) =    28.80   TOTAL RUNOFF(CFS) =     60.04

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE    100.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   439.90  DOWNSTREAM(FEET) =   429.90
  FLOW LENGTH(FEET) =   255.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.72
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    100.00 =     255.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   429.90  DOWNSTREAM(FEET) =   418.70
  FLOW LENGTH(FEET) =   226.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.08
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    120.00 =     482.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   418.70  DOWNSTREAM(FEET) =   402.50
  FLOW LENGTH(FEET) =   245.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    9.89
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    130.00 =     728.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   397.00  DOWNSTREAM(FEET) =   382.10
  FLOW LENGTH(FEET) =    66.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.99
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.04
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.465
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5802
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =       28.9   TOTAL RUNOFF(CFS) =      60.04
  TC(MIN.) =    9.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   156.70
  UPSTREAM ELEVATION(FEET) =    449.00
  DOWNSTREAM ELEVATION(FEET) =    440.30
  ELEVATION DIFFERENCE(FEET) =      8.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.962
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.217
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.30  DOWNSTREAM(FEET) =    428.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   232.80   CHANNEL SLOPE =  0.0507
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.839
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.99
  Tc(MIN.) =    7.95
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.60
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =     389.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.95   RAIN INTENSITY(INCH/HOUR) =  3.35
  TOTAL AREA(ACRES) =     0.60   TOTAL RUNOFF(CFS) =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   425.50  DOWNSTREAM(FEET) =   419.90
  FLOW LENGTH(FEET) =    80.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.93
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.95
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.10
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    510.00 =     469.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   419.90  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =   100.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.34
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.95
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    520.00 =     570.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   3.31
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
================================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =    453.00
  DOWNSTREAM ELEVATION(FEET) =    446.90
  ELEVATION DIFFERENCE(FEET) =      6.10
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.777
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.16
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.252
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    446.90  DOWNSTREAM(FEET) =    428.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   407.80   CHANNEL SLOPE =  0.0463
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.563
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.87
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   3.63
  Tc(MIN.) =    9.41
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     506.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   423.20  DOWNSTREAM(FEET) =   417.70
```

```
  FLOW LENGTH(FEET) =    64.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.95
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.07
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    9.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     571.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.542
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.24
  TC(MIN.) =    9.51

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    216.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   417.70  DOWNSTREAM(FEET) =   417.20
  FLOW LENGTH(FEET) =    31.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.24
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    216.00 =     602.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    216.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.524
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.18
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.41
  TC(MIN.) =    9.61
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    225.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.62   RAIN INTENSITY(INCH/HOUR) =  3.27
  TOTAL AREA(ACRES) =     0.80   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    226.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.70  DOWNSTREAM(FEET) =   408.60
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.11
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.63
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    226.00 =     607.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    521.00 TO NODE    226.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.270
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4293
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.29
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       1.40
  TC(MIN.) =   11.63

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   408.50  DOWNSTREAM(FEET) =   406.50
  FLOW LENGTH(FEET) =    17.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.75
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       1.40
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   11.66
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.66
  RAINFALL INTENSITY(INCH/HR) =   3.27
  TOTAL STREAM AREA(ACRES) =     1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.40

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.95    11.25        3.313          0.60
      2        1.40    11.66        3.267          1.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        2.30    11.25       3.313
      2        2.34    11.66       3.267

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.34   Tc(MIN.) =   11.66
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    520.00 =     625.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.50  DOWNSTREAM(FEET) =   391.00
  FLOW LENGTH(FEET) =   124.40   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.85
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.34
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.81
```

```
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    525.00 =     750.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   391.00  DOWNSTREAM(FEET) =   384.90
 FLOW LENGTH(FEET) =   169.40   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.34
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.13
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   538.50
 UPSTREAM ELEVATION(FEET) =    452.90
 DOWNSTREAM ELEVATION(FEET) =    423.00
 ELEVATION DIFFERENCE(FEET) =     29.90
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.459
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    95.55
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.123
 SUBAREA RUNOFF(CFS) =      0.19
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
 FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    423.00  DOWNSTREAM(FEET) =    392.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   289.40   CHANNEL SLOPE =  0.1068
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   0.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.980
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =    7.21
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.554
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   7.68
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.10

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.24   RAIN INTENSITY(INCH/HOUR) =  3.20
  TOTAL AREA(ACRES) =    21.50   TOTAL RUNOFF(CFS) =     40.47

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE    610.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.24
```

```
  RAINFALL INTENSITY(INCH/HR) =   3.20
  TOTAL STREAM AREA(ACRES) =    21.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     40.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.10     7.21        3.980          0.50
      2       40.47    12.24        3.204         21.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       24.95     7.21       3.980
      2       41.36    12.24       3.204

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      41.36   Tc(MIN.) =   12.24
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     827.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    620.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.00  DOWNSTREAM(FEET) =   386.30
  FLOW LENGTH(FEET) =    95.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.36
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =     923.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.191
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5850
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.43
```

```
  TOTAL AREA(ACRES) =       22.3   TOTAL RUNOFF(CFS) =      41.63
  TC(MIN.) =   12.35

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    530.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   386.20  DOWNSTREAM(FEET) =   384.90
  FLOW LENGTH(FEET) =    52.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.52
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.63
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    530.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       41.63    12.42       3.184       22.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    530.00 =     975.90 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        2.34    12.13       3.215        1.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    530.00 =     919.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      43.02      12.13        3.215
      2      43.95      12.42        3.184

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      43.95   Tc(MIN.) =   12.42
  TOTAL AREA(ACRES) =       23.9

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   384.80  DOWNSTREAM(FEET) =   382.20
  FLOW LENGTH(FEET) =   146.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.14
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.95
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.62
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       43.95    12.62       3.162       23.90
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    140.00 =    1121.90 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       60.04     9.92       3.465       28.90
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    140.00 =     794.30 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      94.60       9.92        3.465
      2      98.74      12.62        3.162

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      98.74   Tc(MIN.) =   12.62
  TOTAL AREA(ACRES) =       52.8

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   382.00  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.29
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      98.74
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.66
  RAINFALL INTENSITY(INCH/HR) =   3.16
  TOTAL STREAM AREA(ACRES) =    52.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     98.74

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   172.20
  UPSTREAM ELEVATION(FEET) =    434.00
  DOWNSTREAM ELEVATION(FEET) =    416.30
  ELEVATION DIFFERENCE(FEET) =     17.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.924
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    416.30  DOWNSTREAM(FEET) =    392.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   254.30   CHANNEL SLOPE =  0.0924
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =    4.12
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =     426.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   389.30  DOWNSTREAM(FEET) =   388.90
  FLOW LENGTH(FEET) =    38.90   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.23
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =     465.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.80  DOWNSTREAM(FEET) =   388.50
  FLOW LENGTH(FEET) =    36.10   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.35
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.96
  TC(MIN.) =    4.35

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =    47.80   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    4.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =     549.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    360.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7500
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =    4.48

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    360.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.48   RAIN INTENSITY(INCH/HOUR) =  4.31
  TOTAL AREA(ACRES) =     1.30   TOTAL RUNOFF(CFS) =      3.29

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   373.30  DOWNSTREAM(FEET) =   367.10
 FLOW LENGTH(FEET) =    12.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.26
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.29
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.49
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    145.00 =     561.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    360.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.49
 RAINFALL INTENSITY(INCH/HR) =   4.31
 TOTAL STREAM AREA(ACRES) =     1.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.29

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       98.74    12.66        3.157         52.80
     2        3.29     5.49        4.307          1.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       46.09     5.49       4.307
     2      101.15    12.66       3.157

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     101.15   Tc(MIN.) =   12.66
 TOTAL AREA(ACRES) =       54.1
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    145.00 =    1212.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    147.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   366.30
  FLOW LENGTH(FEET) =    42.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.14
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     101.15
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.71
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    147.00 =    1255.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    147.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.152
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5774
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =       54.5   TOTAL RUNOFF(CFS) =     101.15
  TC(MIN.) =   12.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    366.20  DOWNSTREAM(FEET) =    363.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.10   CHANNEL SLOPE =  0.0333
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.133
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     101.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.31
  AVERAGE FLOW DEPTH(FEET) =   1.50   TRAVEL TIME(MIN.) =   0.17
  Tc(MIN.) =   12.88
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.28
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.577
  TOTAL AREA(ACRES) =       54.7         PEAK FLOW RATE(CFS) =     101.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  1.50   FLOW VELOCITY(FEET/SEC.) =   9.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    147.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.88
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =    54.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    101.15

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.08   RAIN INTENSITY(INCH/HOUR) =  4.38
  TOTAL AREA(ACRES) =     5.90   TOTAL RUNOFF(CFS) =     11.32

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.08
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =     5.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.32

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      101.15    12.88        3.133         54.70
      2       11.32     5.08        4.385          5.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       83.60     5.08       4.385
```

```
      2      109.24    12.88       3.133

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     109.24   Tc(MIN.) =   12.88
  TOTAL AREA(ACRES) =       60.6
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    150.00 =    1348.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    360.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =    21.60   CHANNEL SLOPE =  0.1019
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.131
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     109.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.15
  AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   0.03
  Tc(MIN.) =   12.90
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.563
  TOTAL AREA(ACRES) =       60.7         PEAK FLOW RATE(CFS) =     109.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =  14.14
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    155.00 =    1370.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.80  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    90.80   CHANNEL SLOPE =  0.1079
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     109.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.78
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.15
```

```
  Tc(MIN.) =   13.06
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.563
  TOTAL AREA(ACRES) =       61.0         PEAK FLOW RATE(CFS) =     109.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.76
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.06
  RAINFALL INTENSITY(INCH/HR) =   3.11
  TOTAL STREAM AREA(ACRES) =    61.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    109.24

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    410.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   193.70
  UPSTREAM ELEVATION(FEET) =    431.60
  DOWNSTREAM ELEVATION(FEET) =    408.00
  ELEVATION DIFFERENCE(FEET) =     23.60
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.760
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    407.90  DOWNSTREAM(FEET) =    389.90
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   483.90   CHANNEL SLOPE =  0.0372
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.60
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.10
  Tc(MIN.) =    6.86
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =     677.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    420.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.046
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.05
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.68
  TC(MIN.) =    6.86

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   388.50  DOWNSTREAM(FEET) =   388.00
  FLOW LENGTH(FEET) =   106.30   MANNING'S N =  0.011
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.68
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    7.25
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     783.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.972
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       6.97
  TC(MIN.) =    7.25

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    440.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.25   RAIN INTENSITY(INCH/HOUR) =  3.59
  TOTAL AREA(ACRES) =     2.70   TOTAL RUNOFF(CFS) =      5.57

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    450.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   373.00  DOWNSTREAM(FEET) =   369.00
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.55
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.29
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    450.00 =     823.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    451.00 TO NODE    450.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.584
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5657
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =        2.9   TOTAL RUNOFF(CFS) =       5.88
  TC(MIN.) =    9.29
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    450.00 TO NODE    460.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   356.90  DOWNSTREAM(FEET) =   356.80
  FLOW LENGTH(FEET) =     2.20   MANNING'S N =  0.011
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.95
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.88
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    460.00 =     825.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    461.00 TO NODE    460.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.584
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5517
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       6.52
  TC(MIN.) =    9.30

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    351.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    20.40   CHANNEL SLOPE =  0.3922
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.574
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.48
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =    9.35
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.549
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       6.67
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   6.55
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    160.00 =     846.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.35
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.67

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      109.24    13.06        3.114         61.00
      2        6.67     9.35        3.574          3.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      101.84     9.35       3.574
      2      115.05    13.06       3.114

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     115.05   Tc(MIN.) =   13.06
  TOTAL AREA(ACRES) =       64.4
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    160.00 =    1461.20 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       64.4  TC(MIN.) =     13.06
  PEAK FLOW RATE(CFS)   =     115.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

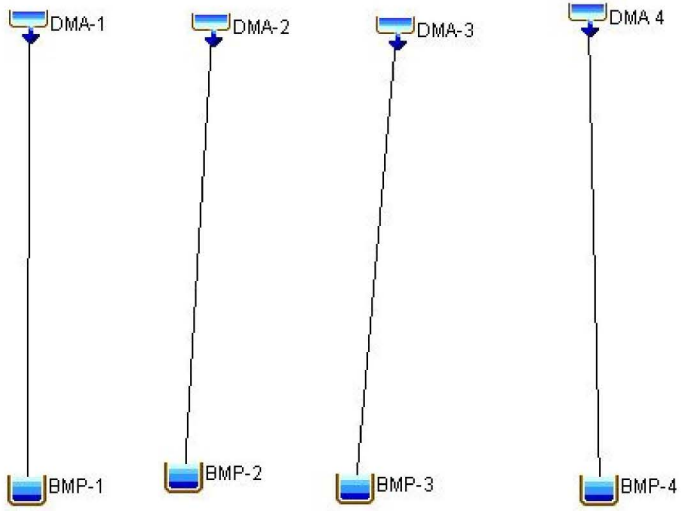


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mpute Results Tools Help

--None Selected-- Run: Q100 --None Selected--

Basin Model [Post_Dev] Current Run [Q100]



Summary Results for Reservoir "BMP-1"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-1

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	1.1 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	0.9 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:13
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.5 (FT)

Summary Results for Reservoir "BMP-3"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-3

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	4.3 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:05
Peak Discharge:	3.3 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:06
Inflow Volume:	n/a	Peak Storage:	0.1 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.7 (FT)

Summary Results for Reservoir "BMP-2"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-2

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	1.4 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	1.1 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:12
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.4 (FT)

Summary Results for Reservoir "BMP-4"

Project: All Peoples Church Simulation Run: Q100
Reservoir: BMP-4

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:05	Meteorologic Model:	Met 1
Compute Time:	03Feb2021, 11:01:44	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	7.0 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	5.6 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:12
Inflow Volume:	n/a	Peak Storage:	0.1 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.4 (FT)

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.6 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 1.15 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0
TIME (MIN) = 20	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 40	DISCHARGE (CFS) = 0
TIME (MIN) = 50	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 80	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 100	DISCHARGE (CFS) = 0.1
TIME (MIN) = 110	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 130	DISCHARGE (CFS) = 0.1
TIME (MIN) = 140	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 160	DISCHARGE (CFS) = 0.1
TIME (MIN) = 170	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 190	DISCHARGE (CFS) = 0.1
TIME (MIN) = 200	DISCHARGE (CFS) = 0.1
TIME (MIN) = 210	DISCHARGE (CFS) = 0.1
TIME (MIN) = 220	DISCHARGE (CFS) = 0.2
TIME (MIN) = 230	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.5
TIME (MIN) = 250	DISCHARGE (CFS) = 1.15
TIME (MIN) = 260	DISCHARGE (CFS) = 0.2
TIME (MIN) = 270	DISCHARGE (CFS) = 0.1
TIME (MIN) = 280	DISCHARGE (CFS) = 0.1
TIME (MIN) = 290	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 310	DISCHARGE (CFS) = 0.1
TIME (MIN) = 320	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-1

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	1		Invert:	0.50 ft
Invert:	0 ft		L:	6.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	0.5 ft			
A	0.125	0.125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.037	0.000	0.037	
0.667	0.167	0.105	0.000	0.105	
0.750	0.250	0.194	0.000	0.194	
0.833	0.333	0.549	0.000	0.549	
0.917	0.417	0.576	0.000	0.576	
1.000	0.500	0.602	0.000	0.602	RISER STRUCTURE
1.083	0.583	0.626	0.447	1.074	
1.167	0.667	0.650	1.266	1.916	
1.250	0.750	0.673	2.325	2.998	
1.333	0.833	0.695	3.580	4.275	
1.417	0.917	0.716	5.003	5.719	
1.500	1.000	0.737	6.576	7.313	
1.583	1.083	0.757	8.287	9.044	
1.667	1.167	0.777	10.125	10.902	
1.750	1.250	0.796	12.081	12.877	
1.833	1.333	0.815	14.149	14.964	
1.917	1.417	0.833	16.324	17.157	
2.000	1.500	0.851	18.600	19.451	

Note:

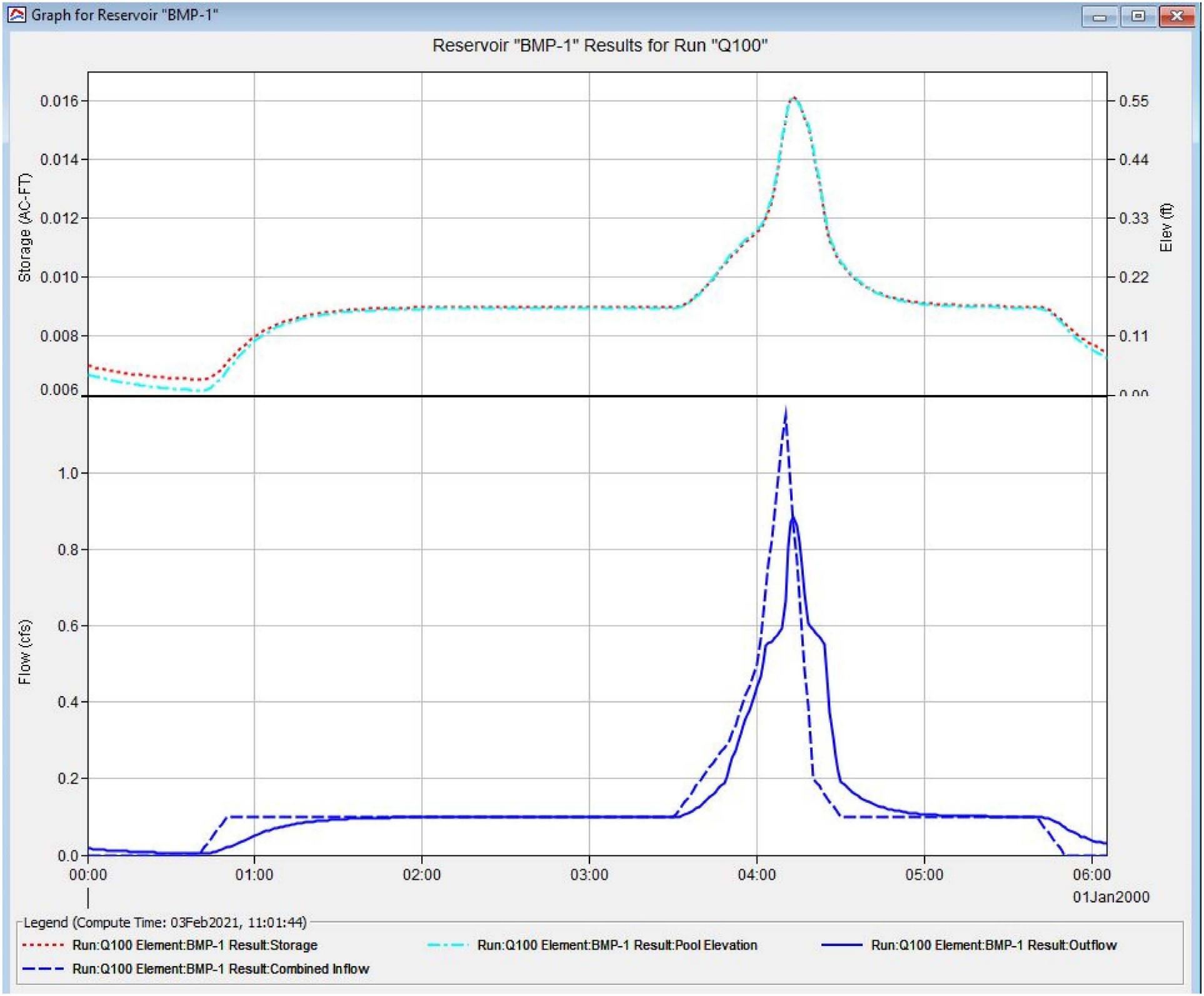
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-1

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	473	0
0.083	488	40
0.167	504	83
0.250	519	128
0.333	535	176
0.417	551	226
0.500	567	280
0.583	584	336
0.667	600	395
0.750	617	456
0.833	634	521
0.917	651	589
1.000	668	660
1.083	685	733
1.167	702	809
1.250	719	888
1.333	736	970
1.417	753	1055
1.500	770	1142

Stage-Storage-Discharge of BMP-1

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0064	0.000
0.083	0.0077	0.037
0.167	0.0091	0.105
0.250	0.0105	0.194
0.333	0.0120	0.549
0.417	0.0135	0.576
0.500	0.0151	0.602
0.583	0.0168	1.074
0.667	0.0186	1.916
0.750	0.0204	2.998
0.833	0.0223	4.275
0.917	0.0242	5.719
1.000	0.0262	7.313


Graph for Reservoir "BMP-1"
Reservoir "BMP-1" Results for Run "Q100"
Storage (AC-FT)
0.016
0.014
0.012
0.010
0.008
0.006
Elev (ft)
0.55
0.44
0.33
0.22
0.11
Flow (cfs)
1.0
0.8
0.6
0.4
0.2
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-1 Result:Storage
Run:Q100 Element:BMP-1 Result:Pool Elevation
Run:Q100 Element:BMP-1 Result:Outflow
Run:Q100 Element:BMP-1 Result:Combined Inflow

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RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.8 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 1.41 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.1
TIME (MIN) = 20	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 40	DISCHARGE (CFS) = 0.1
TIME (MIN) = 50	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 80	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 100	DISCHARGE (CFS) = 0.1
TIME (MIN) = 110	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 130	DISCHARGE (CFS) = 0.1
TIME (MIN) = 140	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 160	DISCHARGE (CFS) = 0.1
TIME (MIN) = 170	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 190	DISCHARGE (CFS) = 0.2
TIME (MIN) = 200	DISCHARGE (CFS) = 0.2
TIME (MIN) = 210	DISCHARGE (CFS) = 0.2
TIME (MIN) = 220	DISCHARGE (CFS) = 0.2
TIME (MIN) = 230	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.7
TIME (MIN) = 250	DISCHARGE (CFS) = 1.41
TIME (MIN) = 260	DISCHARGE (CFS) = 0.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.2
TIME (MIN) = 280	DISCHARGE (CFS) = 0.1
TIME (MIN) = 290	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 310	DISCHARGE (CFS) = 0.1
TIME (MIN) = 320	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-2

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	1		Invert:	0.50 ft
Invert:	0 ft		L:	6.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1 ft			
A	0.250	0.25		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.075	0.000	0.075	
0.667	0.167	0.211	0.000	0.211	
0.750	0.250	0.388	0.000	0.388	
0.833	0.333	1.099	0.000	1.099	
0.917	0.417	1.152	0.000	1.152	
1.000	0.500	1.204	0.000	1.204	RISER STRUCTURE
1.083	0.583	1.253	0.447	1.700	
1.167	0.667	1.300	1.266	2.566	
1.250	0.750	1.346	2.325	3.671	
1.333	0.833	1.390	3.580	4.970	
1.417	0.917	1.433	5.003	6.435	
1.500	1.000	1.474	6.576	8.050	
1.583	1.083	1.515	8.287	9.802	
1.667	1.167	1.554	10.125	11.679	
1.750	1.250	1.592	12.081	13.673	
1.833	1.333	1.630	14.149	15.779	
1.917	1.417	1.667	16.324	17.991	
2.000	1.500	1.702	18.600	20.302	

Note:

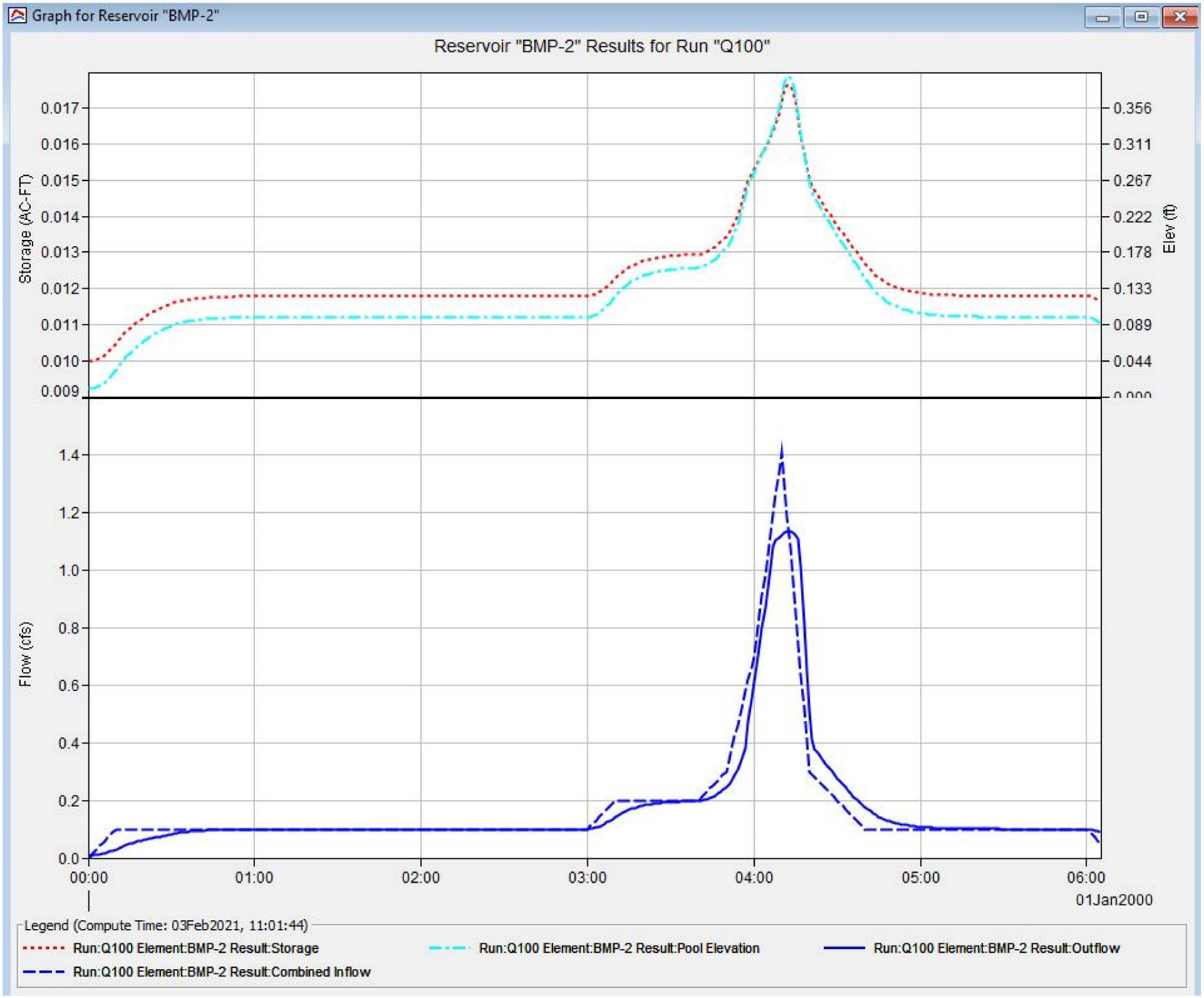
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-2

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	858	0
0.083	858	72
0.167	858	143
0.250	858	215
0.333	858	286
0.417	858	358
0.500	858	429
0.583	858	501
0.667	858	572
0.750	858	644
0.833	858	715
0.917	858	787
1.000	858	858
1.083	858	930
1.167	858	1001
1.250	858	1073
1.333	858	1144
1.417	858	1216
1.500	858	1287

Stage-Storage-Discharge of BMP-2

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0098	0.000
0.083	0.0115	0.075
0.167	0.0131	0.211
0.250	0.0148	0.388
0.333	0.0164	1.099
0.417	0.0181	1.152
0.500	0.0197	1.204
0.583	0.0213	1.700
0.667	0.0230	2.566
0.750	0.0246	3.671
0.833	0.0263	4.970
0.917	0.0279	6.435
1.000	0.0295	8.050


Graph for Reservoir "BMP-2"
Reservoir "BMP-2" Results for Run "Q100"
Storage (AC-FT)
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
Elev (ft)
0.356
0.311
0.267
0.222
0.178
0.133
0.089
0.044
Flow (cfs)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-2 Result:Storage
Run:Q100 Element:BMP-2 Result:Pool Elevation
Run:Q100 Element:BMP-2 Result:Outflow
Run:Q100 Element:BMP-2 Result:Combined Inflow

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RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 5 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 1.3 ACRES
RUNOFF COEFFICIENT 0.75
PEAK DISCHARGE 4.29 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 5	DISCHARGE (CFS) = 0.1
TIME (MIN) = 10	DISCHARGE (CFS) = 0.1
TIME (MIN) = 15	DISCHARGE (CFS) = 0.1
TIME (MIN) = 20	DISCHARGE (CFS) = 0.2
TIME (MIN) = 25	DISCHARGE (CFS) = 0.2
TIME (MIN) = 30	DISCHARGE (CFS) = 0.2
TIME (MIN) = 35	DISCHARGE (CFS) = 0.2
TIME (MIN) = 40	DISCHARGE (CFS) = 0.2
TIME (MIN) = 45	DISCHARGE (CFS) = 0.2
TIME (MIN) = 50	DISCHARGE (CFS) = 0.2
TIME (MIN) = 55	DISCHARGE (CFS) = 0.2
TIME (MIN) = 60	DISCHARGE (CFS) = 0.2
TIME (MIN) = 65	DISCHARGE (CFS) = 0.2
TIME (MIN) = 70	DISCHARGE (CFS) = 0.2
TIME (MIN) = 75	DISCHARGE (CFS) = 0.2
TIME (MIN) = 80	DISCHARGE (CFS) = 0.2
TIME (MIN) = 85	DISCHARGE (CFS) = 0.2
TIME (MIN) = 90	DISCHARGE (CFS) = 0.2
TIME (MIN) = 95	DISCHARGE (CFS) = 0.2
TIME (MIN) = 100	DISCHARGE (CFS) = 0.2
TIME (MIN) = 105	DISCHARGE (CFS) = 0.2
TIME (MIN) = 110	DISCHARGE (CFS) = 0.2
TIME (MIN) = 115	DISCHARGE (CFS) = 0.2
TIME (MIN) = 120	DISCHARGE (CFS) = 0.2
TIME (MIN) = 125	DISCHARGE (CFS) = 0.2
TIME (MIN) = 130	DISCHARGE (CFS) = 0.2
TIME (MIN) = 135	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 145	DISCHARGE (CFS) = 0.3
TIME (MIN) = 150	DISCHARGE (CFS) = 0.3
TIME (MIN) = 155	DISCHARGE (CFS) = 0.3
TIME (MIN) = 160	DISCHARGE (CFS) = 0.3
TIME (MIN) = 165	DISCHARGE (CFS) = 0.3
TIME (MIN) = 170	DISCHARGE (CFS) = 0.3
TIME (MIN) = 175	DISCHARGE (CFS) = 0.3
TIME (MIN) = 180	DISCHARGE (CFS) = 0.3
TIME (MIN) = 185	DISCHARGE (CFS) = 0.4
TIME (MIN) = 190	DISCHARGE (CFS) = 0.4
TIME (MIN) = 195	DISCHARGE (CFS) = 0.4
TIME (MIN) = 200	DISCHARGE (CFS) = 0.4
TIME (MIN) = 205	DISCHARGE (CFS) = 0.5
TIME (MIN) = 210	DISCHARGE (CFS) = 0.5
TIME (MIN) = 215	DISCHARGE (CFS) = 0.6
TIME (MIN) = 220	DISCHARGE (CFS) = 0.6
TIME (MIN) = 225	DISCHARGE (CFS) = 0.8
TIME (MIN) = 230	DISCHARGE (CFS) = 0.9
TIME (MIN) = 235	DISCHARGE (CFS) = 1.3
TIME (MIN) = 240	DISCHARGE (CFS) = 3.9
TIME (MIN) = 245	DISCHARGE (CFS) = 4.29
TIME (MIN) = 250	DISCHARGE (CFS) = 1
TIME (MIN) = 255	DISCHARGE (CFS) = 0.7
TIME (MIN) = 260	DISCHARGE (CFS) = 0.5
TIME (MIN) = 265	DISCHARGE (CFS) = 0.4
TIME (MIN) = 270	DISCHARGE (CFS) = 0.4
TIME (MIN) = 275	DISCHARGE (CFS) = 0.3
TIME (MIN) = 280	DISCHARGE (CFS) = 0.3
TIME (MIN) = 285	DISCHARGE (CFS) = 0.3
TIME (MIN) = 290	DISCHARGE (CFS) = 0.3
TIME (MIN) = 295	DISCHARGE (CFS) = 0.3
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 305	DISCHARGE (CFS) = 0.2
TIME (MIN) = 310	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 320	DISCHARGE (CFS) = 0.2
TIME (MIN) = 325	DISCHARGE (CFS) = 0.2
TIME (MIN) = 330	DISCHARGE (CFS) = 0.2
TIME (MIN) = 335	DISCHARGE (CFS) = 0.2
TIME (MIN) = 340	DISCHARGE (CFS) = 0.2
TIME (MIN) = 345	DISCHARGE (CFS) = 0.2
TIME (MIN) = 350	DISCHARGE (CFS) = 0.2
TIME (MIN) = 355	DISCHARGE (CFS) = 0.2
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 365	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-3

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	1		Invert:	0.50 ft
Invert:	0 ft		L:	8.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1.25 ft			
A	0.313	0.3125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.093	0.000	0.093	
0.667	0.167	0.264	0.000	0.264	
0.750	0.250	0.484	0.000	0.484	
0.833	0.333	1.374	0.000	1.374	
0.917	0.417	1.441	0.000	1.441	
1.000	0.500	1.505	0.000	1.505	RISER STRUCTURE
1.083	0.583	1.566	0.597	2.163	
1.167	0.667	1.625	1.687	3.313	
1.250	0.750	1.682	3.100	4.782	
1.333	0.833	1.737	4.773	6.510	
1.417	0.917	1.791	6.670	8.461	
1.500	1.000	1.843	8.768	10.611	
1.583	1.083	1.893	11.049	12.942	
1.667	1.167	1.943	13.499	15.442	
1.750	1.250	1.991	16.108	18.099	
1.833	1.333	2.037	18.866	20.903	
1.917	1.417	2.083	21.766	23.849	
2.000	1.500	2.128	24.800	26.928	

Note:

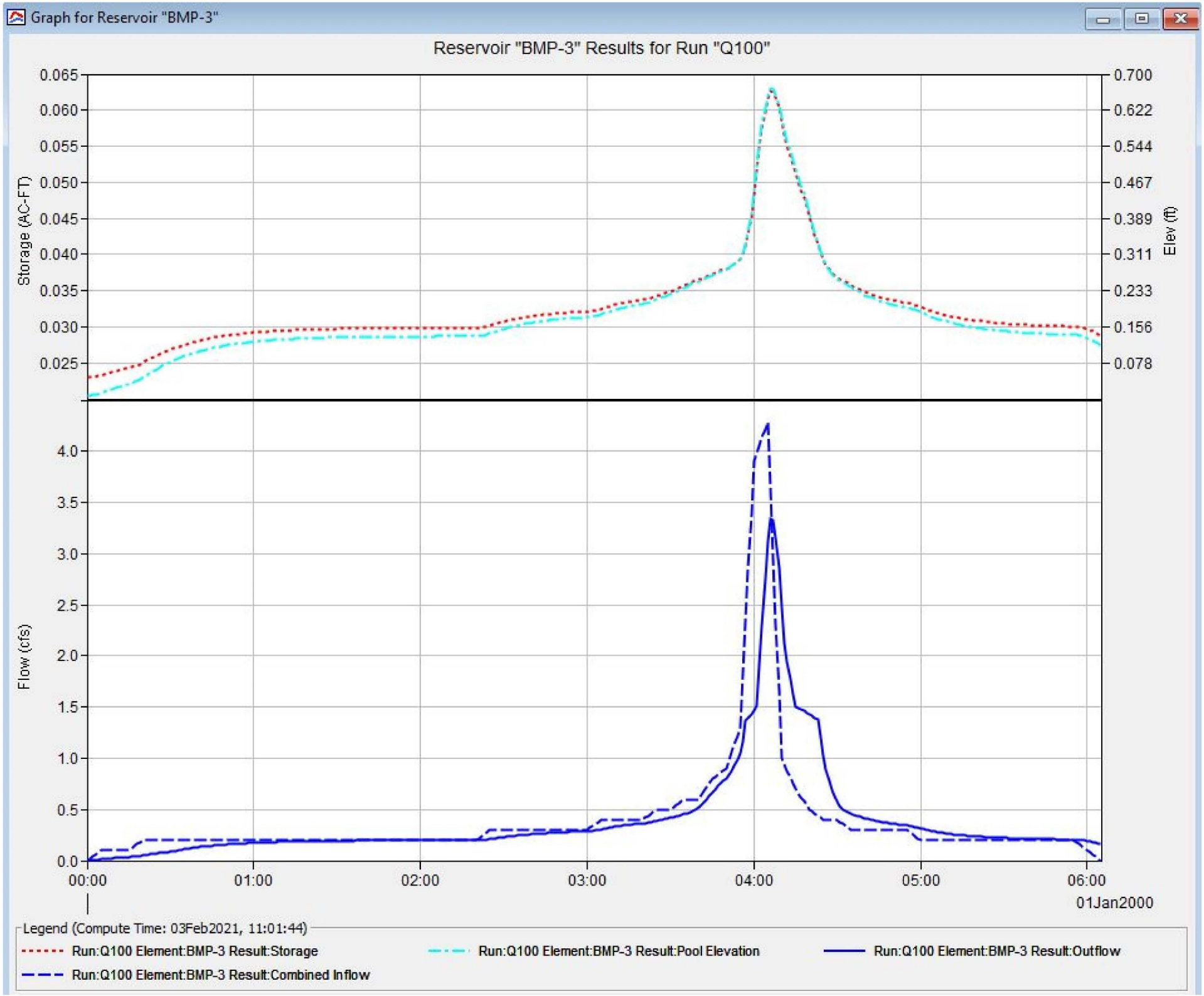
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-3

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	1725	0
0.083	1770	146
0.167	1815	299
0.250	1860	459
0.333	1905	628
0.417	1950	803
0.500	1995	986
0.583	2040	1177
0.667	2085	1375
0.750	2130	1581
0.833	2175	1794
0.917	2220	2014
1.000	2265	2243
1.083	2310	2478
1.167	2355	2721
1.250	2400	2972
1.333	2445	3230
1.417	2490	3496
1.500	2535	3769

Stage-Storage-Discharge of BMP-3

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0226	0.000
0.083	0.0270	0.093
0.167	0.0316	0.264
0.250	0.0363	0.484
0.333	0.0412	1.374
0.417	0.0462	1.441
0.500	0.0515	1.505
0.583	0.0569	2.163
0.667	0.0625	3.313
0.750	0.0682	4.782
0.833	0.0742	6.510
0.917	0.0802	8.461
1.000	0.0865	10.611


Graph for Reservoir "BMP-3"
Reservoir "BMP-3" Results for Run "Q100"
Storage (AC-FT)
Elev (ft)
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.700
0.622
0.544
0.467
0.389
0.311
0.233
0.156
0.078
Flow (cfs)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-3 Result:Storage
Run:Q100 Element:BMP-3 Result:Pool Elevation
Run:Q100 Element:BMP-3 Result:Outflow
Run:Q100 Element:BMP-3 Result:Combined Inflow

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RUN DATE 2/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 2.7 ACRES
RUNOFF COEFFICIENT 0.65
PEAK DISCHARGE 6.97 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.3
TIME (MIN) = 20	DISCHARGE (CFS) = 0.3
TIME (MIN) = 30	DISCHARGE (CFS) = 0.3
TIME (MIN) = 40	DISCHARGE (CFS) = 0.3
TIME (MIN) = 50	DISCHARGE (CFS) = 0.3
TIME (MIN) = 60	DISCHARGE (CFS) = 0.3
TIME (MIN) = 70	DISCHARGE (CFS) = 0.3
TIME (MIN) = 80	DISCHARGE (CFS) = 0.3
TIME (MIN) = 90	DISCHARGE (CFS) = 0.3
TIME (MIN) = 100	DISCHARGE (CFS) = 0.4
TIME (MIN) = 110	DISCHARGE (CFS) = 0.4
TIME (MIN) = 120	DISCHARGE (CFS) = 0.4
TIME (MIN) = 130	DISCHARGE (CFS) = 0.4
TIME (MIN) = 140	DISCHARGE (CFS) = 0.4
TIME (MIN) = 150	DISCHARGE (CFS) = 0.5
TIME (MIN) = 160	DISCHARGE (CFS) = 0.5
TIME (MIN) = 170	DISCHARGE (CFS) = 0.5
TIME (MIN) = 180	DISCHARGE (CFS) = 0.6
TIME (MIN) = 190	DISCHARGE (CFS) = 0.7
TIME (MIN) = 200	DISCHARGE (CFS) = 0.7
TIME (MIN) = 210	DISCHARGE (CFS) = 0.9
TIME (MIN) = 220	DISCHARGE (CFS) = 1
TIME (MIN) = 230	DISCHARGE (CFS) = 1.5
TIME (MIN) = 240	DISCHARGE (CFS) = 2.5
TIME (MIN) = 250	DISCHARGE (CFS) = 6.97
TIME (MIN) = 260	DISCHARGE (CFS) = 1.2
TIME (MIN) = 270	DISCHARGE (CFS) = 0.8
TIME (MIN) = 280	DISCHARGE (CFS) = 0.6
TIME (MIN) = 290	DISCHARGE (CFS) = 0.5
TIME (MIN) = 300	DISCHARGE (CFS) = 0.4
TIME (MIN) = 310	DISCHARGE (CFS) = 0.4
TIME (MIN) = 320	DISCHARGE (CFS) = 0.4
TIME (MIN) = 330	DISCHARGE (CFS) = 0.3
TIME (MIN) = 340	DISCHARGE (CFS) = 0.3
TIME (MIN) = 350	DISCHARGE (CFS) = 0.3
TIME (MIN) = 360	DISCHARGE (CFS) = 0.3
TIME (MIN) = 370	DISCHARGE (CFS) = 0

Outlet Structure for Discharge of BMP-4

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	4		Invert:	0.50 ft
Invert:	0 ft		L:	8.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1.25 ft			
A	0.313	0.3125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.373	0.000	0.373	
0.667	0.167	1.055	0.000	1.055	
0.750	0.250	1.938	0.000	1.938	
0.833	0.333	5.494	0.000	5.494	
0.917	0.417	5.762	0.000	5.762	
1.000	0.500	6.019	0.000	6.019	RISER STRUCTURE
1.083	0.583	6.264	0.597	6.861	
1.167	0.667	6.501	1.687	8.188	
1.250	0.750	6.729	3.100	9.829	
1.333	0.833	6.950	4.773	11.723	
1.417	0.917	7.164	6.670	13.834	
1.500	1.000	7.371	8.768	16.140	
1.583	1.083	7.573	11.049	18.622	
1.667	1.167	7.770	13.499	21.270	
1.750	1.250	7.962	16.108	24.070	
1.833	1.333	8.149	18.866	27.015	
1.917	1.417	8.333	21.766	30.098	
2.000	1.500	8.512	24.800	33.312	

Note:

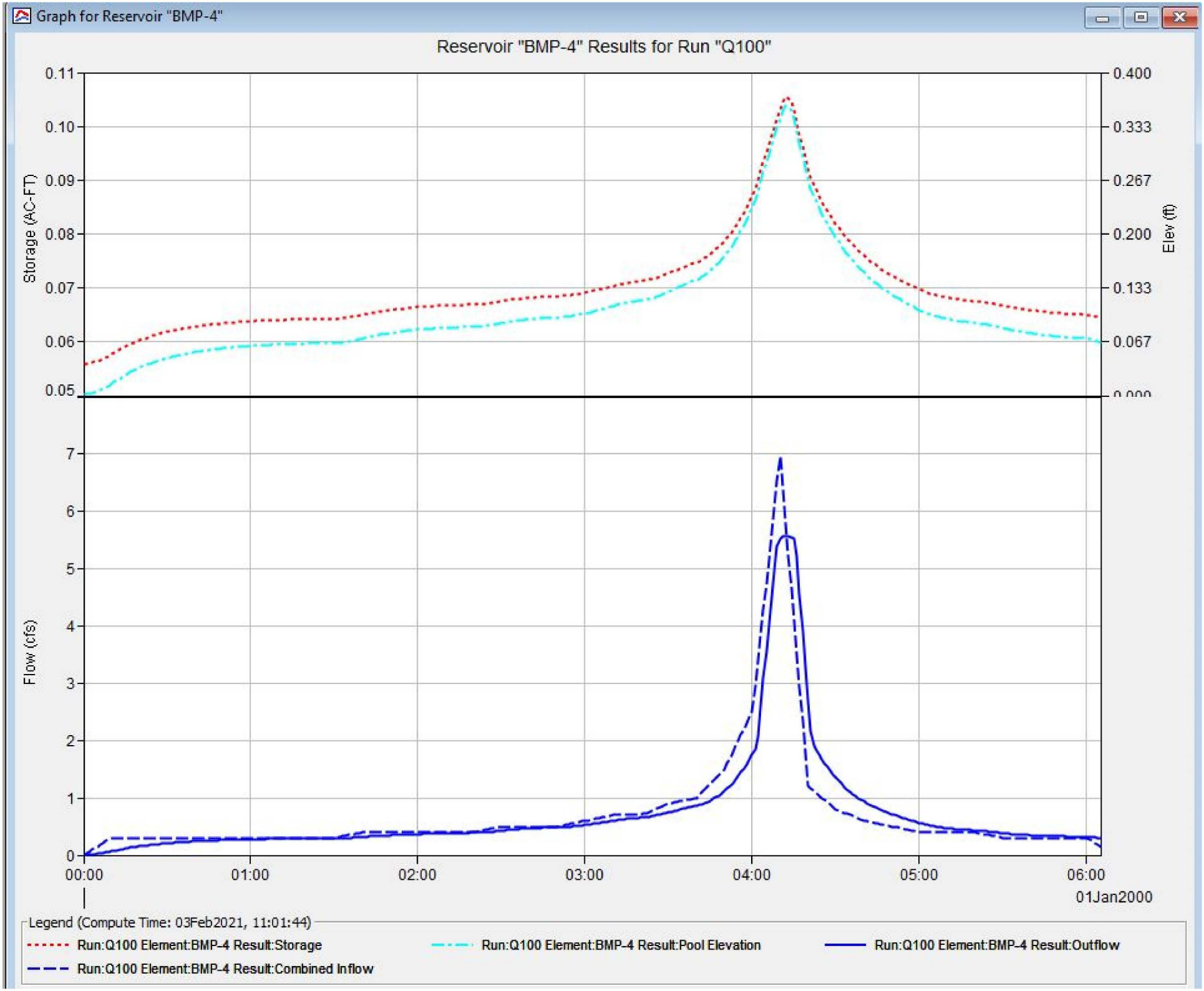
1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-4

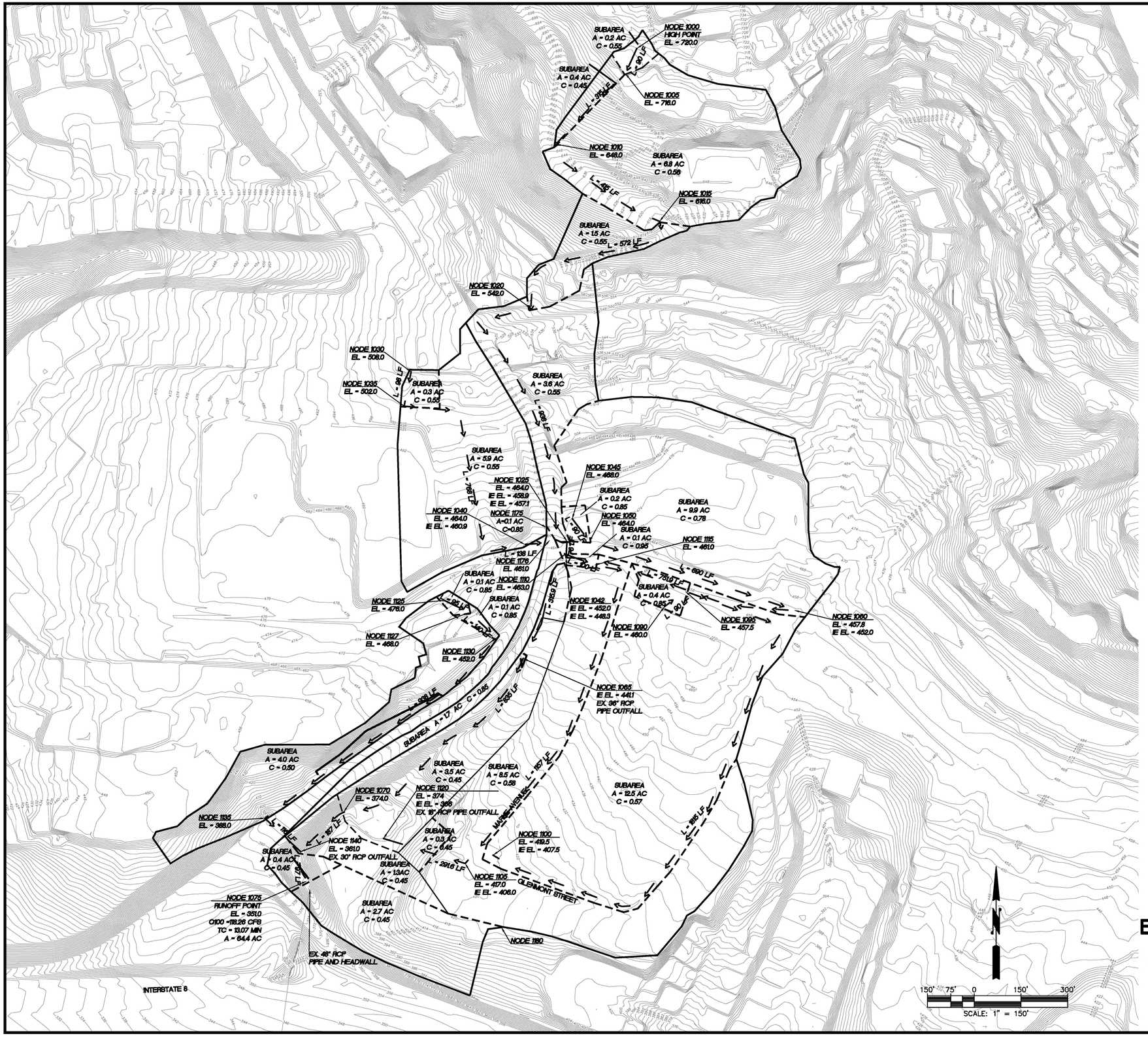
Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	4252	0
0.083	4363	359
0.167	4472	736
0.250	4586	1132
0.333	4698	1547
0.417	4810	1981
0.500	4921	2433
0.583	5032.714286	2903
0.667	5144.392857	3392
0.750	5256.071429	3900
0.833	5367.75	4427
0.917	5479.428571	4972
1.000	5591	5535
1.083	5703	6118
1.167	5815	6719
1.250	5927	7339
1.333	6039	7977
1.417	6151	8635
1.500	6263	9311

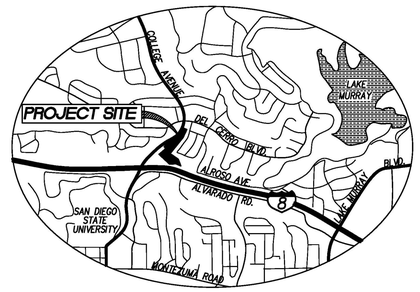
Stage-Storage-Discharge of BMP-4

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0558	0.000
0.083	0.0666	0.373
0.167	0.0779	1.055
0.250	0.0895	1.938
0.333	0.1016	5.494
0.417	0.1141	5.762
0.500	0.1271	6.019
0.583	0.1404	6.861
0.667	0.1542	8.188
0.750	0.1685	9.829
0.833	0.1831	11.723
0.917	0.1982	13.834
1.000	0.2137	16.140


Graph for Reservoir "BMP-4"
Reservoir "BMP-4" Results for Run "Q100"
Storage (AC-FT)
Elev (ft)
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.400
0.333
0.267
0.200
0.133
0.067
Flow (cfs)
7
6
5
4
3
2
1
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 03Feb2021, 11:01:44)
Run:Q100 Element:BMP-4 Result:Storage
Run:Q100 Element:BMP-4 Result:Pool Elevation
Run:Q100 Element:BMP-4 Result:Outflow
Run:Q100 Element:BMP-4 Result:Combined Inflow

Appendix 2
Existing and Proposed Drainage Exhibits





VICINITY MAP

NOT TO SCALE

LEGEND:

- MAJOR–BASIN BOUNDARY
- SUB–BASIN BOUNDARY
- FLOW PATH
- NODE 1060 / EL. = 458.0 / IE EL. = 452.0 — HYDROLOGIC NODE
- SUBAREA / A = 9.9 AC / C = 0.78 — HYDROLOGIC AREA

EXISTING HYDROLOGY

ALL PEOPLES CHURCH

INTERSTATE 8 • COLLEGE AVENUE, SAN DIEGO, CA

PROJECT NUMBER: PLSA 2936

SCALE: 1" = 150'

DATE: FEBRUARY 2021

SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES

CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

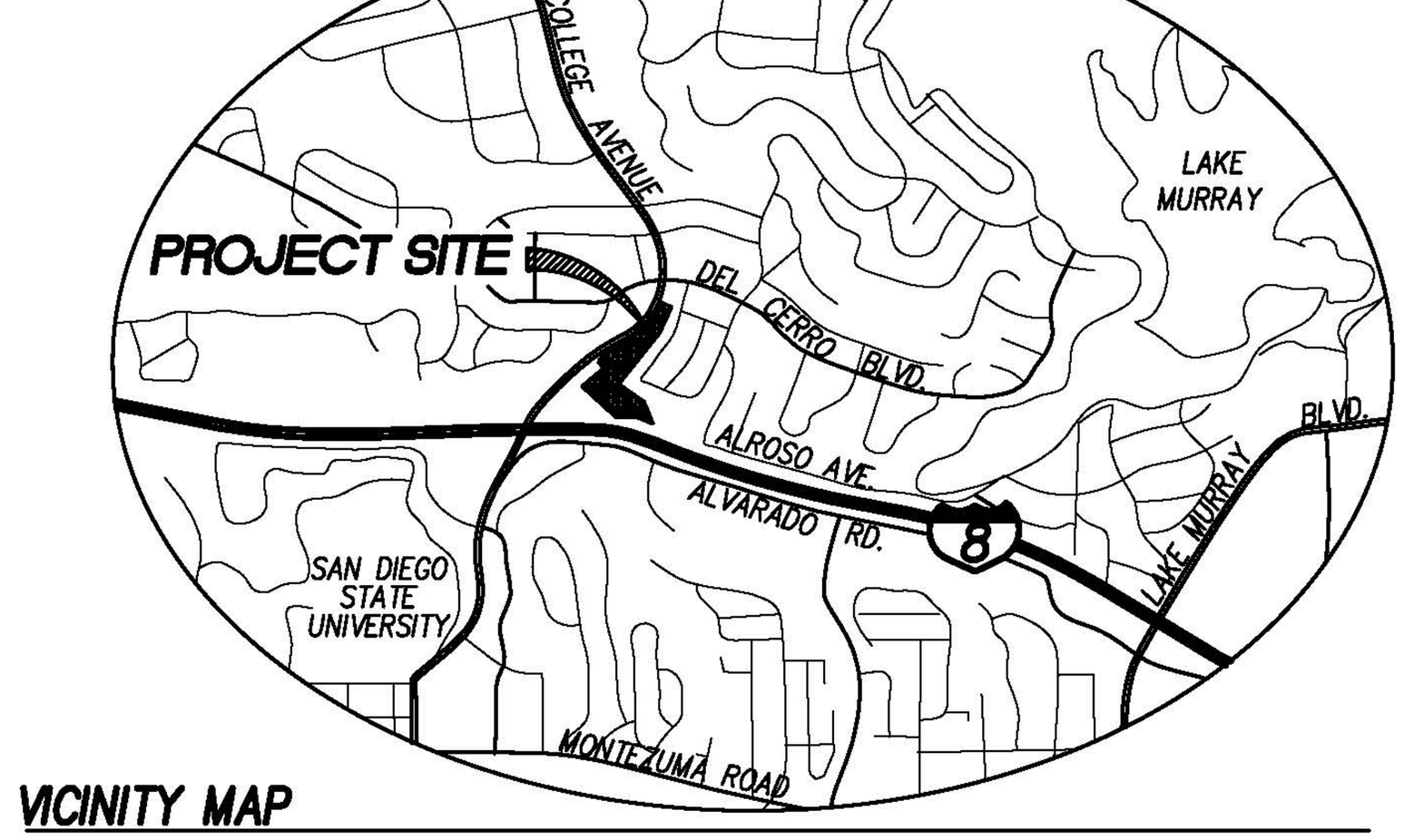
535 North Highway 101, Ste A, Solana Beach, CA 92075

ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

FILE:K:\ACTIVE JOBS\2936 ALL PEOPLE'S CHURCH\CIVIL\REPORTS\HYDROLOGY\2021-1-28\2936_HYDRO_EX.dwg DATE: Feb 02, 21 1:55pm by:glnudson

POST HYDROLOGY EXHIBIT





VICINITY MAP

NOT TO SCALE

LEGEND

- RIGHT-OF-WAY — R/W
- PROPERTY LINE — P/L
- DRAINAGE BOUNDARY
- DRAINAGE SUB-BOUNDARY
- PROPOSED PERMABLE PAVEMENT
- PROPOSED ROOF/HARDSCAPE AREA
- BIOFILTRATION BASIN
- PROPOSED STORM DRAIN PIPE
- FLOW PATH
- HYDROLOGY NODE / Q100 (CFS)

SOIL INFORMATION

SOIL: TYPE D

LAND USE

COMMERCIAL (APPROXIMATELY 80% IMPERVIOUS)

RUNOFF COEFFICIENT

THE DEVELOPED CONDITION RUNOFF COEFFICIENT IS ESTIMATED BASED ON LAND USE AND SOIL TYPE IN ACCORDANCE WITH CITY OF SAN DIEGO STANDARDS. AN APPROPRIATE RUNOFF COEFFICIENT (C) FOR EACH TYPE OF LAND USE IN THE SUBAREA WAS SELECTED FROM TABLE A-1 OF THE CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL (JANUARY 2017) AND MULTIPLIED BY THE PERCENTAGE OF TOTAL AREA (A) INCLUDED IN THAT CLASS. THE SUM OF PRODUCTS FOR ALL LAND USES IS THE WEIGHTED RUNOFF COEFFICIENT ($\Sigma[C]$).

BASIN 1: ACTUAL IMPERVIOUSNESS: 0% , PERMEABLE PAVEMENT 52%
BASIN 2: ACTUAL IMPERVIOUSNESS: 6% , PERMEABLE PAVEMENT 80%
BASIN 3: ACTUAL IMPERVIOUSNESS: 71% , PERMEABLE PAVEMENT 14%
BASIN 4: ACTUAL IMPERVIOUSNESS: 61% , PERMEABLE PAVEMENT 7%

TABULATED IMPERVIOUSNESS: 41%

C=0.45 PERVIOUS
C=0.85 IMPERVIOUS

BASIN 1: RUNOFF COEFFICIENT =0%/80% * 0.85=0 =MIN. VALUE 0.50
BASIN 2: RUNOFF COEFFICIENT = 6%/80% * 0.85 = 0.06 = MIN. VALUE 0.50
BASIN 3: RUNOFF COEFFICIENT = 71&/80% * 0.85 = 0.75
BASIN 4: RUNOFF COEFFICIENT = 61%/80% * 0.85= 0.65

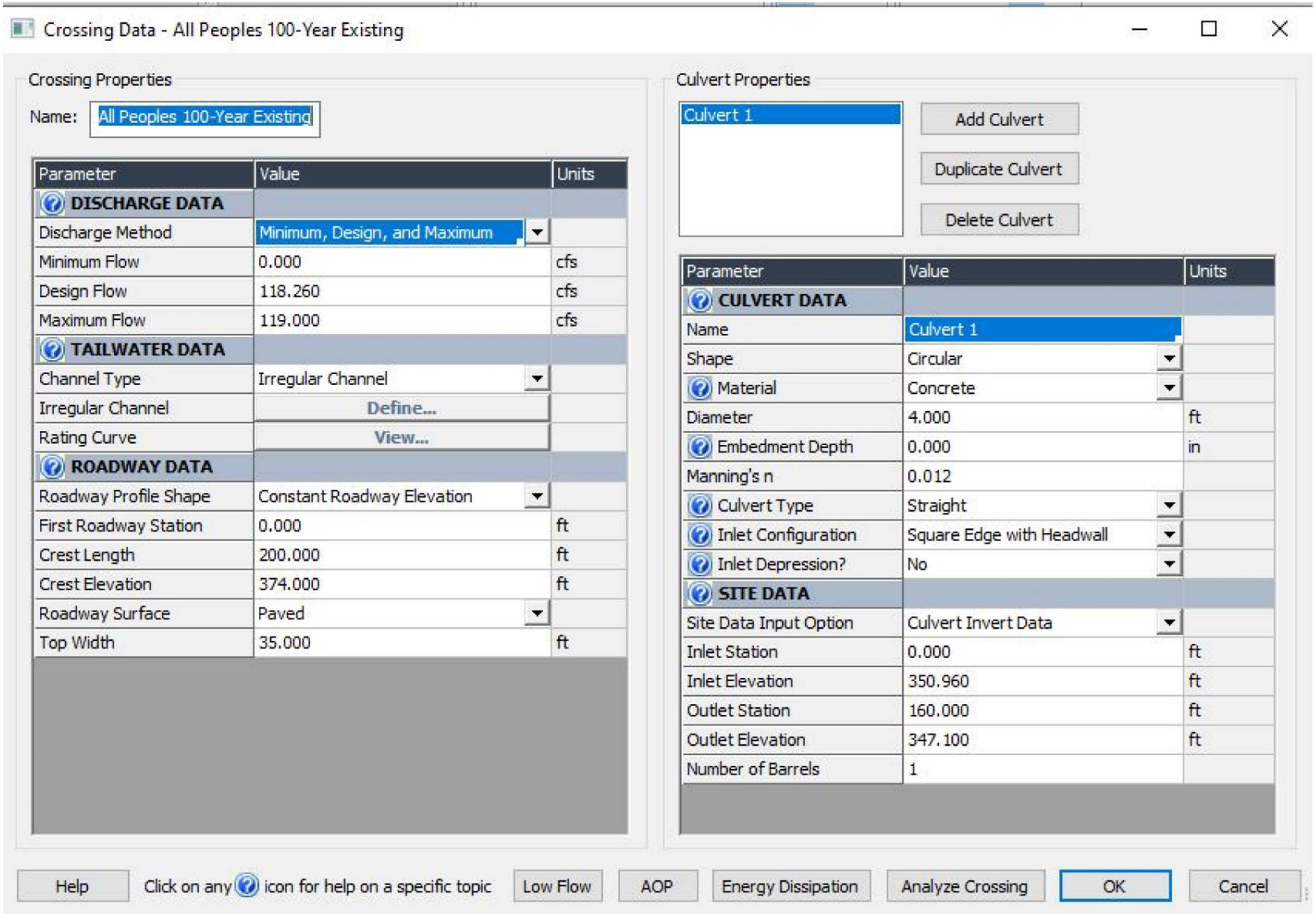
PROPOSED CONDITION
HYDROLOGY EXHIBIT

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

Appendix 3
Caltrans Headwall Calculations


Crossing Data - All Peoples 100-Year Existing
Crossing Properties
Name: All Peoples 100-Year Existing
Parameter | Value | Units
DISCHARGE DATA
Discharge Method | Minimum, Design, and Maximum
Minimum Flow | 0.000 | cfs
Design Flow | 118.260 | cfs
Maximum Flow | 119.000 | cfs
TAILWATER DATA
Channel Type | Irregular Channel
Irregular Channel | Define...
Rating Curve | View...
ROADWAY DATA
Roadway Profile Shape | Constant Roadway Elevation
First Roadway Station | 0.000 | ft
Crest Length | 200.000 | ft
Crest Elevation | 374.000 | ft
Roadway Surface | Paved
Top Width | 35.000 | ft
Culvert Properties
Culvert 1
Add Culvert
Duplicate Culvert
Delete Culvert
Parameter | Value | Units
CULVERT DATA
Name | Culvert 1
Shape | Circular
Material | Concrete
Diameter | 4.000 | ft
Embedment Depth | 0.000 | in
Manning's n | 0.012
Culvert Type | Straight
Inlet Configuration | Square Edge with Headwall
Inlet Depression? | No
SITE DATA
Site Data Input Option | Culvert Invert Data
Inlet Station | 0.000 | ft
Inlet Elevation | 350.960 | ft
Outlet Station | 160.000 | ft
Outlet Elevation | 347.100 | ft
Number of Barrels | 1
Help
Click on any icon for help on a specific topic
Low Flow
AOP
Energy Dissipation
Analyze Crossing
OK
Cancel

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: All Peoples 100-Year Existing

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
350.96	0.00	0.00	0.00	1
352.31	11.90	11.90	0.00	1
352.91	23.80	23.80	0.00	1
353.48	35.70	35.70	0.00	1
353.98	47.60	47.60	0.00	1
354.44	59.50	59.50	0.00	1
354.89	71.40	71.40	0.00	1
355.36	83.30	83.30	0.00	1
355.89	95.20	95.20	0.00	1
357.09	118.26	118.26	0.00	1
357.13	119.00	119.00	0.00	1
374.00	279.92	279.92	0.00	Overtopping

HY-8 Analysis Results

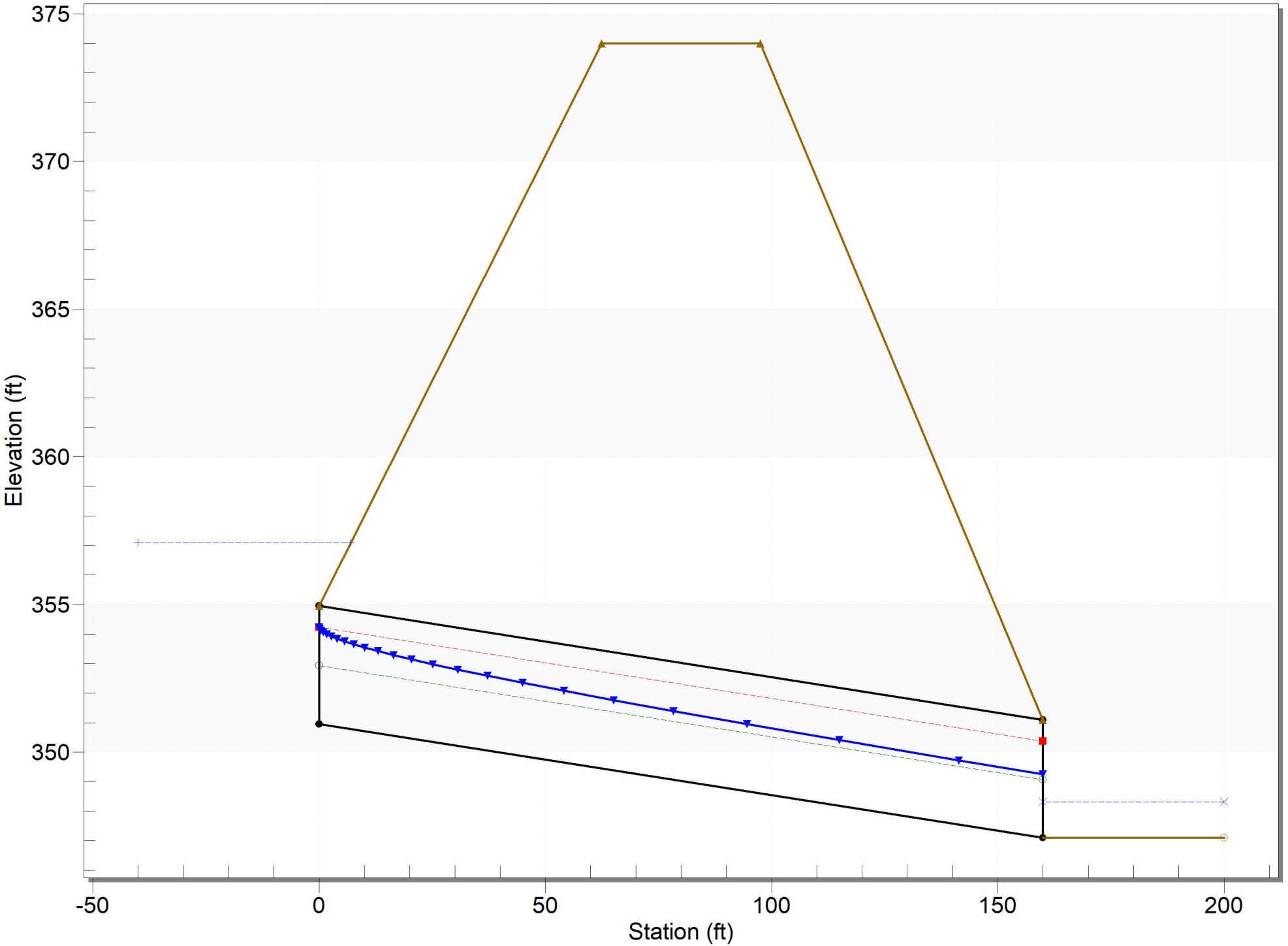
Culvert Summary Table - Culvert 1

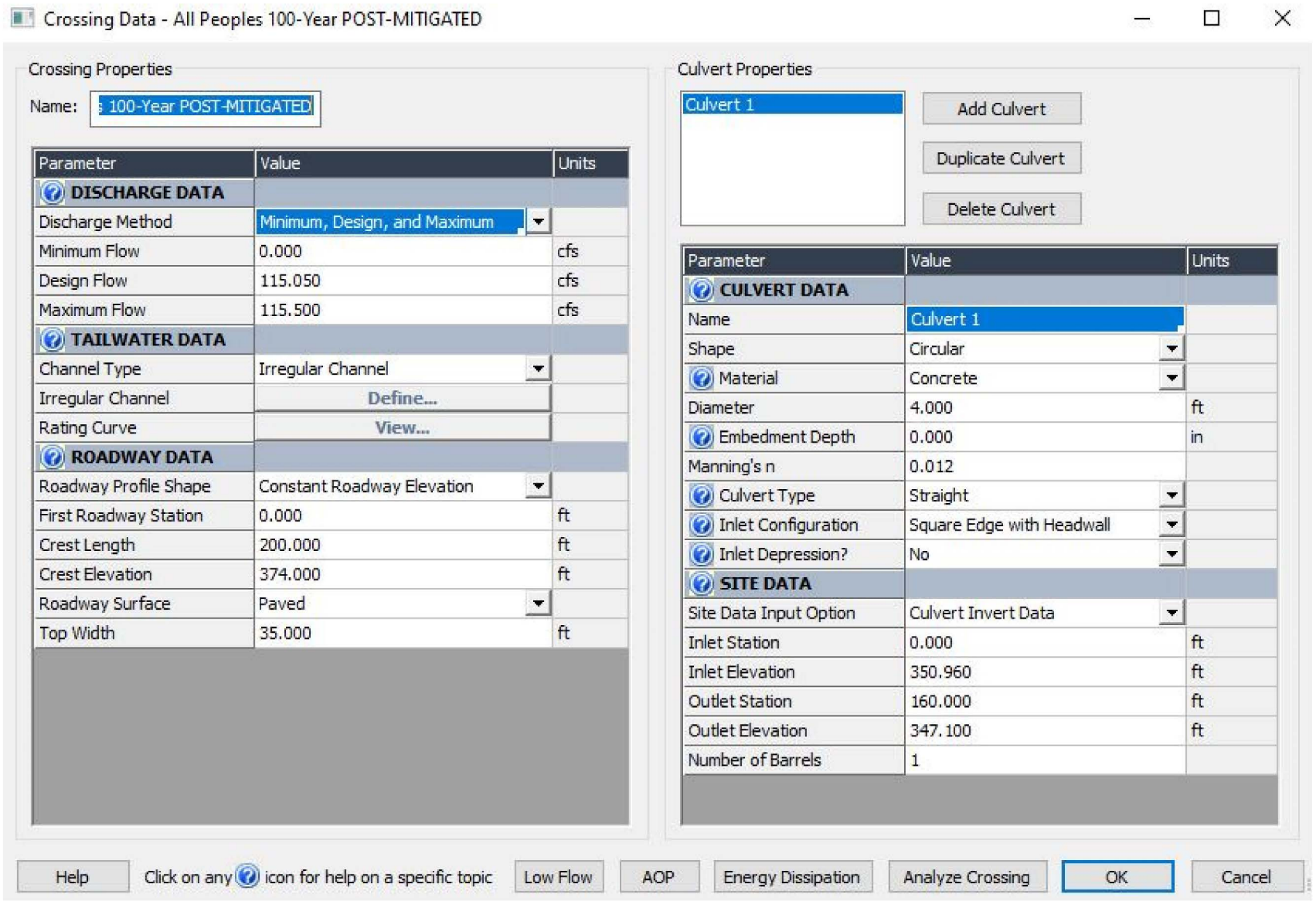
Culvert Crossing: All Peoples 100-Year Existing

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	350.96	0.00	0.0	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
11.90	11.90	352.31	1.35	0.0*	1-S2n	0.60	1.01	0.60	0.33	10.01	15.43
23.80	23.80	352.91	1.95	0.0*	1-S2n	0.85	1.44	0.87	0.50	11.75	19.19
35.70	35.70	353.48	2.52	0.0*	1-S2n	1.04	1.78	1.07	0.63	13.13	21.66
47.60	47.60	353.98	3.02	0.0*	1-S2n	1.20	2.07	1.26	0.74	14.07	23.53
59.50	59.50	354.44	3.48	0.0*	1-S2n	1.35	2.32	1.42	0.84	14.86	25.06
71.40	71.40	354.89	3.93	0.0*	1-S2n	1.49	2.55	1.58	0.93	15.40	26.36
83.30	83.30	355.36	4.40	0.39	5-S2n	1.62	2.77	1.74	1.01	15.93	27.49
95.20	95.20	355.89	4.93	1.03	5-S2n	1.74	2.96	1.88	1.08	16.39	28.51
118.26	118.26	357.09	6.13	2.76	5-S2n	1.97	3.28	2.15	1.22	17.18	30.21
119.00	119.00	357.13	6.17	2.80	5-S2n	1.98	3.29	2.16	1.22	17.20	30.26

Crossing - All Peoples 100-Year Existing, Design Discharge - 118.3 cfs

Culvert - Culvert 1, Culvert Discharge - 118.3 cfs




Crossing Data - All Peoples 100-Year POST-MITIGATED
Crossing Properties
Name: 100-Year POST-MITIGATED
Parameter
Value
Units
DISCHARGE DATA
Discharge Method
Minimum, Design, and Maximum
Minimum Flow
0.000
cfs
Design Flow
115.050
cfs
Maximum Flow
115.500
cfs
TAILWATER DATA
Channel Type
Irregular Channel
Irregular Channel
Define...
Rating Curve
View...
ROADWAY DATA
Roadway Profile Shape
Constant Roadway Elevation
First Roadway Station
0.000
ft
Crest Length
200.000
ft
Crest Elevation
374.000
ft
Roadway Surface
Paved
Top Width
35.000
ft
Culvert Properties
Culvert 1
Add Culvert
Duplicate Culvert
Delete Culvert
Parameter
Value
Units
CULVERT DATA
Name
Culvert 1
Shape
Circular
Material
Concrete
Diameter
4.000
ft
Embedment Depth
0.000
in
Manning's n
0.012
Culvert Type
Straight
Inlet Configuration
Square Edge with Headwall
Inlet Depression?
No
SITE DATA
Site Data Input Option
Culvert Invert Data
Inlet Station
0.000
ft
Inlet Elevation
350.960
ft
Outlet Station
160.000
ft
Outlet Elevation
347.100
ft
Number of Barrels
1
Help
Click on any icon for help on a specific topic
Low Flow
AOP
Energy Dissipation
Analyze Crossing
OK
Cancel

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: All Peoples 100-Year POST-MITIGATED

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
350.96	0.00	0.00	0.00	1
352.29	11.55	11.55	0.00	1
352.88	23.10	23.10	0.00	1
353.44	34.65	34.65	0.00	1
353.92	46.20	46.20	0.00	1
354.37	57.75	57.75	0.00	1
354.81	69.30	69.30	0.00	1
355.26	80.85	80.85	0.00	1
355.76	92.40	92.40	0.00	1
356.91	115.05	115.05	0.00	1
356.93	115.50	115.50	0.00	1
374.00	279.92	279.92	0.00	Overtopping

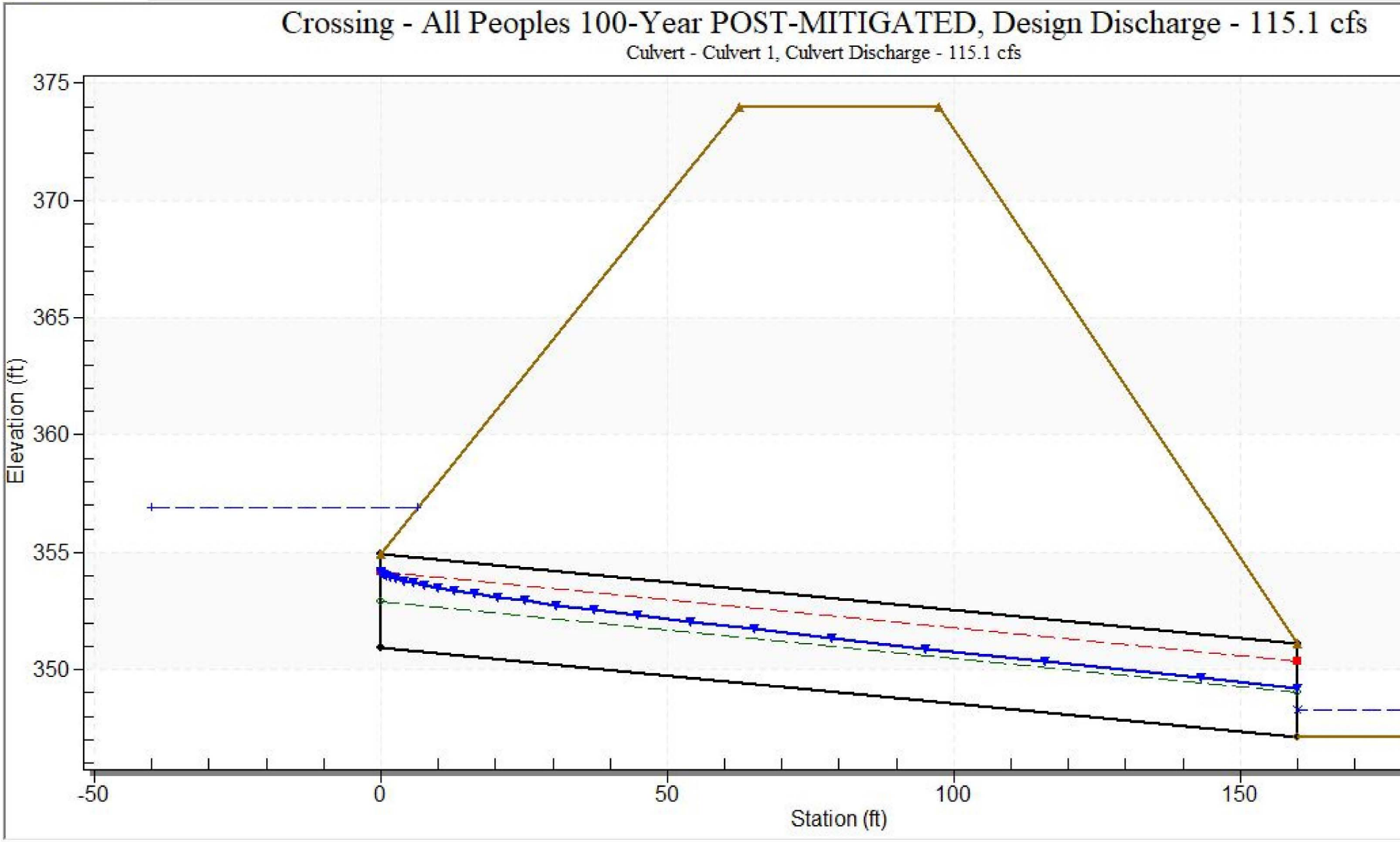
HY-8 Analysis Results

Culvert Summary Table - Culvert 1

Culvert Crossing: All Peoples 100-Year POST-MITIGATED

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	350.96	0.00	0.0	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
11.55	11.55	352.29	1.33	0.0*	1-S2n	0.59	0.99	0.59	0.33	9.93	15.28
23.10	23.10	352.88	1.92	0.0*	1-S2n	0.83	1.42	0.86	0.49	11.59	19.01
34.65	34.65	353.44	2.48	0.0*	1-S2n	1.02	1.75	1.05	0.62	13.15	21.47
46.20	46.20	353.92	2.96	0.0*	1-S2n	1.18	2.04	1.23	0.73	14.03	23.33
57.75	57.75	354.37	3.41	0.0*	1-S2n	1.33	2.29	1.40	0.82	14.72	24.85
69.30	69.30	354.81	3.85	0.0*	1-S2n	1.46	2.52	1.56	0.91	15.32	26.14
80.85	80.85	355.26	4.30	0.26	5-S2n	1.59	2.72	1.71	0.99	15.82	27.27
92.40	92.40	355.76	4.80	0.87	5-S2n	1.71	2.91	1.85	1.07	16.28	28.28
115.05	115.05	356.91	5.95	2.58	5-S2n	1.94	3.24	2.11	1.20	17.07	29.99
115.50	115.50	356.93	5.97	2.61	5-S2n	1.95	3.24	2.12	1.20	17.09	30.02

Culvert Stations



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Attachment 6
Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 786-5661

All Peoples Church
c/o Hamann Companies
1000 Pioneer Way
El Cajon, CA 92020

January 20, 2020
P/W 1805-05
Report No. 1805-05-B-3

Attention: **Mrs. Linda Richardson**

Subject: **Updated Preliminary Geotechnical Investigation and Design Recommendations, Proposed Church Facility, APN 463-010-1000, San Diego, California 90212**

Gentlemen:

In accordance with your request, presented herein are the results of Advanced Geotechnical Solutions, Inc.'s (AGS) updated preliminary geotechnical investigation and design recommendations for the proposed church development northeast of the intersection of College Avenue and Interstate 8, in the City of San Diego, California. It is our understanding that the site will be graded to support a church, a parking structure and associated improvements.

AGS appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have questions regarding this report, please contact the undersigned at (619) 850-3980.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

Prepared by:

SHANE P. SMITH
Staff Engineer

Reviewed by:

ANDRES BERNAL, Sr. Geotechnical Engineer
RCE 62366, RGE 2715, Reg. Exp. 9-30-21

PAUL J. DERISI, Vice President
CEG 2536, Reg. Exp. 5-31-21

Distribution: (3) Addressee





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UPDATED PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED CHURCH AND PARKING STRUCTURES COLLEGE AVENUE AND INTERSTATE 8 SAN DIEGO, CALIFORNIA

1.0 INTRODUCTION

1.1. Purpose and Background

This study is aimed at providing geologic and geotechnical information and recommendations for the development of the proposed church and parking structure. This report has been prepared in a manner consistent with City of San Diego geotechnical report guidelines and the current standard of practice.

1.2. Scope of Work

The scope of our preliminary geotechnical investigation consisted of the following tasks:

- Review readily available geologic maps, literature, aerial photographs, and previous geotechnical studies (Appendix A);
- Compile previous subsurface data (Appendix B) and laboratory test results (Appendix C);
- Prepare a geotechnical/geologic map depicting exploratory locations, approximate distribution of geologic units onsite, and proposed improvements (Plate 1);
- Prepare geologic cross-sections A-A' and B-B' depicting underlying geology, existing and proposed conditions (Plate 2);
- Evaluate groundwater conditions and potential effects on construction;
- Analyze and discuss excavation characteristics (i.e. rippability) of onsite materials, earthwork recommendations, unsuitable soil removals, and compaction criteria for use of on-site earth materials as compacted fill for the proposed development;
- Provide seismic design parameters in accordance with 2019 California Building Code;
- Provide foundation design recommendations based upon anticipated site geotechnical conditions.
- Prepare preliminary foundation and retaining wall design parameters and recommendations;
- Evaluate the impacts of the proposed improvements and excavations on adjacent improvements; and,
- Summarize this data in a report suitable for design, bidding and regulatory review..

2.0 REPORT LIMITATIONS

The conclusions and recommendations in this report are based on the data developed during our previous investigation at the site and a review of readily available geologic and geotechnical information. The materials immediately adjacent to, or beneath those observed in the exploratory excavations may have different characteristics and no representations are made as to the quality or extent of materials not observed. The recommendations presented herein are specific to the development as reflected on the current grading plan. Modifications to the design or development plans could necessitate revisions to these recommendations.

3.0 SITE LOCATION AND DESCRIPTION

The site consists of an approximately 9.2-acre L-shaped parcel located northeast of the intersection of College Avenue and Interstate 8 West, in the City of San Diego, California (see Figure 1, Site Location Map). The site is currently vacant, supporting a light growth of seasonal grasses, shrubs, and small trees. Access to the site is via northbound College Avenue. The site topography generally slopes down toward the southwest. Approximate elevations range from 450 feet above mean sea level (msl) at the northerly limits to 356 feet msl at the southwest corner of the site. Ascending slopes up to approximately 25 feet in height are present along the westerly/northwesterly property boundary adjacent to College Avenue. Existing slopes descend to a minor drainage basin at the southwesterly corner of the site.

4.0 PREVIOUS DEVELOPMENT

As part of our preliminary investigation several historic aerial photos and topographic maps of the project area were reviewed by representatives of AGS. Based on our review it was determined that the site was previously graded to its current configuration. This grading was likely accomplished in multiple phases. The first phase of grading appears to have occurred in the late 1950's to early 1960's during construction of the residential development superjacent to the east, College Avenue to the west, Interstate 8 (previously Highway 80) and associated College Avenue off ramp to the south and southwest.

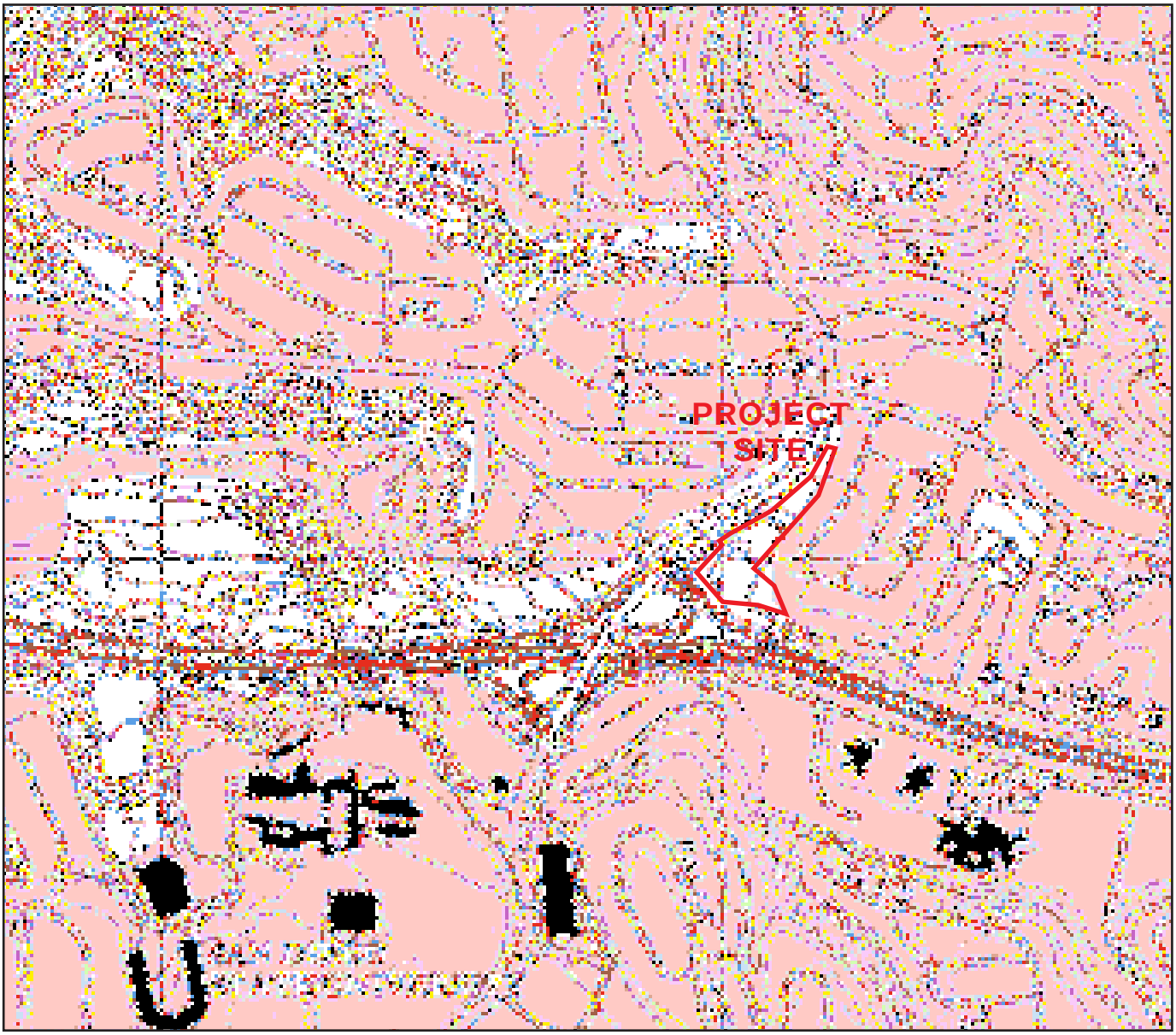
Pre-development photos show a moderate sized drainage trending southwest through the approximate central portion of the site. Minor modifications to this drainage occurred during the first phase of grading activities. Subsequently, a second phase of grading appears to have occurred in the mid- to late-1960's. During this phase, the drainage appears to have been filled and a level pad constructed in the southwest portion of the site with graded slopes descending the west and southwest. Based on our review of historic photos and topographic maps it is anticipated that fills on the order of 20 to 30 feet deep were placed in the southwesterly portion of the site. The fill materials placed during this second phase of grading may have been derived from the residential development to the southeast (Del Cerro Court).

5.0 PROPOSED DEVELOPMENT

Based on our review of the 40-scale preliminary grading plan for All Peoples Church prepared by Pasco Laret Suiter & Associates (PLSA) dated January 20, 2020, it is our understanding that the subject site will be graded to support a nearly 37,000 square-foot church structure to the west, a two-level parking structure in the central portion of the site, paved driveways and parking areas, and several retaining walls and slopes. It is anticipated that the church will consist of a two- to three-story concrete and/or steel frame structure supported by a shallow slab-on-grade foundation system. The two-level parking garage is anticipated to be a concrete structure supported by a shallow slab-on-grade foundation system.

6.0 SUBSURFACE INVESTIGATION

As part of our previous investigation at the site, AGS excavated and logged ten (10) exploratory test pits in December 2014. The test pits were excavated with a Caterpillar 328D tracked excavator equipped with a two-foot bucket. The exploratory test pits extended to a maximum depth of 27 feet below existing grade. In addition, four (4) borehole percolation tests (P-1 through P-4) were performed evaluate the feasibility of storm water infiltration at the site. The approximate locations of the test pits, percolation test borings, interpreted geology and geologic contacts have been plotted on the 40-scale preliminary grading plan prepared by PLSA and are presented in the attached Plate 1, Geologic Map and Exploration Location Plan.



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SITE LOCATION MAP
PROPOSED ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

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FIGURE 1

SOURCE MAP - TOPOGRAPHIC MAP OF THE
LA MESA 7.5 MINUTE QUADRANGLE,
SAN DIEGO COUNTY, CALIFORNIA

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7.0 ENGINEERING GEOLOGY

7.1. Regional Geologic and Geomorphic Setting

The subject site is situated within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges province occupies the southwestern portion of California and extends southward to the southern tip of Baja California. In general, the province consists of young, steeply sloped, northwest trending mountain ranges underlain by metamorphosed Late Jurassic to Early Cretaceous-aged extrusive volcanic rock and Cretaceous-aged igneous plutonic rock of the Peninsular Ranges Batholith. The westernmost portion of the province, where the subject site is located, is predominantly underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges' dominant structural feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

7.2. Site Geology

A majority of the site is mantled with pre-existing undocumented fill soils. The undocumented fill is locally underlain by young alluvium and older alluvium where a pre-development drainage was filled in. The fill and alluvial soils are underlain to maximum depths explored by Tertiary-aged Stadium Conglomerate and Cretaceous-age Santiago Peak Volcanics (see Figure 2, Regional Geologic Map). A brief description of the earth materials encountered on this site is presented in the following sections. More detailed description of these materials is provided in the test pit logs included in Appendix B.

7.2.1. Artificial Fill - Undocumented (Map Symbol afu)

The site is mantled with undocumented fill soils ranging from 2 to 22 feet in thickness. As encountered, these materials generally consist of fine to coarse grained sand and silty sand with abundant cobbles and some boulders up to 4 feet in diameter. These materials were observed to be slightly moist to very moist in a loose to medium dense condition. Buried trash and construction debris were encountered in test pit EX-9. An area of large hard rock boulders (shot rock) up to 8 feet in diameter is exposed at the surface in the central portion of the site in proximity to the proposed parking structure location.

7.2.2. Young Alluvium (Qal)

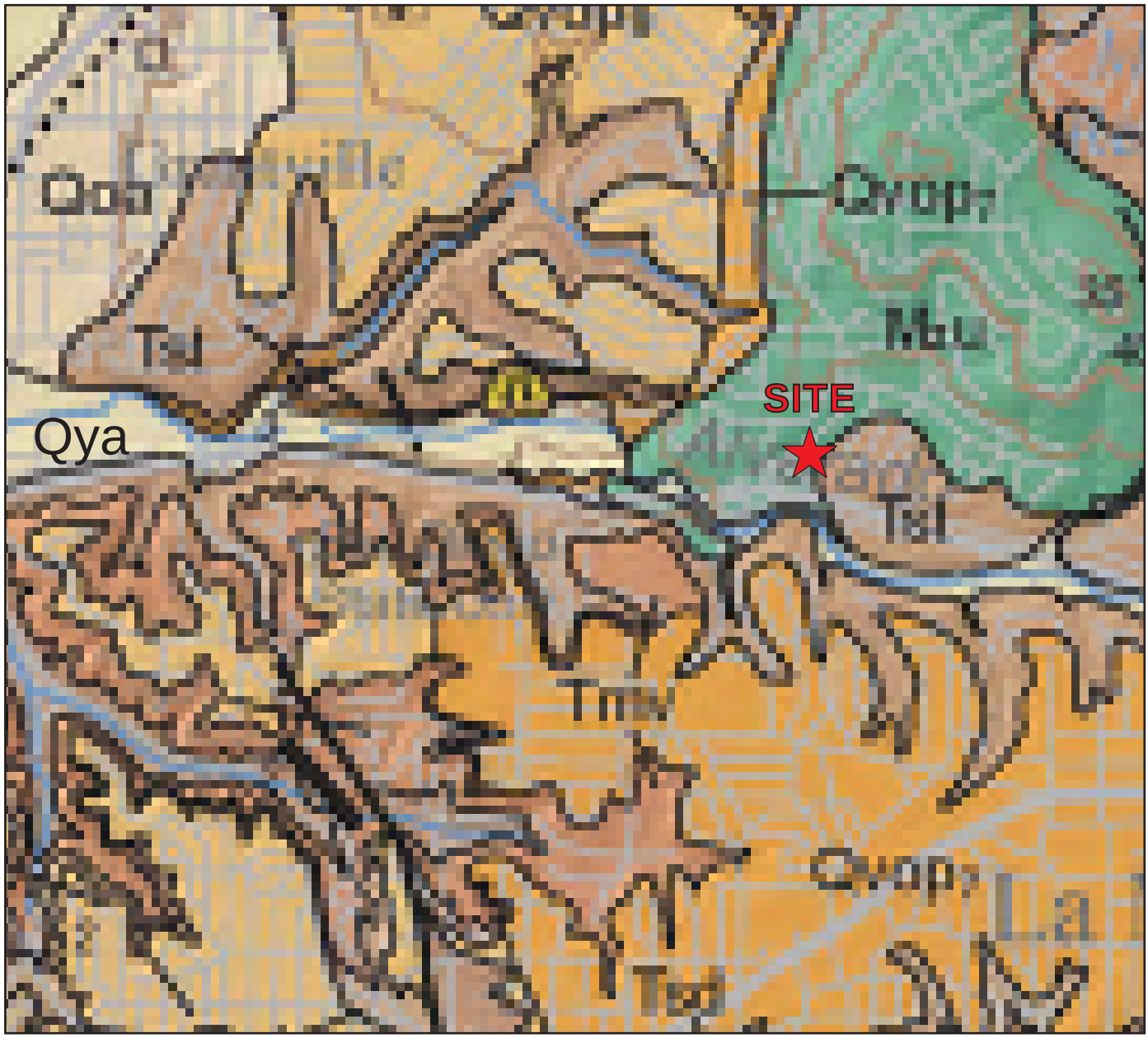
Young alluvium was encountered underlying undocumented fill in test pits EX-3 and EX-5 at 21 to 22 feet below ground surface. The alluvium encountered ranged from a few feet to as much as 4 feet thick. As encountered these materials generally consist of brown to gray, clayey silt with sand and gravel, in a very moist and firm to stiff condition.

7.2.3. Older Alluvium (Map Symbol Qoa)

Older Alluvium was encountered in test pits EX-4 through EX-7. As encountered these materials generally consist of fine-grained, yellow silty sand with silty clay lenses in a slightly moist to moist and moderately dense to dense condition.

7.2.4. Stadium Conglomerate (Map Symbol Tst)

Tertiary aged Stadium Conglomerate was encountered in test pits EX-1, EX-8 and EX-9 below undocumented fill. As encountered, these materials consist of moderately hard, cobble



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REGIONAL GEOLOGIC MAP
PROPOSED ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

Qya	Young Alluvium
Qoa	Older Alluvium
Tst	Stadium Conglomerate (Middle Eocene)
Mzu	Metamorphosed and Unmetamorphosed Volcanic and Sedimentary Rocks, Undivided (Mesozoic)

P/W 1805-05

FIGURE 2

SOURCE MAP(S):Geologic Map of the San Diego 30' x 60'Quadrangle, California, Kennedy and Tan 2008

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conglomerate, in a brownish yellow, silty sandstone matrix. Cobbles were generally on the order of 3 to 6 inches in diameter and composed of rounded volcanic 'Poway' clasts.

7.2.5. Santiago Peak Volcanics (Map Symbol Jsp)

As encountered, this unit can generally be described as moderately to slightly weathered, moderately hard to hard, metavolcanic bedrock that is reddish brown to brownish yellow on weathered surfaces, and gray on fresh surfaces.

7.3. Geologic Structure

The Stadium Conglomerate non-conformably overlies the basement rocks of the Santiago Peak Volcanics and appears to be confined to the easterly portion of the site. Based on review of historic aerial photos, the original surface contact between the Stadium Conglomerate and Santiago Peak Volcanics appears to coincide with the pre-development drainage that transected the site in a roughly northeast to southwest direction. The Stadium Conglomerate is massively bedded and is anticipated to be near horizontal to very slightly dipping to the west in line with the overall regional dip.

7.4. Groundwater

Groundwater was not encountered to the depths explored at the site. Minor seepage was observed in EX-2 at the fill and bedrock contact. No other natural groundwater condition is known to exist at the site that would impact the proposed site development. However, it should be noted that localized perched groundwater may develop at a later date, most likely at or near fill/bedrock contacts, due to fluctuations in precipitation, irrigation practices, or factors not evident at the time of our field exploration.

7.5. Faulting and Seismicity

The site is located in the tectonically active Southern California area, and will therefore likely experience shaking effects from earthquakes. The type and severity of seismic hazards affecting the site are to a large degree dependent upon the distance to the causative fault, the intensity of the seismic event, and the underlying soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or dynamic settlement. The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

7.5.1. Surface Fault Rupture

No known active faults have been mapped at or near the subject site. The nearest known active surface fault is the Silver Strand section of the Newport-Inglewood-Rose Canyon fault zone, located approximately 7.1 miles southwest of the site. Accordingly, the potential for fault surface rupture on the subject site is considered very low to remote. This conclusion is based on our literature and map review.

7.5.2. Seismicity

As noted, the site is within the tectonically active southern California area, and is approximately 7 miles from an active fault. Given the proximity of the site to the nearest active fault the potential exists for strong ground motion that may affect future improvements.

At this point in time, non-critical structures (commercial, residential, and industrial) are designed according to the California Building Code (2019) and the requirements of the controlling local agency.

7.5.3. Liquefaction

Given the dense nature of the formational materials underlying the site, the proposed remedial grading as recommended herein, and the lack of a shallow groundwater table at the project site, the potential for seismically induced liquefaction is considered remote.

7.5.4. Dynamic Settlement

Dynamic settlement occurs in response to an earthquake event in loose sandy earth materials. The potential of dynamic settlement at the subject site is considered to be remote due to the presence of well consolidated/indurated formational materials underlying the site and the proposed removal of loose, sandy soils as recommended herein.

7.5.5. Seismically Induced Landsliding

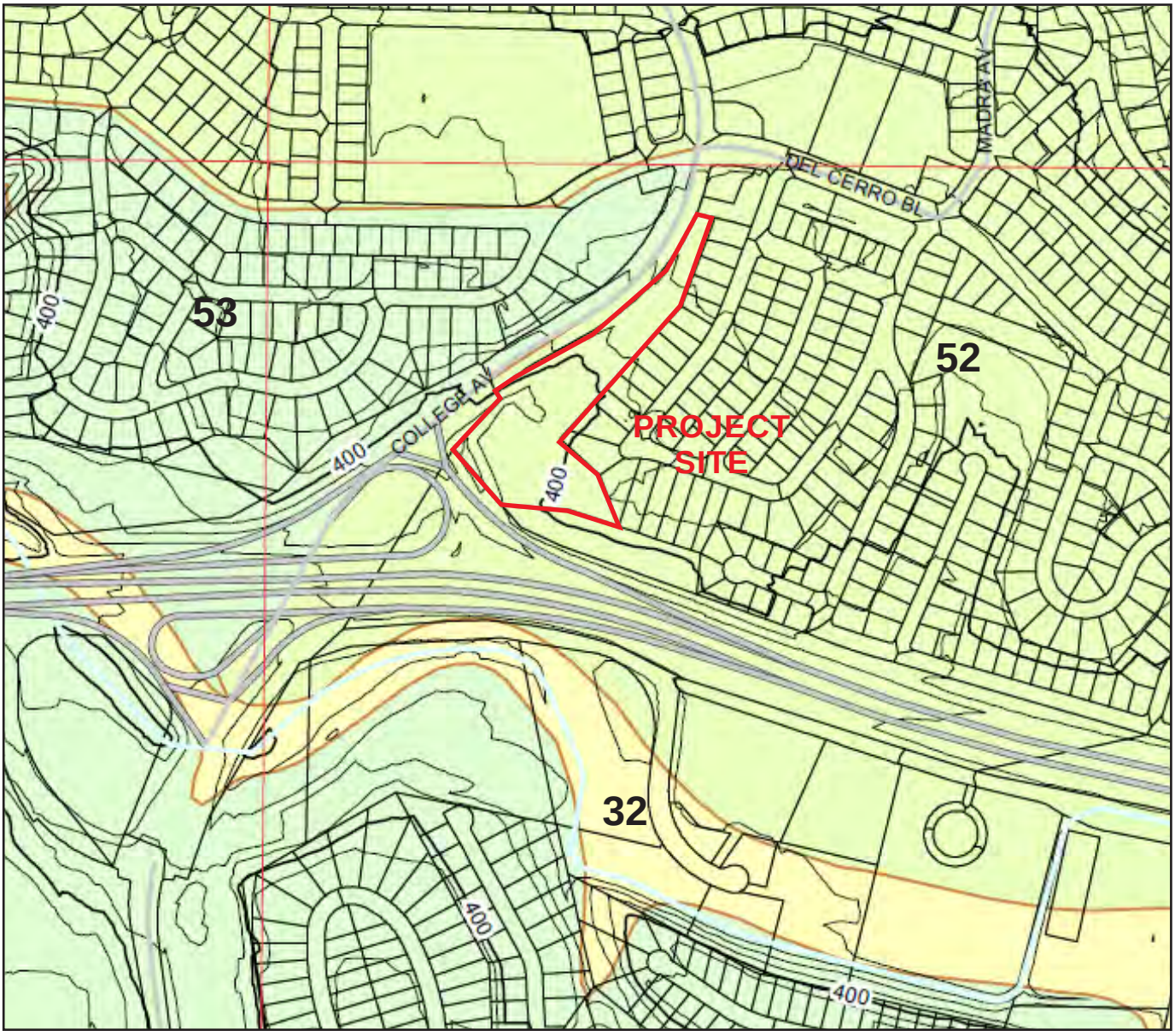
Evidence of landsliding at the site was not observed during our field observations, nor are there any geomorphic features indicative of landsliding noted in our review of published geologic maps. The nearest known landslide is approximately ¾-mile west of the project and developed within exposures of Friars Formation. If the recommendations provided in this report are followed, the likelihood for seismically induced landsliding is considered to be remote.

7.5.6. City of San Diego Seismic Safety Study

As indicated in Figure 3 (excerpted from the San Diego Seismic Safety Study Grid Tile 22), the site is mapped under Geologic Hazard Category 52: Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk.

7.6. Seismic Design Parameters

Based on our subsurface exploration, the site has been classified as Seismic Site Class D - Default consisting of a stiff soil profile with average SPT N blowcount between 15 and 50 blows per foot and assumed Vs30 of 270 m/s. Table 7.5.7 presents seismic design parameters in accordance with 2019 CBC and mapped spectral acceleration parameters (United States Geological Survey, 2019) utilizing site coordinates of Latitude 32.7805°N and Longitude 117.0640°W. The seismic provisions of the 2019 CBC are significantly different from the previous version and require a site-specific seismic hazard analysis (SHA) for most sites located on Site Class D and E soil conditions which was performed as described in Section 7.7.



CITY OF SAN DIEGO
SEISMIC SAFETY STUDY
PROPOSED ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

32 Low Potential (liquefaction) – fluctuating groundwater minor drainages.

52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk.

53 Level or sloping Terrain, unfavorable geologic structure, Low to moderate risk.

P/W 1805-05

FIGURE 3

SOURCE MAP - CITY OF SAN DIEGO
SEISMIC SAFETY STUDY, GRID TILE 22
DATED APRIL 3, 2008

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TABLE 7.5.7 - 2019 CBC SEISMIC DESIGN PARAMETERS (SITE CLASS D)	
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	0.889g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.316g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	1.067g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.711g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	0.470g
Seismic Design Category	N/A[3]

Notes: [1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8

7.7. Site Specific Ground Motion Hazard Analysis

The site-specific ground motion hazard analysis was performed in accordance with Section 21.1 of ASCE Standard 7-16. Probabilistic and deterministic maximum considered earthquake (MCE) response accelerations were evaluated in order to develop the site-specific design response spectrum. The derivation of the site-specific design response spectra, including the probabilistic and deterministic seismic hazard analyses, are presented in Figure 4, Site-Specific Design Response Spectrum. The detailed analyses and results are described below.

7.7.1. Probabilistic Seismic Hazard Analysis

A site-specific probabilistic seismic hazard analysis was performed to evaluate the spectral response accelerations represented by a 5-percent-damped acceleration response spectrum having a 2 percent probability of exceedance within a 50-year period. The probabilistic seismic hazard analysis was performed using the Java program OpenSHA (http://www.OpenSHA.org), developed jointly by the Southern California Earthquake Center (SCEC) and the United States Geological Survey (USGS). The probabilistic seismic hazard analyses used the next generation attenuation (NGA) relationships by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014). The resulting median geometric-mean acceleration response spectra were used to create a probabilistic response spectrum based on the average spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors.

7.7.2. Deterministic Seismic Hazard Analysis

A site-specific deterministic seismic hazard analysis was performed to evaluate the MCE response acceleration. The deterministic MCE response acceleration at specified periods was calculated as the 84th percentile of the maximum rotated component of ground motion computed at each period for characteristic earthquakes on known active faults within the region. Initially we performed an evaluation of potentially damaging earthquake sources by

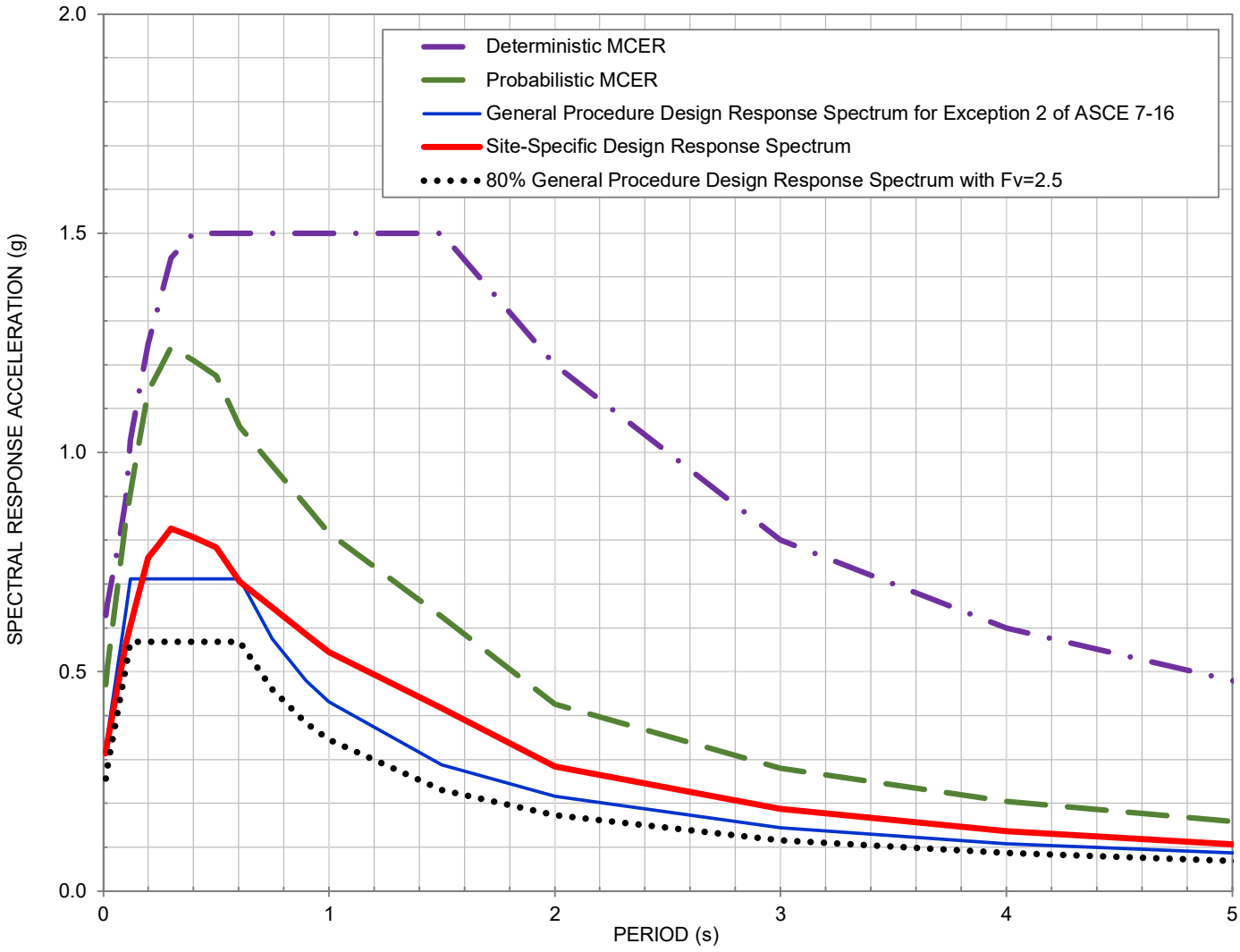
reviewing published geologic maps and sources that contribute to the probabilistic hazard analysis, according to the deaggregation results obtained using the USGS unified hazard tool website (https://earthquake.usgs.gov/hazards/ interactive/). Based on our evaluation, we selected three "controlling" sources and seismic events: the Rose Canyon (Silver Strand section-Downtown Graben fault), Rose Canyon (San Diego section) and Rose Canyon (Silver Strand section) faults. Subsequently we used the NGA Models by Abrahamson, Silva & Kamai (2014); Boore, Stewart, Seyhan & Atkinson (2014); Campbell and Bozorgnia (2014) and Chiou and Youngs (2014) to estimate the ground motion distribution for each earthquake. The 5-percent-damped pseudo-absolute acceleration response spectrum was calculated for each earthquake using an Excel spreadsheet issued by the Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/ngawest2/ databases/). Earthquake source and site characteristic parameters were evaluated using the California Geological Survey earthquake source database and the CalTrans ARS Online web-based tool (http://dap3.dot.ca.gov/ARS_Online). Distances to faults were evaluated using the USGS unified hazard tool website. The resulting median geometric-mean acceleration response spectra were used to create a deterministic MCE response spectrum based on the greatest spectral acceleration at each period, and then converted into maximum rotated components of ground motion using applicable scale factors. The final deterministic spectral response accelerations were taken to be not lower than the deterministic lower limit as calculated using Figure 21.2-1 of ASCE 7-16, Chapter 21.

7.7.3. Site-Specific Design Response Spectrum

The site-specific MCER spectral response acceleration was calculated at each period to be the lesser of the spectral response accelerations from the probabilistic and deterministic MCE. Finally, the design spectral response acceleration at each period was calculated as two-thirds of the site-specific MCE spectral response acceleration, but not less than 80 percent of the spectral response acceleration evaluated in accordance with Section 11.4.5 of ASCE 7-16. In order to calculate the 80 percent lower limit, mapped values from USGS Seismic Design Maps (http://earthquake.usgs.gov/designmaps/us) were used to calculate SDS, SD1 and the design spectrum in accordance with Section 21.4 of ASCE 7-16. Applicable response spectra data are presented in Table 7.7.3A and on Figure 4, Site-Specific Design Response Spectrum.

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.01	0.314
0.02	0.341
0.03	0.369
0.05	0.424
0.075	0.494
0.10	0.563
0.121	0.605
0.15	0.661
0.2	0.759
0.25	0.793
0.3	0.827

PERIOD (s)	SITE-SPECIFIC DESIGN SPECTRAL ACCELERATION Sa, (g)
0.4	0.806
0.5	0.784
0.606	0.705
0.8	0.647
0.9	0.586
1.0	0.544
1.5	0.417
2.0	0.284
3.0	0.187
4.0	0.136
5.0	0.106



Note: See Table 7.7.3A of the report for values of the various curves.

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SITE-SPECIFIC DESIGN RESPONSE SPECTRUM

ALL PEOPLES CHURCH
COLLEGE AVENUE AND INTERSTATE 8
SAN DIEGO, CALIFORNIA

PROJECT NO.	DATE	FIGURE 4
1805-05	01/20	

TABLE 7.7.3A
SITE-SPECIFIC DESIGN RESPONSE SPECTRUM DATA

Period (sec)	General Procedure Design Response Spectrum for Exception 2 of ASCE 7-16	Risk Coeff. C_R	Site-Specific Ground Motion Analysis Spectral Accelerations (g)							
			Maximum direction 2%-in-50-yr Probabilistic Spectrum	Probabilistic MCE_R	Maximum direction 84th-percentile Deterministic Spectrum	Deterministic Lower Limit	Deterministic MCE_R	Site Specific MCE_R	80% General Procedure Design Response Spectrum with Fv=2.5	Site-Specific Design Response Spectrum
0.01	0.320	0.896	0.525	0.470	0.544	0.628	0.628	0.470	0.256	0.314
0.02	0.355	0.896	0.571	0.512	0.545	0.656	0.656	0.512	0.284	0.341
0.03	0.390	0.896	0.618	0.553	0.555	0.684	0.684	0.553	0.312	0.369
0.05	0.461	0.896	0.710	0.637	0.622	0.741	0.741	0.637	0.368	0.424
0.075	0.549	0.896	0.826	0.740	0.756	0.811	0.811	0.740	0.439	0.494
0.1	0.637	0.896	0.942	0.844	0.893	0.881	0.893	0.844	0.509	0.563
0.1212	0.711	0.896	1.012	0.907	1.029	0.941	1.029	0.907	0.569	0.605
0.15	0.711	0.896	1.107	0.992	1.109	1.022	1.109	0.992	0.569	0.661
0.2	0.711	0.896	1.271	1.139	1.247	1.163	1.247	1.139	0.569	0.759
0.25	0.711	0.897	1.326	1.189	1.345	1.303	1.345	1.189	0.569	0.793
0.3	0.711	0.898	1.382	1.241	1.407	1.444	1.444	1.241	0.569	0.827
0.4	0.711	0.900	1.344	1.210	1.415	1.500	1.500	1.210	0.569	0.806
0.5	0.711	0.902	1.304	1.175	1.363	1.500	1.500	1.175	0.569	0.784
0.6061	0.711	0.904	1.171	1.058	1.229	1.500	1.500	1.058	0.569	0.705
0.75	0.575	0.906	1.071	0.970	1.135	1.500	1.500	0.970	0.460	0.647
0.9	0.479	0.909	0.966	0.878	1.036	1.500	1.500	0.878	0.383	0.586
1	0.431	0.911	0.896	0.817	0.971	1.500	1.500	0.817	0.345	0.544
1.5	0.287	0.911	0.687	0.625	0.670	1.500	1.500	0.625	0.230	0.417
2	0.216	0.911	0.468	0.426	0.495	1.200	1.200	0.426	0.172	0.284
3	0.144	0.911	0.308	0.280	0.314	0.800	0.800	0.280	0.115	0.187
4	0.108	0.911	0.223	0.204	0.211	0.600	0.600	0.204	0.086	0.136
5	0.086	0.911	0.174	0.159	0.150	0.480	0.480	0.159	0.069	0.106

The site-specific design response parameters are provided in Table 7.7.3B. These parameters were evaluated from Design Response Spectra values presented above in accordance with ASCE 7-16 Section 21.4 guidelines.

TABLE 7.7.3B
SITE-SPECIFIC SEISMIC DESIGN PARAMETERS

Spectral Response Acceleration 0.2-second period, S_{MS}	1.117g
Spectral Response Acceleration 1-second period, S_{M1}	0.938g
Design Spectral Response Acceleration for short period, S_{DS}	0.745g
Design Spectral Response Acceleration for 1-second period, S_{D1}	0.625g
MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA_M	0.477g

7.8. Non-seismic Geologic Hazards

7.8.1. Mass Wasting

No evidence of mass wasting was observed onsite nor was any noted on the reviewed maps.

7.8.2. Flooding

According to available FEMA maps, the site is not in a FEMA identified flood hazard area.

7.8.3. Subsidence/Ground Fissuring

Due to the presence of the dense underlying materials, the potential for subsidence and ground fissuring due to settlement is unlikely.

8.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytical methods used in this report.

8.1. Soil Characteristics

The materials found in the area of the proposed improvements consist primarily of previously placed undocumented fill soils. Once the planned removals of unsuitable soils (artificial fill, young alluvium, and weathered older alluvium/bedrock) are completed, the proposed structures will be founded upon compacted fill overlying competent Older Alluvium, Stadium Conglomerate, or Santiago Peak Volcanics. In general, these materials exhibit favorable engineering characteristics. Descriptions of the units encountered/anticipated on site can be found in the test pit logs in Appendix B.

8.2. Excavation Characteristics

The onsite soils within the anticipated cut depths are anticipated to be excavatable with conventional grading equipment. Excavations in the cobble rich lenses may necessitate moderate to heavy ripping to efficiently advance. Excavations for deeper utilities and excavations encountering large boulders may require trackhoes. In the southeasterly portion of the site, design cuts are currently proposed to depths on the order of 25 feet below existing grade. Moderately hard to very hard, metavolcanic bedrock will likely be encountered necessitating the use of specialized grading techniques (large excavators with hoe rams, large bulldozers and possibly blasting) to accomplish site grading and overexcavation requirements as outlined in this document.

8.3. Compressibility

Onsite materials that are significantly compressible in their current condition include topsoil, undocumented fill materials, young alluvium, and weathered older alluvium. These materials will require complete removal prior to placement of fill, and where exposed at design grade. Compressibility of unweathered older alluvium, Stadium Conglomerate, and Santiago Peak Volcanics is not a geotechnical design concern for the proposed structures. If the recommended removals are not possible in certain areas due to property line constraints, the improvements in those areas should be designed for increased total and differential settlement potential.

8.4. Collapse Potential/Hydro-Consolidation

Given the removal recommendations presented herein and the age and density of the Older Alluvium, Stadium Conglomerate, and Santiago Peak Volcanics, the potential for hydro-consolidation is considered remote at the subject site.

8.5. Expansion Potential

In general, the onsite soils consist of silty sands with abundant cobbles and some boulders. Minor clayey/silty soils were identified during our subsurface investigation. We anticipate onsite soils will exhibit "Very Low" to "Medium" expansion potential with the majority being in the "Low" range. Final determination of expansion potential for foundation design purposes should be based on testing of the as-graded soil conditions.

8.6. Shear Strength Characteristics

Shear strength testing was not conducted as part of this investigation. Based upon our previous experience with similar soils in the vicinity of the project area, the shear strength parameters presented in Table 8.6 are recommended for compacted fill, Older Alluvium and the bedrock units observed onsite.

TABLE 8.6
SHEAR STRENGTH PARAMETERS

Material	***Cohesion (psf)***	***Friction Angle (degrees)***
Compacted Artificial Fill	150	31
Older Alluvium	100	32
Bedrock (Tst and Jsp)	400	36

8.7. Earthwork Adjustments

The following Table 8.7 presents bulk/shrink values of the various onsite soils for use in estimating earthwork grading quantities.

TABLE 8.7
SHRINK/BULK PARAMETERS

Artificial Fill	Shrink 5-10%
Young Alluvium	Shrink 6-10%
Older Alluvium	Bulk 2-5%
Stadium Conglomerate	Bulk 5-10%
Santiago Peak Volcanics (Rippable)	Bulk 12-18%
Santiago Peak Volcanics (Non-Rippable)	Bulk 18-25%

These values may be used in an effort to balance the earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in progress and actual conditions are better defined.

8.8. Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formulas presented in *NAVFAC DM-7.1*. Allowable bearing was determined by applying a factor of safety of at least three (3) to the ultimate bearing capacity.

Static lateral earth pressures were calculated using *Rankine* methods for active and passive cases. If it is desired to use *Coulomb* forces, a separate analysis specific to the application can be conducted.

8.9. Chemical/Resistivity Analyses

Laboratory testing for sulfates, chlorides, and soil resistivity and pH was not conducted. Final design should be based upon representative sampling of the as-graded soils.

8.10. Infiltration Potential

AGS conducted four borehole percolation tests (P-1 through P-4) in accordance with the testing methods described in Appendix D of the BMP Design Manual (2018). Infiltration rates were calculated using the Porchet method. Based on the results of our subsurface investigation and testing, it was determined that the upper portions of the Stadium Conglomerate and Santiago Peak Volcanics onsite possess relatively low infiltration rates. Measured infiltration rates varied between 0.10 in./hr. and 0.39 in./hr. Preliminary design infiltration rates utilizing a factor of safety of 2.0 were determined to be 0.05 in./hr. for Stadium Conglomerate and 0.18 in./hr. for Santiago Peak Volcanics materials which correspond to a "Partial Infiltration" condition. However, it should be noted that the Santiago Peak Volcanics are virtually impermeable and that 'infiltration' occurred as water flowing along/through fractures in the bedrock rather than infiltrating vertically through the bedrock.

Current plans do not show proposed infiltration type BMPs for the project site. If future plans include permanent storm water BMPs, additional testing and evaluation may be necessary. It should be noted that a large portion of the site is mantled by deep pre-existing fills in excess of 5 feet in depth. The current City of San Diego Storm Water Standards (2018) considers areas with pre-existing fills greater than 5 feet deep not suitable for infiltration. As such AGS would not recommend storm water infiltration onsite.

9.0 GRADING RECOMMENDATIONS

Development of the subject site as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are specific issues identified by this study as possibly impacting site development. Recommendations to mitigate these issues are presented in the text of this report.

9.1. Site Preparation and Removals

Grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current City of San Diego grading ordinance, and AGS's *Earthwork*

Specifications (Appendix C). All topsoil, undocumented artificial fill, younger alluvium, and weathered older alluvium and bedrock should be removed in structural areas planned to receive fill or where exposed at final grade. Localized areas may require removals up to 25 feet deep. Removals should expose competent Older Alluvium, Stadium Conglomerate or Santiago Peak Volcanics materials. In general, soils removed during remedial grading will be suitable for reuse in compacted fills, provided they do not contain deleterious materials and are properly moisture conditioned.

9.1.1. Stripping and Deleterious Material Removal

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to removal of unsuitable soils and placement of compacted fill.

9.1.2. Topsoil (No Map Symbol)

Topsoil, if encountered, will require complete removal and recompaction to project specifications if encountered in areas where settlement sensitive structures or improvements are planned. Topsoil onsite is anticipated to be approximately one-half to one foot thick.

9.1.3. Artificial Fill - Undocumented (Map Symbol afu)

In order to mitigate against potential post construction settlement, the undocumented artificial fill at the site will require complete removal and recompaction to project specifications. Estimated removal depths range from 2 to 25 feet. It should be anticipated that specialized grading techniques may be required to efficiently excavate and recompact these unsuitable soils due to existing offsite improvements and presence of oversize rock. Where deep removals are required in proximity to existing offsite improvements, it may be necessary to use large excavators to remove the soils in a trench wise fashion due to the limited access. The soils can then be moisture conditioned to optimum or above, placed and compacted with a sheepsfoot wheel in two (2) foot lifts until design grades are achieved.

9.1.4. Young Alluvium (Map Symbol Qal)

Young alluvium was encountered underlying undocumented fill in the southwest corner of the site extending to an approximate depth of 26 feet. Young alluvium will require complete removal and recompaction to project specifications within a 1:1 downward projection away from site improvements, where possible.

If saturated alluvium is encountered within structural fill areas, additional recommendations for partial removal and surcharge until primary consolidation settlement is completed may be provided based on observed conditions during grading. Settlement monitoring will be required with the use of buried or surface settlement devices. Final determination of alluvium removals and/or monitoring of left-in–place alluvium will be dependent upon exposed field conditions.

9.1.5. Older Alluvium (Map Symbol Qoa)

Older alluvium commonly has a thin highly weathered horizon on the order of 1 to 3 feet thick. The weathered portion of the older alluvium is unsuitable for structural support or placement of fill and should be removed and replaced with compacted fill.

9.1.6. Stadium Conglomerate / Santiago Peak Volcanics (Map Symbols Tst / Jsp)

The weathered portions of Stadium Conglomerate and Santiago Peak Volcanics materials should be removed and compacted within fill areas or where exposed at design grade. Removals are anticipated to be on the order of 1 to 2 feet thick.

9.2. Overexcavation Recommendations

It is recommended that overexcavation of cut/fill transitions located within the structure's footprint should be conducted during grading. The following general overexcavation recommendations are presented below.

9.2.1. Cut/Fill Transitions

Where design grades and/or remedial grading activities create a cut/fill transition, the cut and shallow fill portions of the building pad should be overexcavated to a minimum depth of five (5) feet or 3 feet below the bottom of footing elevation, whichever is deeper, and replaced to design grade with compacted fill. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas or the front of the pad. The entire area extending on a 1:1 (H:V) projection away for the building pad should be undercut. Replacement fills should be compacted to project specifications as discussed in Section 9.4.

9.2.2. Steep Cut/Fill Transitions

In order to reduce the differential settlement potential under the proposed structures due to steep cut/fill transitions, we recommend that the cut or shallow fill portion of steep transitions be overexcavated to a depth equal to one-third (H/3) of the deepest fill section (H) within the building pad area. Based on our field observations, the anticipated maximum fill thickness under the parking garage and church building pads will be 20 feet and 32 feet, respectively. Therefore the recommended overexcavation of the cut or shallow fill portion should extend to approximate depths of 7 feet and 11 feet for the parking garage and church building pads, respectively. Additional overexcavation recommendations may be provided during grading based on exposed conditions.

9.2.3. Utility Construction in Hard Rock

In order to facilitate utility construction consideration should be given to undercutting all proposed utility locations in Stadium Conglomerate or Santiago Peak Volcanics a minimum of one (1) foot below the deepest utility. A "Select" fill should be placed within the overexcavation limits consisting of a replacement material with maximum rock size of approximately eight- (8) inch or smaller. This "select" fill should be compacted to project specifications as discussed in Section 9.4.

9.2.4. Removals Along Grading Limits and Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. Where possible, a 1:1 (H:V) projection, from toe of slope or grading limit, outward to competent materials should be established. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading

boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading.

9.3. Construction Staking and Survey

Removal bottoms, keyways, subdrains and backdrains should be surveyed by the civil engineer after approval by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations.

9.4. Earthwork Considerations

9.4.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent of the maximum dry density as determined by ASTM Test Method D1557. Care should be taken that the ultimate grade be considered when determining the compaction requirements for disposal fill areas. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix C).

9.4.2. Documentation of Removals and Drains

Removal bottoms, fill keys, backcuts, backdrains and their outlets should be observed and approved by the engineering geologist and/or geotechnical engineer and documented by the civil engineer prior to fill placement.

9.4.3. Treatment of Removal Bottoms

At the completion of removals, the exposed bottom should be scarified to a practical depth, approximately 8-inches, moisture conditioned to above optimum conditions, and compacted in-place to the standards set forth in this report.

9.4.4. Fill Placement

After removals, scarification, and compaction of in-place materials are completed, additional fill may be placed. Fill should be placed in thin lifts [eight- (8) inch bulk], moisture conditioned to above optimum moisture content, mixed, compacted, and tested as grading progresses until final grades are attained.

9.4.5. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical, and where designated by the project geotechnical engineer or geologist, compacted fill material should be keyed and benched into competent bedrock or firm natural soil.

9.4.6. Mixing

In order to provide thorough moisture conditioning and proper compaction, processing (mixing) of materials is necessary. Mixing should be accomplished prior to, and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

9.4.7. Compaction Equipment

Compaction equipment on the project shall include a combination of rubber-tired and sheepsfoot rollers to achieve proper compaction. Adequate water trucks/pulls should be available to provide sufficient moisture and dust control.

9.4.8. Fill Slope Construction

Fill slopes shall be overfilled to an extent determined by the contractor, but not less than two (2) feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the required compaction is achieved.

Compaction of each fill lift should extend out to the temporary slope face. Backrolling during mass filling at intervals not exceeding four (4) feet in height is recommended unless more extensive overfill is undertaken.

As an alternative to overfilling, fill slopes may be built to the finish slope face in accordance with the following recommendations:

- Compaction of each fill lift shall extend to the face of the slopes.
- Backrolling during mass grading shall be undertaken at intervals not exceeding four (4) feet in height. Backrolling at more frequent intervals may be required.
- Care should be taken to avoid spillage of loose materials down the face of the slopes during grading.
- At completion of mass filling, the slope surface shall be watered, shaped and compacted first with a sheepsfoot roller or track walked with a bulldozer, such that compaction to project standards is achieved to the face slope.

Proper seeding and planting of the slopes should follow as soon as practical, to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finished slope surface.

9.5. Haul Roads

Haul roads, ramp fills, and tailing areas should be removed prior to placement of fill.

9.6. Import Materials

Import soils are anticipated to achieve design site grades and/or as select material for backfill of site retaining walls. Import materials should have similar engineering characteristics as the onsite soils and should be approved by the soil engineer at the source prior to importation to the site.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Construction of the proposed structures and associated improvements is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are specific issues identified by this study as possibly affecting site development. Recommendations to mitigate these issues are presented in the text of this report.

10.1. Design Recommendations

Detailed foundation plans are not currently available; however, it is our understanding that the proposed church and parking structures will be supported by a conventional shallow foundation system or a mat foundation placed on compacted fill materials. In addition to the structures, associated parking lots and landscape areas are proposed.

10.1.1. Foundation Design Criteria

The expansion potential of the underlying soils is anticipated to range from "very low" to "medium". For design of shallow foundations supported on compacted fill, the values presented in Table 10.1.1 should be used.

TABLE 10.1.1
SHALLOW FOUNDATION DESIGN PARAMETERS

Minimum Footing Dimensions[1]	• 24 inches in width and 24 inches in depth.
Allowable Bearing Capacity	• 2,500 pounds per square foot (psf). May be increased by 200 psf and 300 psf for each additional foot of foundation width and depth, respectively, up to a maximum of 3,500 psf. • Allowable bearing values may be increased by one-third for transient live loads from wind or seismic forces.
Estimated Static Settlement	• Total settlement: 1.5 inch • Differential settlement: 0.5 inch over 30 feet. • Static settlement of the foundation system is expected to occur on initial application of loading.
Allowable Coefficient of Friction Below Footings	0.35
Lateral Bearing[2] (Level Condition)	300 psf/foot of depth to a maximum of 3,000 psf

Notes: 1. Depth of footing embedment should be measured below lowest adjacent finish grade.
2. For resisting lateral forces on footings, lateral bearing and sliding coefficient may be combined with a maximum sliding resistance limited to ½ of dead load.

10.1.2. Mat Foundation

Mat foundations should be designed by the structural engineer and should conform to the 2019 California Building Code. The allowable bearing pressure is an average value applied to the total area of the mat foundation and was used to evaluate the overall static settlement of the

foundation. In our model, the mat foundation was assumed to be rigid with respect to the soil. The recommended geotechnical design parameters are presented in Table 10.1.2.

TABLE 10.1.2 RIGID MAT FOUNDATION DESIGN PARAMETERS	
Average Allowable Bearing Capacity	• 2,000 pounds per square foot (psf). 3,000 psf maximum • Allowable bearing values may be increased by one-third for transient live loads from wind or seismic forces.
Estimated Total Static Settlement and Tilting	• Total settlement: 1.0 inch • Differential settlement (tilt): 0.5 inch over 40 feet. • Static settlement of the foundation system is expected to occur on initial application of loading.

Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils underlying the mat. For the approximate flexible design of slab-on-grade mat foundation systems a modulus of subgrade reaction (K_{v1}) of 150 pci is recommended. The modulus of subgrade reaction is based on a unit square foot area and should be adjusted for the planned mat size. The coefficient of subgrade reaction Kb for a mat of a specific width, may be evaluated using the following equation:

$$Kb = Kv_1[(b+1)/2b]^2$$

where b is the width of the foundation.

10.1.3. Foundation Excavations

Foundation excavations should be observed by the geotechnical consultant. Footings should be excavated into compacted fill materials. The excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement. Footing excavations should not be allowed to dry back and should be kept moist until concrete is poured.

10.1.4. Isolated Footings

Isolated footings outside the structure footprint should be tied with grade beams to the structure in two orthogonal directions.

10.1.5. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently, 15-mil polyolefin membrane underlayments (Stego® Wrap or similar material) have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The

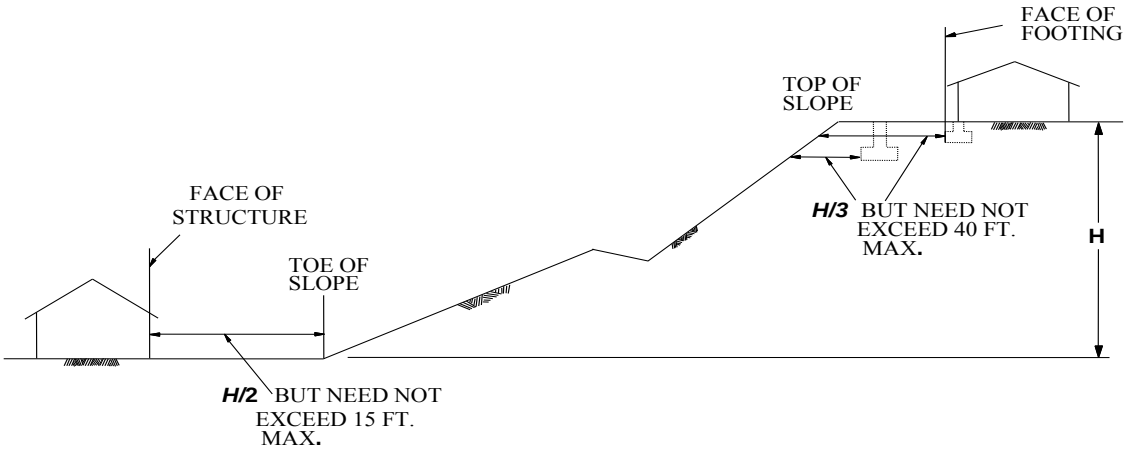
use of this system or other systems, materials or techniques can be considered, at the discretion of the designer.

10.1.6. Deepened Footings and Structural Setbacks

It is generally recognized that improvements constructed in proximity to natural slopes or properly constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils and long-term (secondary) settlement. Most building codes, including the California Building Code (CBC), require that structures be set back or footings deepened, where subject to the influence of these natural processes.

For the subject site, where foundations for structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in Figure 5.

FIGURE 5



10.1.7. Concrete Design

Laboratory testing to determine the sulfate concentration of soils at the subject site was not conducted. Final determination should be based on testing of the as-graded soils. It should be noted that some fertilizers have been known to leach sulfates into soils otherwise containing "negligible" sulfate concentrations and increase the sulfate concentrations to potentially detrimental levels. It is incumbent upon the owner to determine whether additional protective measures are warranted to mitigate the potential for increased sulfate concentrations to onsite soils as a result of the future homeowner's actions.

10.1.8. Corrosion

Corrosivity testing was not conducted under the scope of this investigation. Final determination of the corrosivity of onsite soils should be based on testing of the as-graded soils.

10.2. Retaining Walls

It is our understanding that conventional, mechanically stabilized earth (MSE), and/or tieback walls may be part of the proposed development. For preliminary wall design purposes, the following soil parameters can be used for compacted fill materials:

- Unit Weight: 125 pcf, Cohesion: 150 psf, Friction Angle: 31 degrees.

The following earth pressures are recommended for the design of conventional retaining walls onsite utilizing select backfill material having expansion index (EI) of less than 50 and minimum internal friction angle of 31 degrees.

Static Case

TABLE 10.2
LATERAL EARTH PRESSURES

		Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Level Backfill	Active	$K_a = 0.32$	40
	Passive	$K_p = 3.12$	391
	At Rest	$K_o = 0.48$	61
2:1 Backfill	Active	$K_a = 0.50$	63
	At Rest	$K_o = 0.88$	110

Seismic Case

In addition to the above static pressures, unrestrained retaining walls supporting more than 6 feet of backfill height should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density = 125 pcf for compacted fill

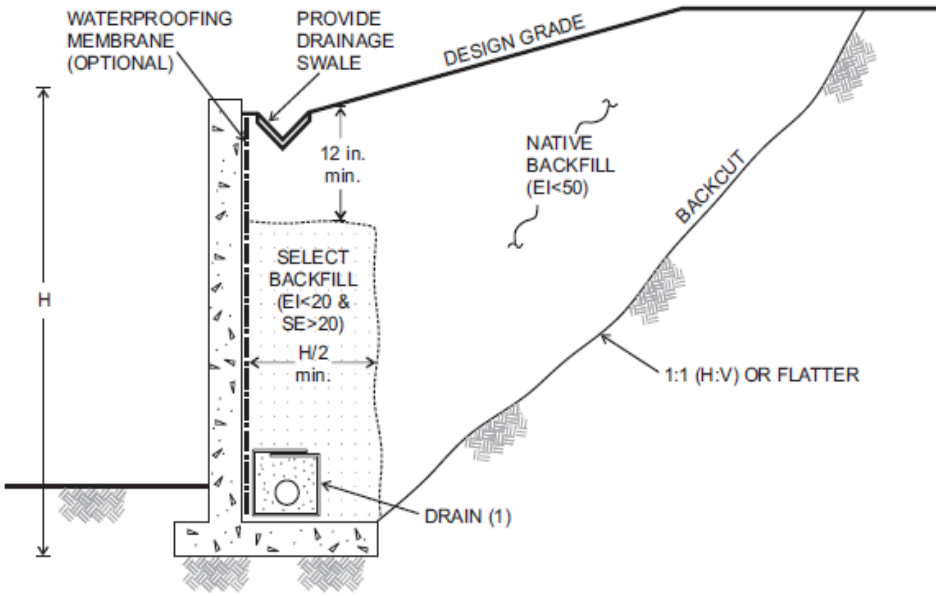
k_h = seismic pseudostatic coefficient = 0.5 * peak horizontal ground acceleration / g

The peak horizontal ground acceleration is anticipated to be on the order of 0.477g as discussed in Section 7.7.3. Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

The foundations for retaining walls of appurtenant structures structurally separated from the building structures, may bear on properly compacted fill. A bearing value of 2,000 lbs./sq.ft. may be used for design of retaining walls. Retaining wall footings should be designed to resist the lateral forces by

passive soil resistance and/or base friction as recommended for foundation lateral resistance. To relieve the potential for hydrostatic pressure wall backfill should consist of a free draining backfill (sand equivalent "SE" >20) and a heel drain should be constructed (see Figure 6). The drain should be placed at the heel of the wall and should consist of a 4-inch diameter perforated pipe (SDR35 or SCHD 40) surrounded by 4 cubic feet of crushed rock (3/4-inch) per lineal foot, wrapped in filter fabric (Mirafi® 140N or equivalent).

FIGURE 6



NOTES: (1) DRAIN: 4-INCH PERFORATED ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE PLACED PERFORATIONS DOWN AND SURROUNDED BY A MINIMUM OF 1 CUBIC FEET OF 3/4 INCH ROCK OR APPROVED EQUIVALENT SUBSTITUTE AND WRAPPED IN MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

Drainage devices should be installed along the top of the wall backfill and should be sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8-inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. The soils engineer or his representative should observe the retaining wall footings, backdrain installation and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.

10.3. Utility Trench Excavation

All utility trenches should be shored or laid back in accordance with applicable OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. AGS should be consulted on these issues during construction.

10.4. Utility Trench Backfill

Mainline and lateral utility trench backfill should be compacted to at least 90 percent relative compaction as determined by ASTM D1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

10.5. Exterior Slabs and Walkways

10.5.1. Subgrade Compaction

The subgrade below exterior slabs, sidewalks, driveways, patios, etc. should be compacted to a minimum of 90 percent relative compaction as determined by ASTM D1557.

10.5.2. Subgrade Moisture

The subgrade below exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of 110 percent of optimum moisture content (low expansive soils) prior to concrete placement, dependent upon the expansion potential of the subgrade soils.

10.5.3. Slab Thickness

Concrete flatwork and driveways should be designed utilizing four-inch minimum thickness.

10.5.4. Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately eight to ten feet. Exterior slabs should be designed to withstand shrinkage of the concrete.

10.5.5. Flatwork Reinforcement

Consideration should be given to reinforcing any exterior flatwork.

10.5.6. Thickened Edge

Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately eight inches below concrete slabs and should be a minimum of six inches wide.

10.6. Preliminary Pavement Design

For preliminary pavement design, we have assumed an "R" Value of 30 for the onsite subgrade soils. Utilizing City of San Diego Pavement Design Standards Schedule "J" and assuming the subject site is classified equivalent to "Local Residential" (max ADT=1200) which equates to a Traffic Index TI=6.0 the following pavement section is presented below. Additional pavement design recommendations will be provided during grading based on as-graded conditions and R-value testing.

Standard Pavement Section

3-inches Asphalt Concrete
over
8.5-inches Aggregate Base

Pavement subgrade soils should be at or near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction and should conform with the specifications in Section 26 of the Standard Specifications for the State of California Department of Transportation (Caltrans) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans Standard Specifications or Section 203-6 of the Green Book.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Some modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the grading and foundation plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from referenced reports and the borings and test pits at the locations indicated on the plans. The findings are based on the review of the field data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same

locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

REFERENCES

Advanced Geotechnical Solutions, Inc., 2014, "Preliminary Geotechnical Investigation, Del Cerro Residential Development, College Avenue and Interstate 8, San Diego, California", dated July 20, 2014, Report No. 1411-02-B-4.

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APPENDIX B

SUBSURFACE INVESTIGATION

Project College Ave/I8
Date Excavated Dec. 2014
Logged by FE
Equipment Cat 328D

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
EX-1	0.0 – 2.0	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND with abundant rounded COBBLES to 4-in. diameter, yellowish brown, very moist, loose; some clay.
	2.0 – 9.5		**Stadium Conglomerate (Tst):** COBBLE CONGLOMERATE, rounded volcanic and metamorphic clasts to 6-in. diameter in a SILTY SANDSTONE matrix, light brownish yellow, moderately hard. TOTAL DEPTH 9.5 FT. NO GROUNDWATER, NO CAVING.
EX-2	0.0 – 3.5	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND, light reddish brown, very moist, loose; with some rounded cobbles to 8-in. diameter; minor seepage at 3.5 ft.
	3.5 – 7.0		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, light gray to gray on fresh surfaces, slightly to moderately weathered, moderately hard to hard; jointed, manganese oxide along joint surfaces. @5 ft. N 60° E, Vertical - Joint N 5° W, 75° SW - Joint @6 ft. Hard, slightly weathered TOTAL DEPTH 7.0 FT. MINOR SEEPAGE AT 3.5 FT., NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-3	0.0 – 22.0	SW	**Artificial Fill – Undocumented (afu):** SAND with COBBLES, fine to coarse grained, brown, moist, loose; with some clay and silt.
		SM	@2 ft. SILTY SAND, pale yellow to light gray, slightly moist, moderately dense; abundant rounded COBBLES to 8-in. diameter.
	22.0 – 26.0	CL/ML	**Alluvium (Qal):** CLAYEY SILT, brown, very moist, stiff; some fine grained sand and angular gravel.
	26.0 – 27.0		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, reddish brown, moderately weathered, hard.
			TOTAL DEPTH 27.0 FT. NO GROUNDWATER, CAVING AT 3 FT.
EX-4	0.0 – 8.0	SW	**Artificial Fill – Undocumented (afu):** SAND with COBBLES, fine to coarse grained, pale yellow, slightly moist, loose. @4 ft. Moderately dense.
	6.5 – 13.0		**Older Alluvium (Qoa):** SILTY SAND, fine grained, yellow, slightly moist to moist, moderately dense to dense; some clay. @10 ft. Some ¼ to ½-in. thick SILTY CLAY lenses, olive, moist, stiff; slightly plastic.
			TOTAL DEPTH 13.0 FT. NO GROUNDWATER, NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-5	0.0 – 21.0	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND, reddish brown, moist, loose.
		SW	@2.5 ft. SAND with COBBLES, light gray, slightly moist, medium dense; with some silt and clay.
	21.0 – 22.0	ML	**Alluvium (Qal):** CLAYEY to SANDY SILT, dark grayish brown, moist to very moist, stiff; abundant subangular gravel.
	22.0 – 23.0		**Older Alluvium (Qoa):** SILTY SAND, fine grained, yellow, slightly moist, moderately dense to dense.
			TOTAL DEPTH 23.0 FT. NO GROUNDWATER, NO CAVING.
EX-6	0.0 – 10.0	SW	**Artificial Fill – Undocumented (afu):** SAND with COBBLES, pale yellow to light gray; with some silt and clay.
	10.0 – 15.0		**Older Alluvium (Qoa):** Interbedded CLAYEY fine grained SAND and SILTY CLAY, yellow and olive, moist, dense/stiff.
	15.0 – 15.5		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, brownish yellow, highly weathered, abundant clay development, soft to moderately hard. @15.5 ft. Slightly weathered, hard.
			TOTAL DEPTH 15.5 FT. NO GROUNDWATER, NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-7	0.0 – 20.0	SM	**Artificial Fill – Undocumented (afu):** Angular, gray metavolcanic clasts from 8-in. to 4-ft. diameter in a SILTY SAND matrix, fine to coarse grained, yellowish brown, moist, loose. @6 ft. Some rounded cobbles to 5-in. diameter. @8 ft. Some rounded cobbles to 7-in. diameter. @19 ft. Some rounded cobbles to 10-in. diameter.
	20.0 – 24.5		**Older Alluvium (Qoa):** Fine SANDY SILT, red, slightly moist, stiff; some 1/16-in. paleo root holes. @22 ft. Some clay; no visible porosity.
			TOTAL DEPTH 24.5 FT. NO GROUNDWATER, CAVING AT 5 FT.
EX-8	0.0 – 4.5	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND, fine to coarse grained, reddish brown, moist, loose; abundant rounded cobbles to 3-in. diameter.
	4.5 – 12.5		**Stadium Conglomerate (Tst):** COBBLE CONGLOMERATE, rounded cobbles to 3-in. diameter in a SILTY SANDSTONE matrix, yellow, slightly moist, hard.
			TOTAL DEPTH 12.5 FT. NO GROUNDWATER, NO CAVING.

Test Pit No.	Depth (ft.)	USCS	Description
EX-9	0.0 – 10.0	SM	**Artificial Fill – Undocumented (afu):** SILTY SAND with COBBLES, dark brown and yellowish brown, moist, loose; some 4-in. thick asphalt slabs. @4 ft. Some angular metavolcanic clasts to 2-ft. diameter. @8 ft. Trash debris.
	10.0 – 12.5		**Stadium Conglomerate (Tst):** COBBLE CONGLOMERATE, rounded volcanic and metamorphic clasts to 3-in. diameter, in a SILTY SANDSTONE matrix, light yellow, slightly moist, moderately hard. @11 ft. Hard.
			TOTAL DEPTH 12.5 FT. NO GROUNDWATER, CAVING AT 4 FT.
EX-10	0.0 – 22.0	SW	**Artificial Fill – Undocumented (afu):** GRAVELY SAND, reddish brown, moist, loose; with some rounded cobbles to 3-in. diameter; few metavolcanic clasts to 18-in. diameter.425
		SM-ML	@11 ft. SILTY SAND and CLAYEY SILT, dark gray, moist to very moist, firm to medium dense; some organics.
	22.0 – 22.5		**Santiago Peak Volcanics (Jsp):** METAVOLCANIC BEDROCK, moderately weathered, hard.
			TOTAL DEPTH 15.5 FT. NO GROUNDWATER, CAVING AT 6 FT.

APPENDIX C

GENERAL EARTHWORK SPECIFICATIONS AND GRADING GUIDELINES

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be retained to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to appraise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

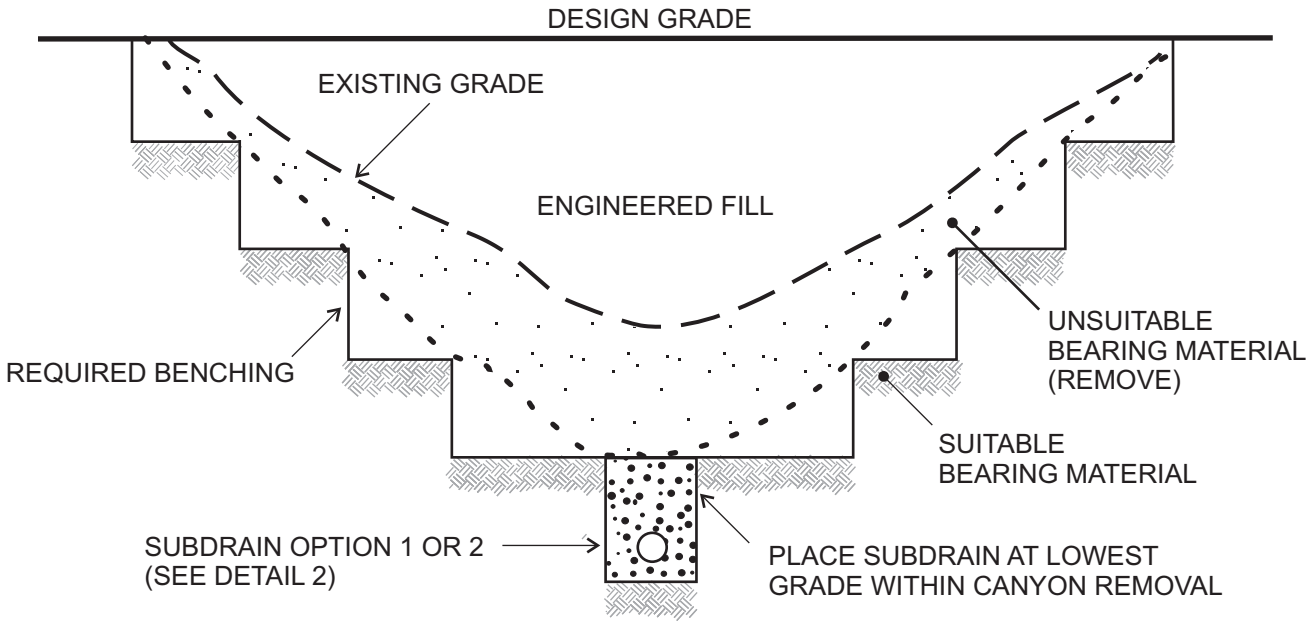
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

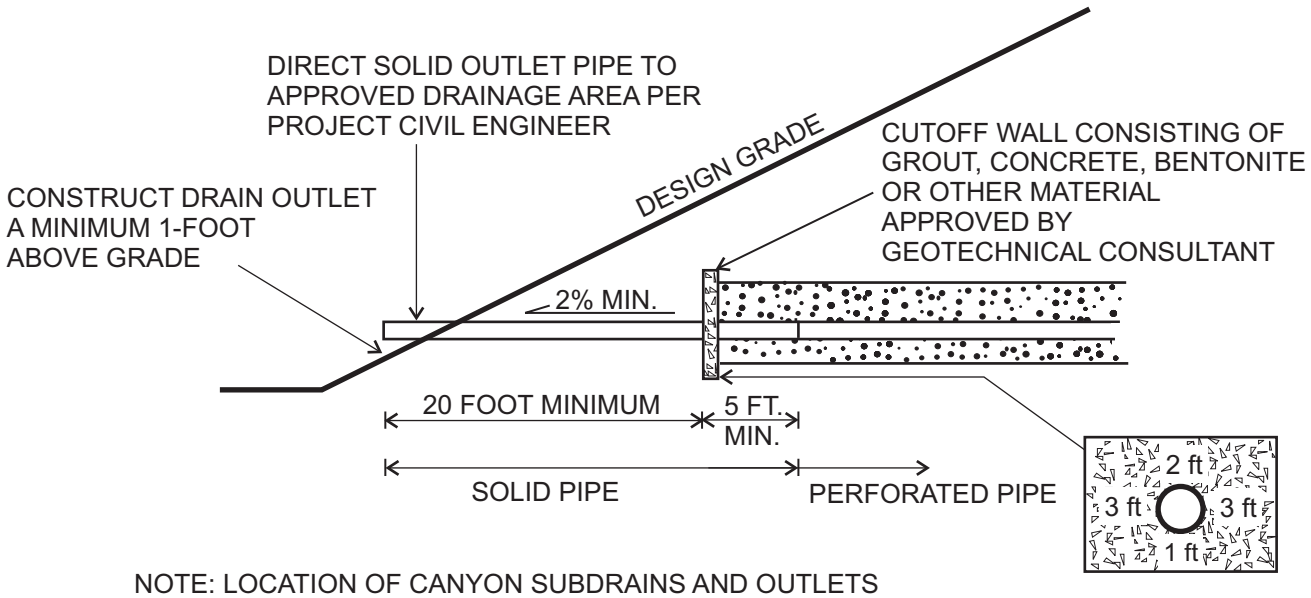
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results. These reports may be subject to review by the local governing agencies.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

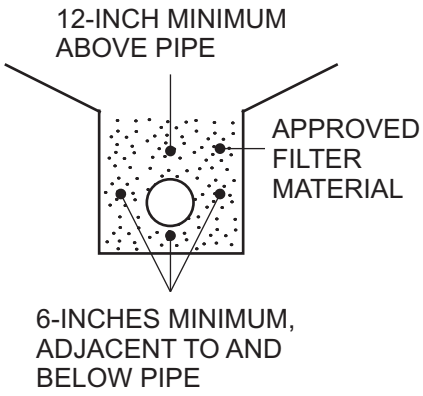
CUTOFF WALL DIMENSIONS

CANYON SUBDRAIN TERMINUS

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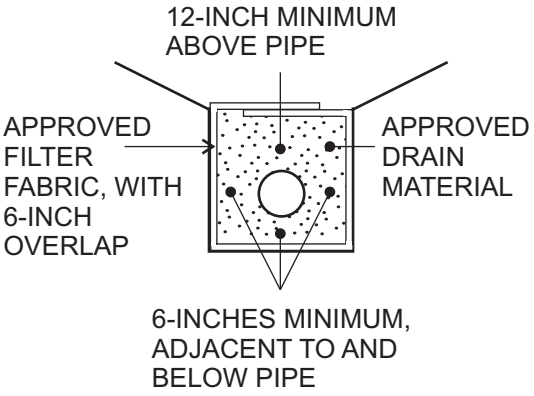
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AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

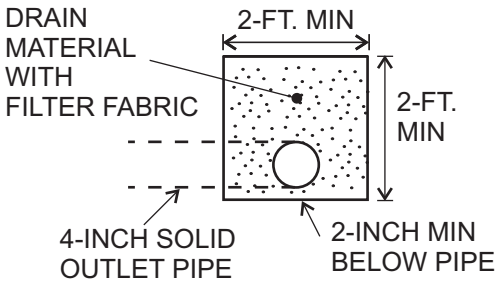
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

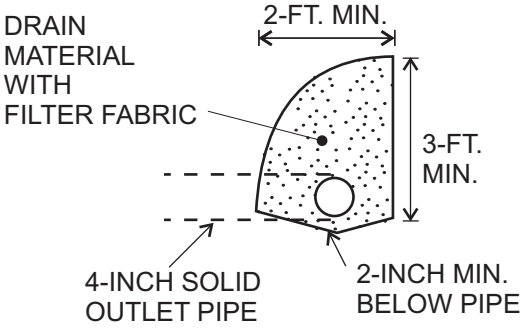
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

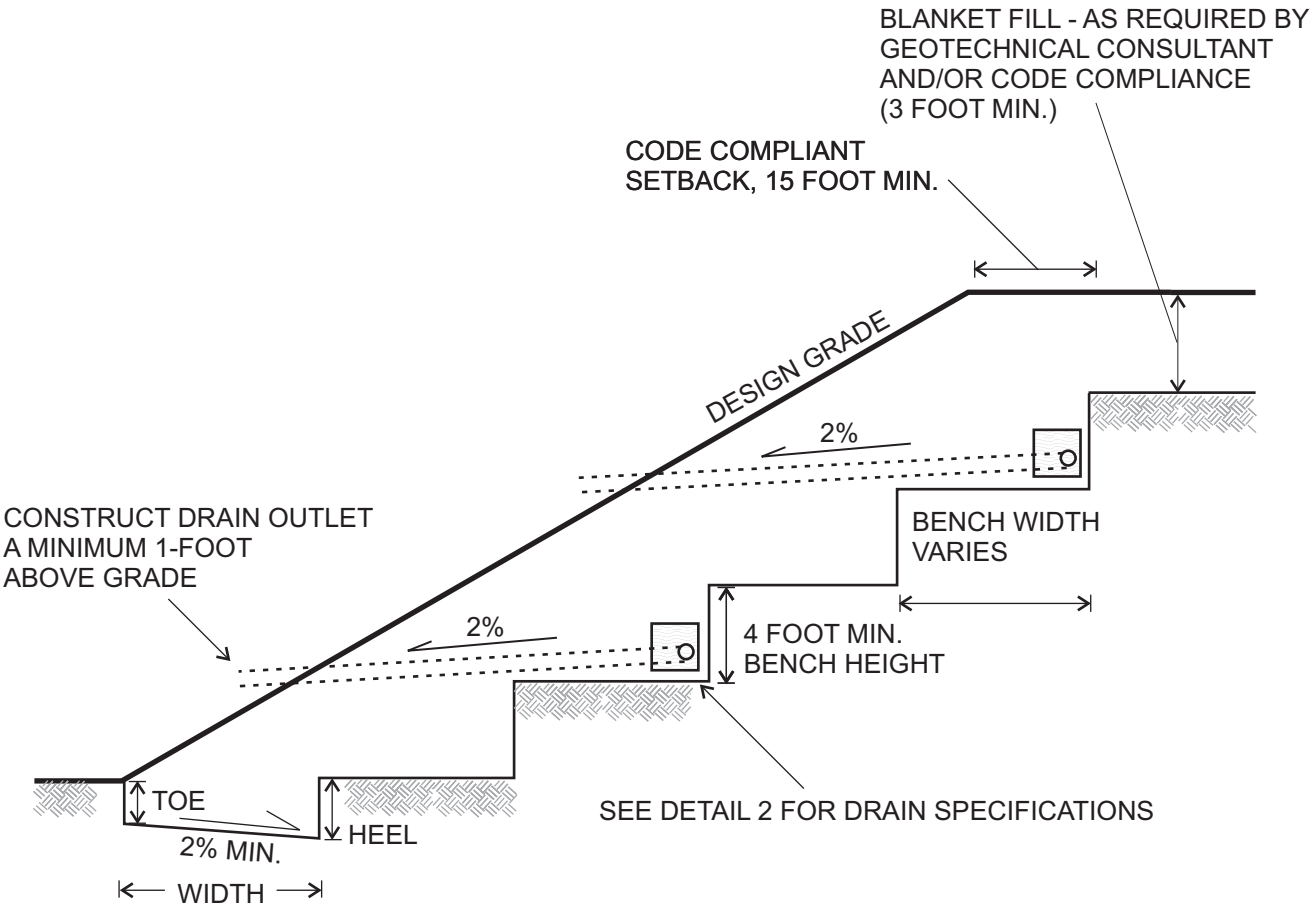
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NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.

2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.

3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

VER 1.0

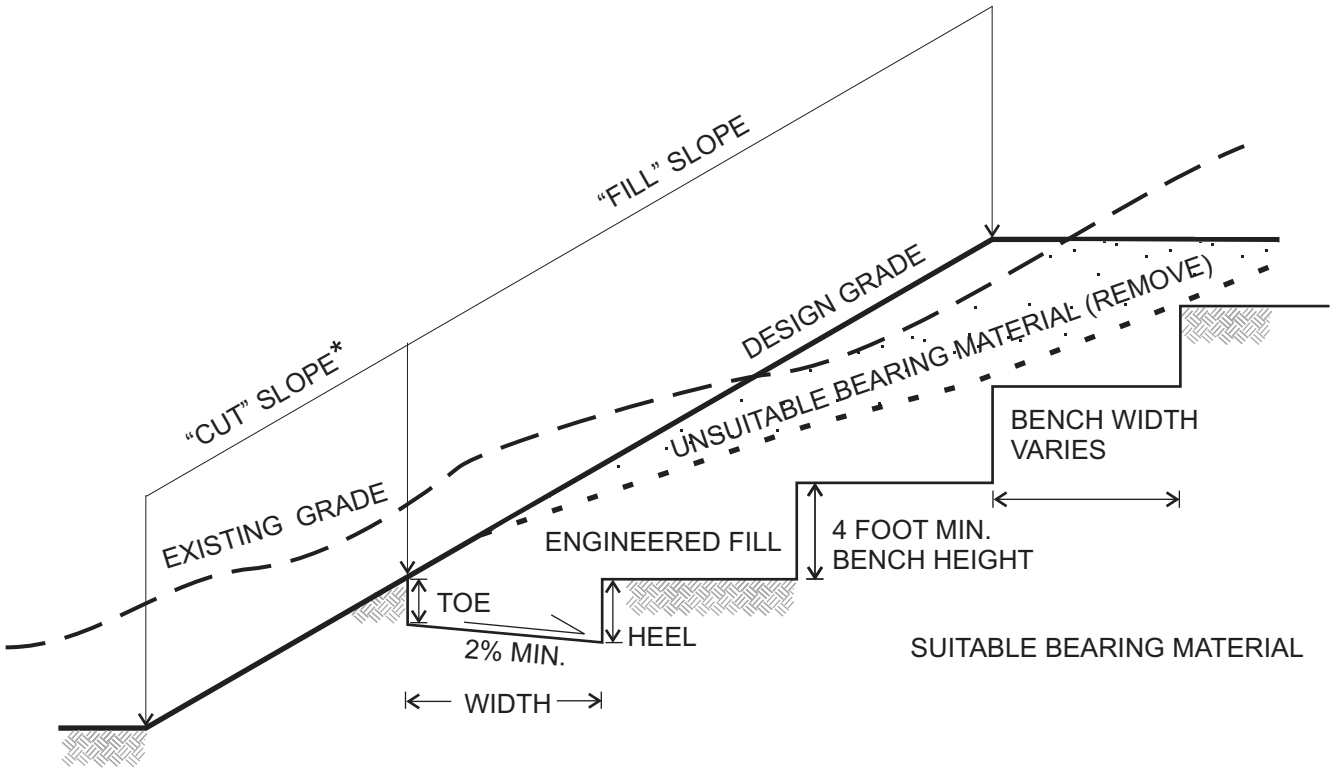
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STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

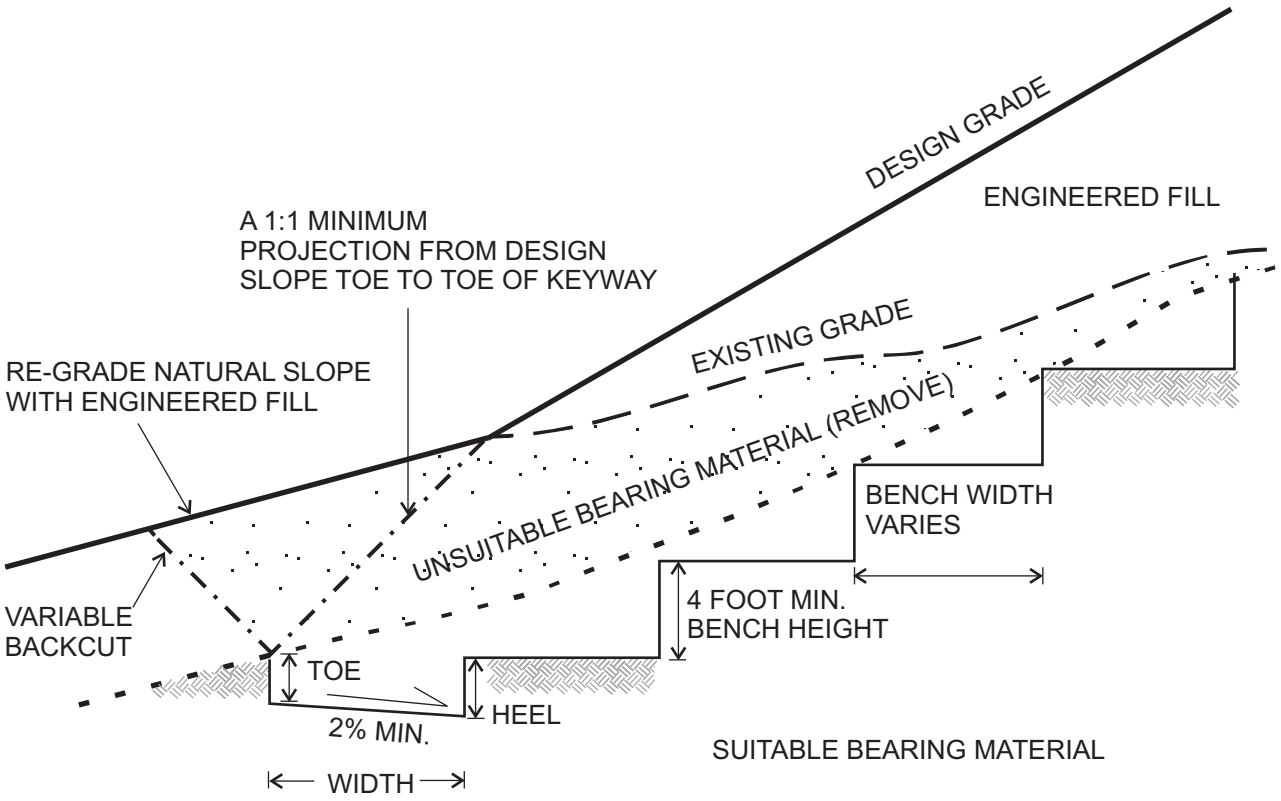
2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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AGS
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

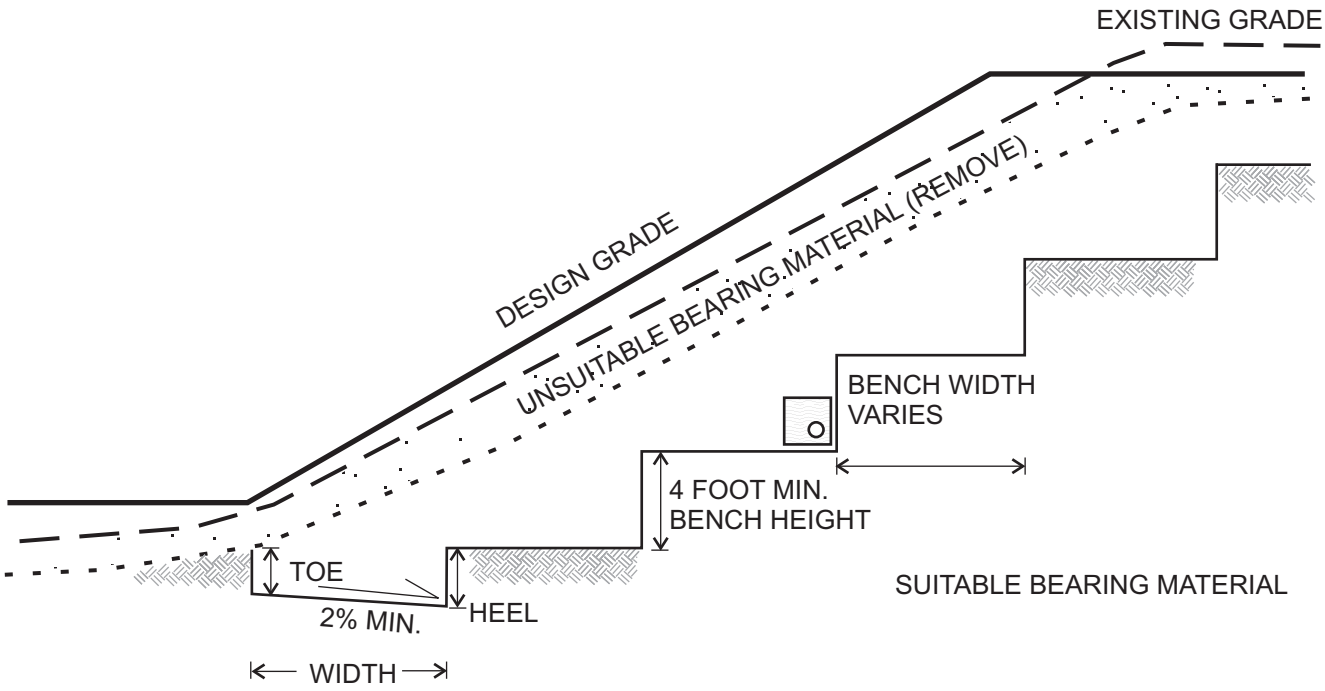
3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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AGS
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

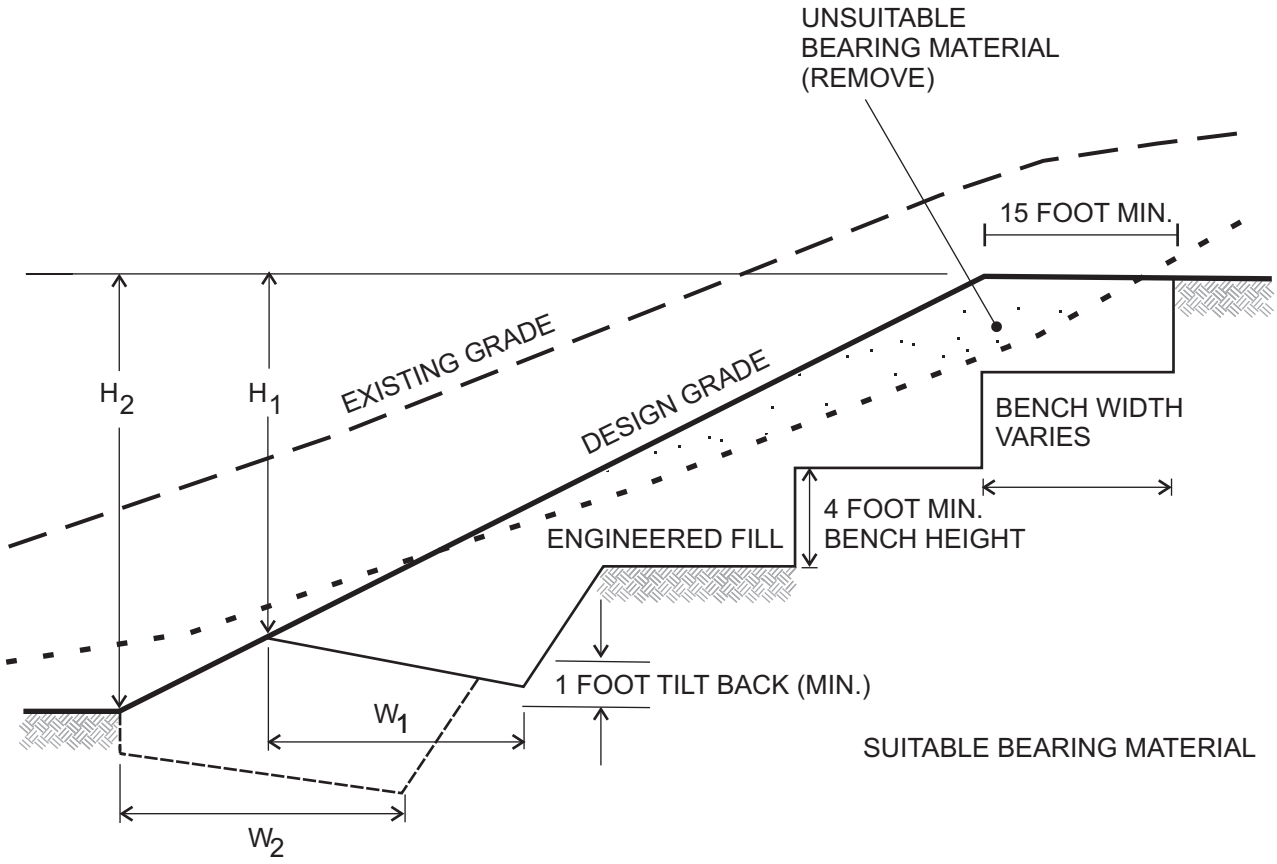
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SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

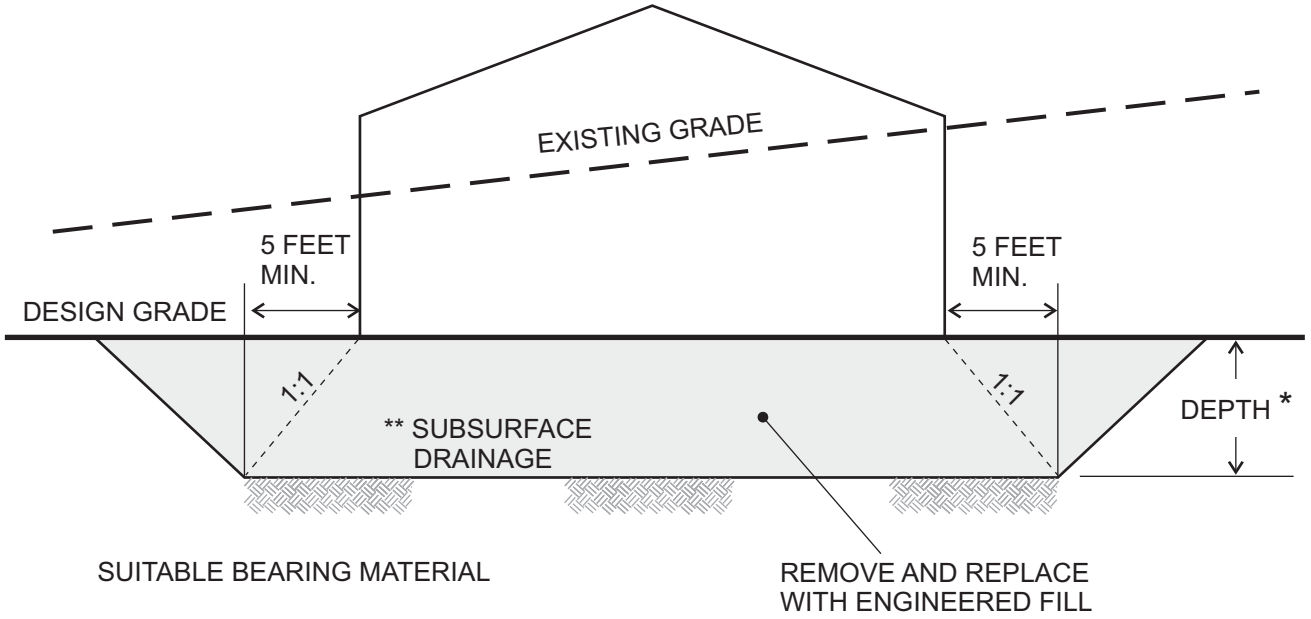
VER 1.0

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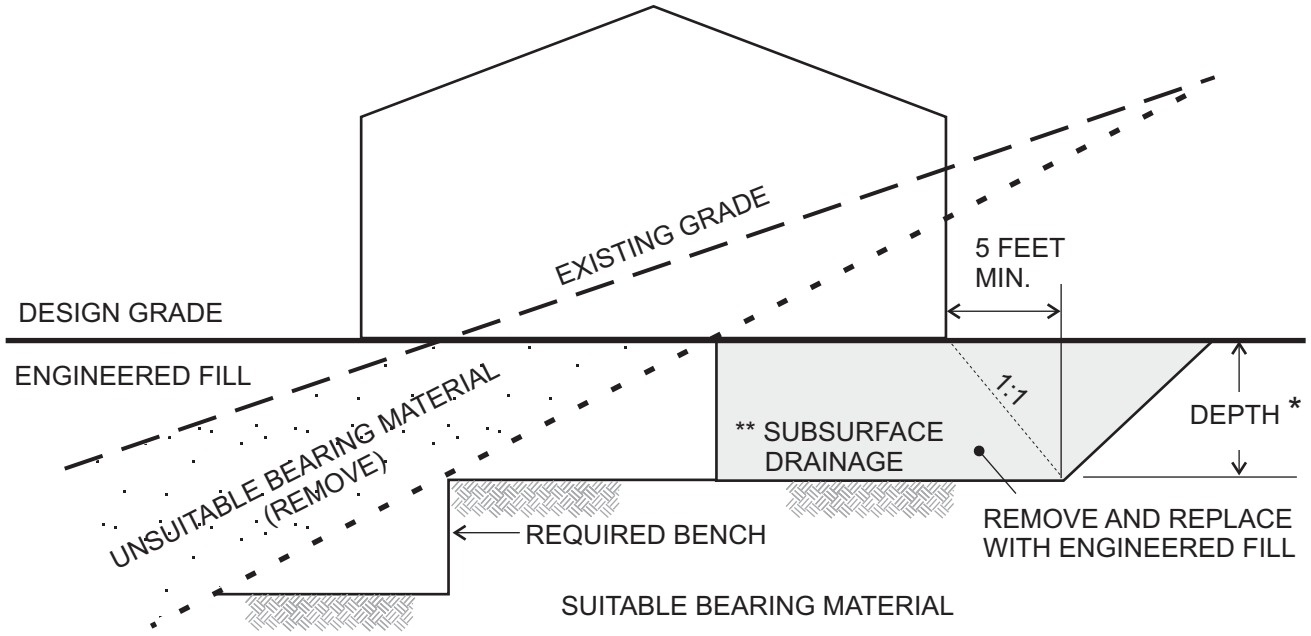
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

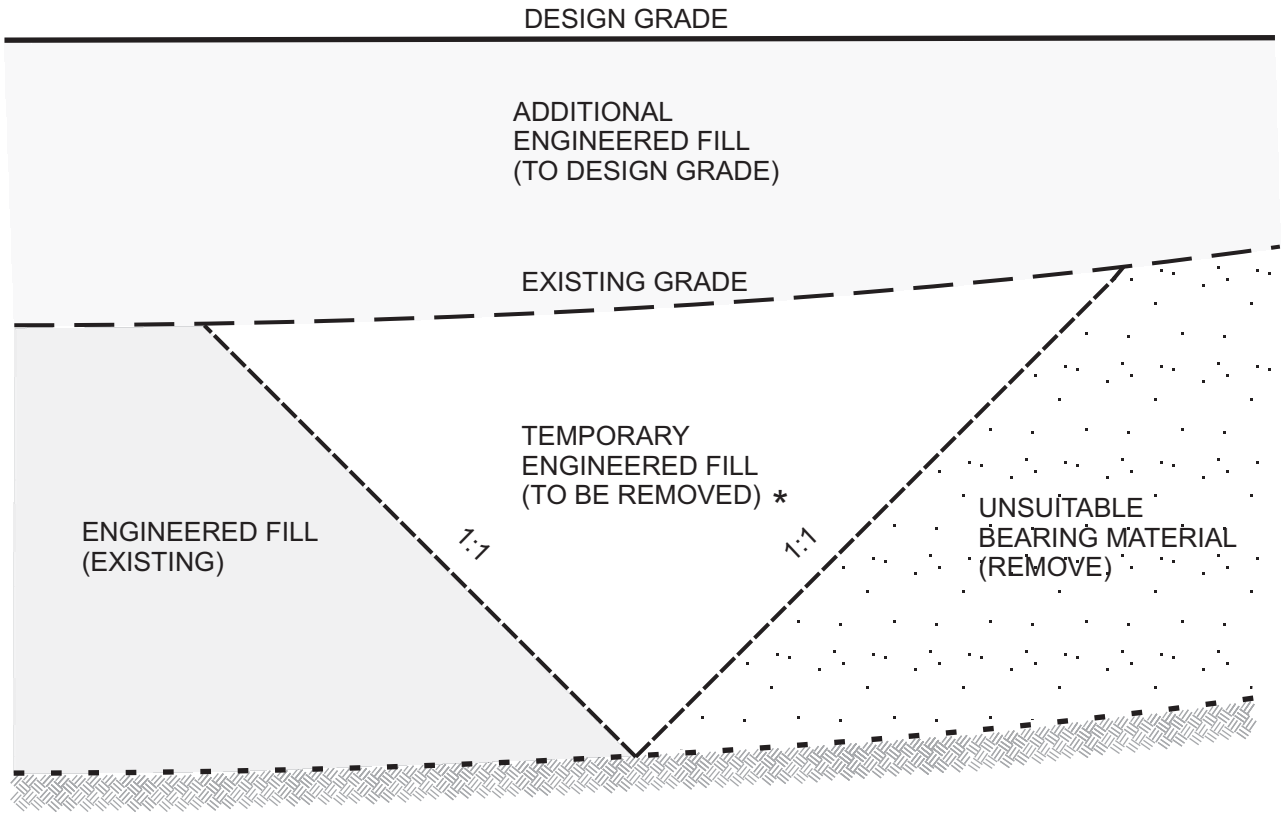
NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

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AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

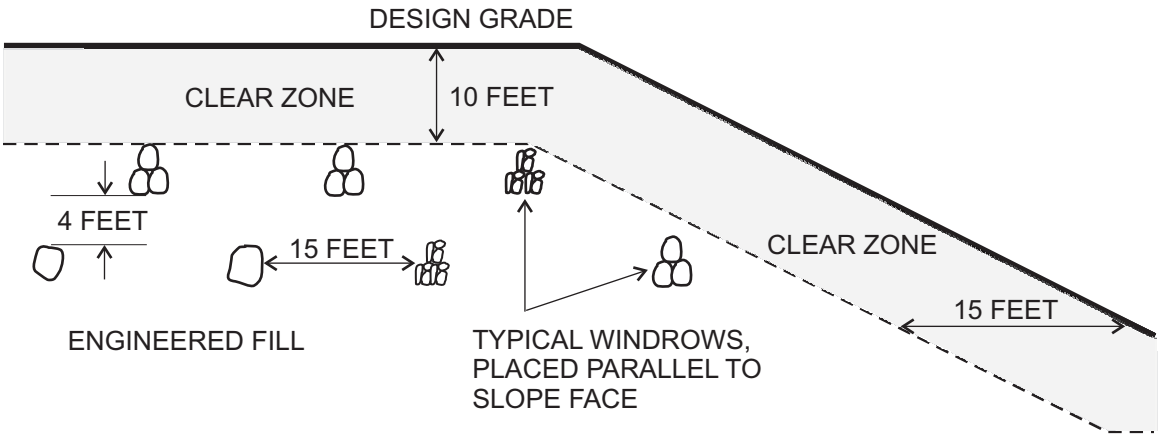
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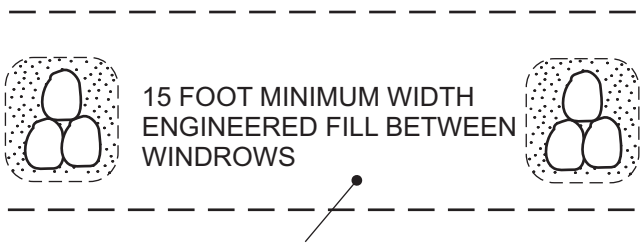
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

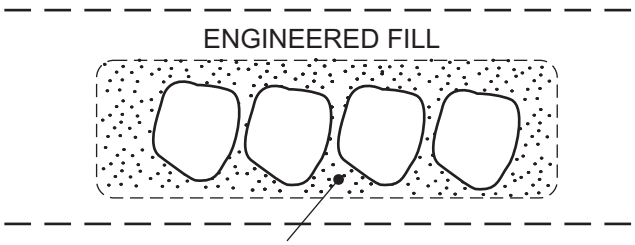
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION

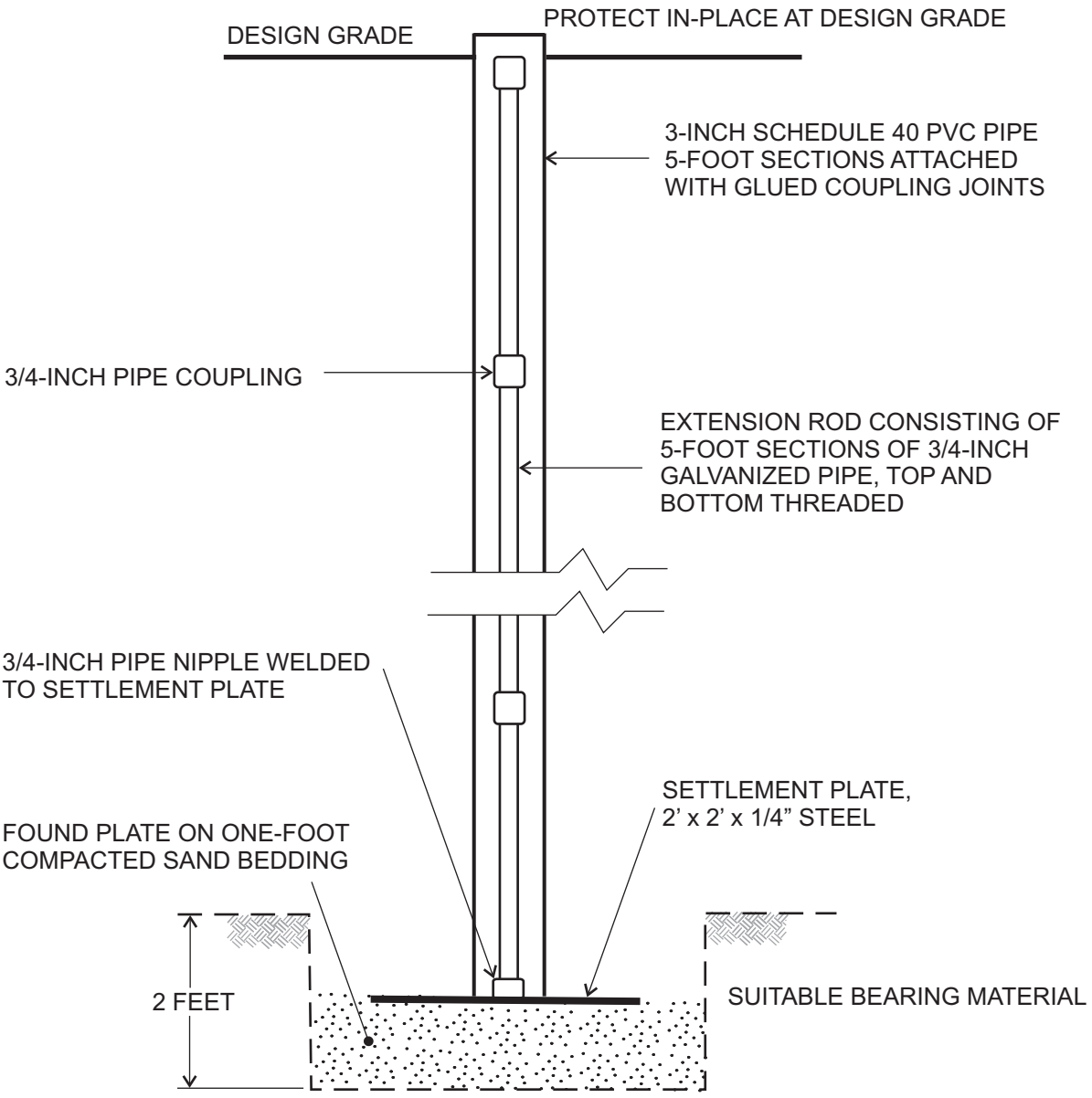


WINDROW PROFILE

VER 1.0

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AGS ADVANCED GEOTECHNICAL SOLUTIONS	OVERSIZED MATERIAL DISPOSAL CRITERIA	DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

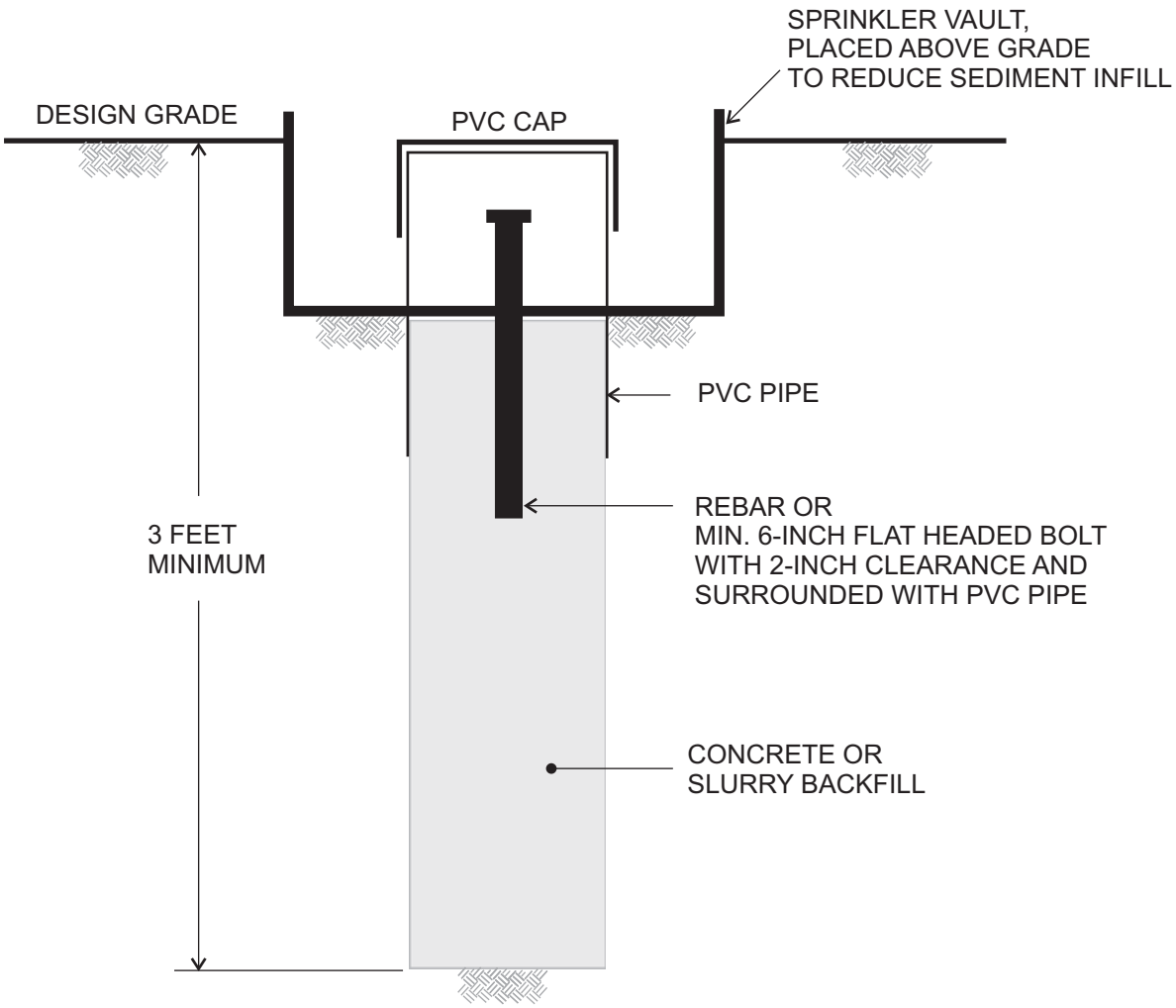
VER 1.0

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ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

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ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT MONUMENT

DETAIL 12

PRELIMINARY GRADING PLAN

SITE DEVELOPMENT PERMIT NO. 92338, PLANNED DEVELOPMENT PERMIT NO. 92339, EASEMENT VACATION NO. 92340, AND TENTATIVE MAP NO. _____

ALL PEOPLES CHURCH

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION

TOPOGRAPHY:

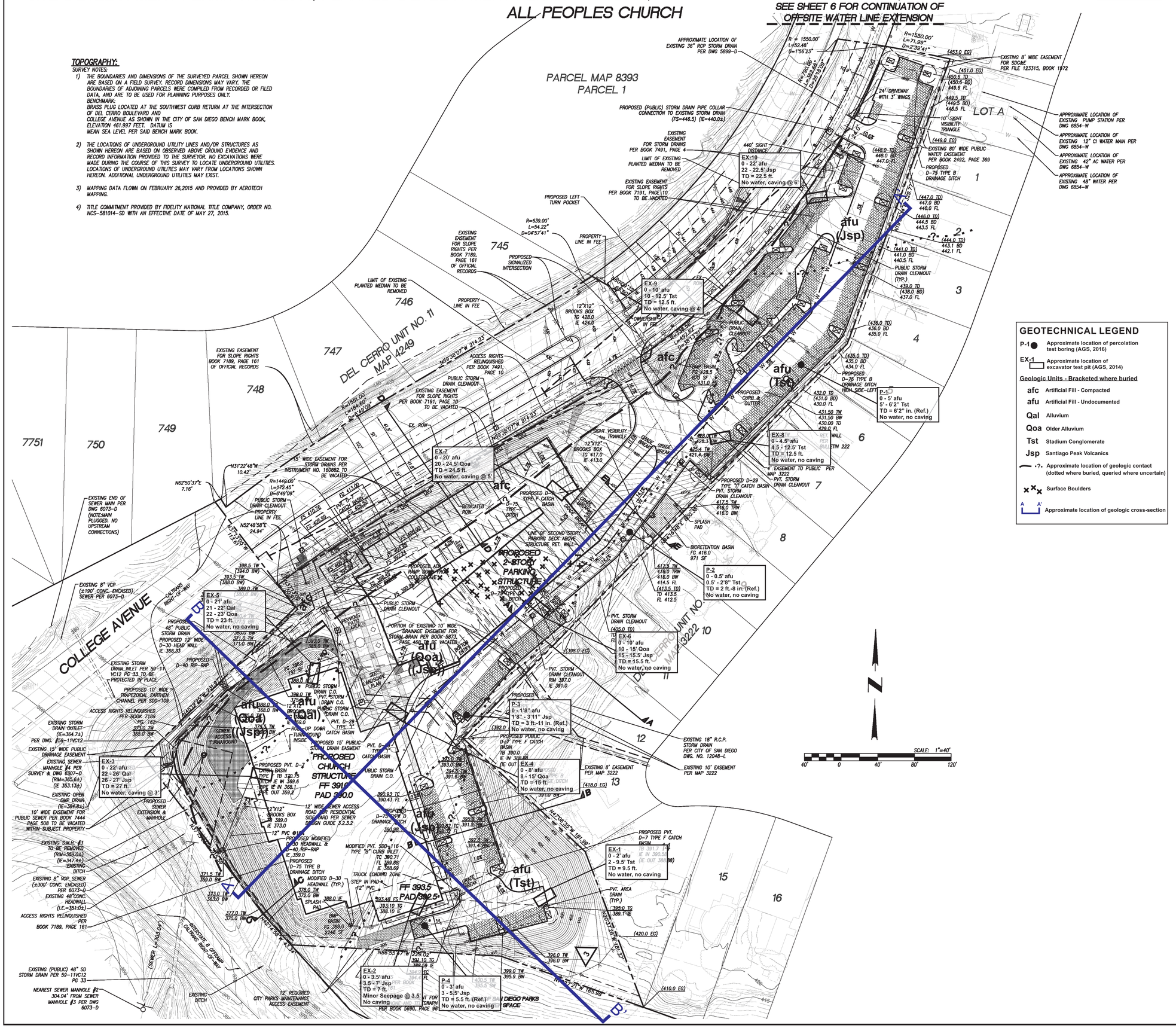
SURVEY NOTES:

1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.

2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.

3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.

4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.



GEOTECHNICAL LEGEND

- P-1 ● Approximate location of percolation test boring (AGS, 2016)
- EX-1 ▭ Approximate location of excavator test pit (AGS, 2014)

Geologic Units - Bracketed where buried

- afc Artificial Fill - Compacted
- afu Artificial Fill - Undocumented
- Qal Alluvium
- Qoa Older Alluvium
- Tst Stadium Conglomerate
- Jsp Santiago Peak Volcanics
- ?• Approximate location of geologic contact (dotted where buried, queried where uncertain)
- Surface Boulders
- A A' Approximate location of geologic cross-section

LEGEND

- BOUNDARY LINE
- ADJACENT PROPERTY LINE
- EASEMENT LINE
- RIGHT OF WAY
- EXISTING STREET CENTERLINE
- EXISTING IMPROVEMENTS
- EXISTING CONTOUR
- EXISTING CURB & GUTTER
- EXISTING SEWER MAIN
- EXISTING STORM DRAIN MAIN
- EXISTING CURB INLET
- EXISTING WATER MAIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING STRUCTURE
- EXISTING VEGETATION
- PROPOSED IMPROVEMENTS
- PROPOSED ROAD CENTERLINE
- LIMIT OF WORK LINE
- CURB AND GUTTER
- 24' RESIDENTIAL DRIVEWAY
- PROPOSED CONTOURS
- PROPOSED SPOT ELEVATION
- RETAINING WALL
- SDRSD D-75 BROW DITCH
- BIORETENTION BASIN
- STORM DRAIN HEADWALL
- STORM DRAIN CLEANOUT
- AREA DRAIN
- STORM DRAIN INLET
- TYPE F CATCH BASIN
- RIP RAP ENERGY DISSIPATOR PER SDD-104
- PVC STORM DRAIN (SIZE VARIES)
- WATER SERVICE
- TRAFFIC SIGNAL
- PARKING GARAGE WALL
- CUT/FILL SLOPE
- PERMEABLE PAVERS
- PROPOSED RIP-RAP
- TREE PER LANDSCAPE PLANS

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

REGISTERED PROFESSIONAL ENGINEER — WILLIAM GREGG MACK — No. 73620 Exp. 12/31/20 — CIVIL — STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620 DATE
EXPIRATION: 12/31/2020

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: PRELIMINARY GRADING PLAN

SHEET NUMBER: C 2.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019
REVISIONS:
1. 03-17-2020 11. _____
2. _____ 12. _____

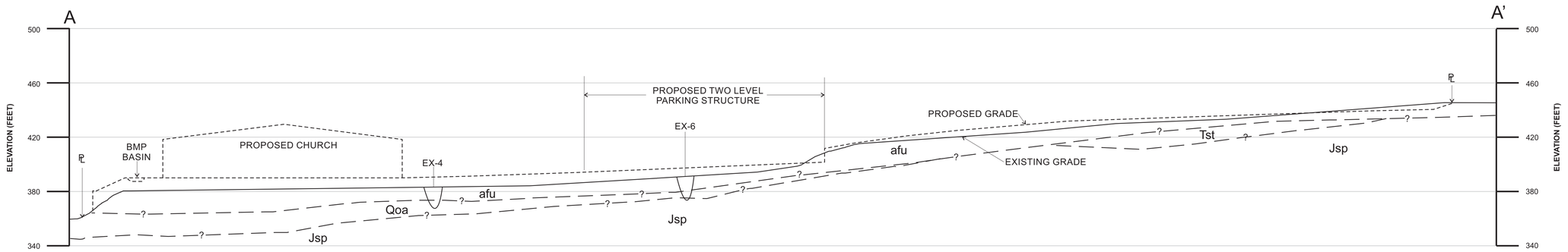
PLATE 1
Geologic Map and Exploration Location Plan

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1805-05	1805-05-B-3	Oct. 2020

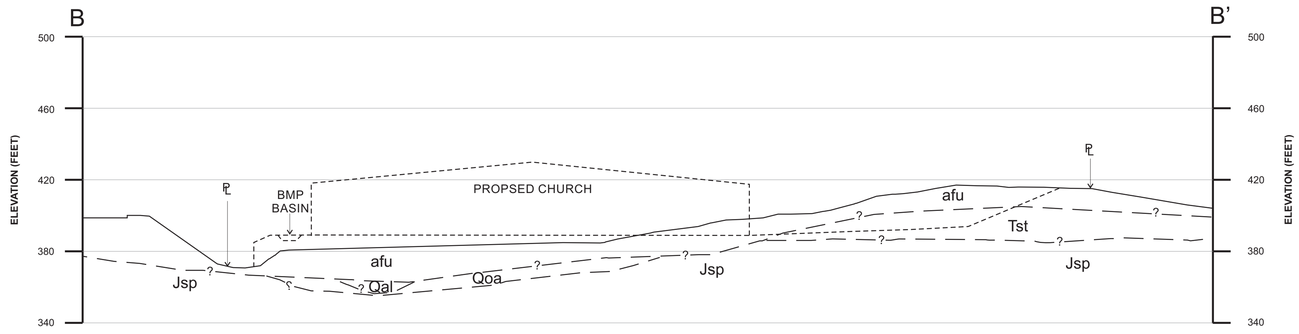
3-17-2020

PLSA 2936



CROSS-SECTION A-A'

SCALE 1"=40.0' H&V



CROSS-SECTION B-B'

SCALE 1"=40.0' H&V

PLATE 2

Geologic Cross-Sections A-A' & B-B'

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1805-05	1805-05-B-3	Oct. 2020

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