RIVERSIDE COUNTY
ENGINEERING DIVISION

**PRELIMINARY HYDROLOGY STUDY**

**FOR**

# CHERRY VALLEY STORAGE

# CUP 230006

ENGINEER OF WORK

_____

WILLIAM F. STRAND, PE – CE 65712

**PREPARED FOR:**


**CORION CAPITAL PARTNERS, LLC**

**C/O FRED CORDOVA**

**270 PACIFIC PALISADE ROAD, SUITE 302**

**fcordova@corioncapital.com**

**(310) 283-5058**


**PREPARED BY:**


**STRAND ENGINEERING, INC.**

**1001 AVENIDA PICO, C-121**

**SAN CLEMENTE, CA 92673**

**bstrand@strandengineeringinc.com**

**(949) 431-0610**


**February 14, 2023**

**Rev April 21, 2023, November 28, 2023**

**Introduction:**

This project proposes to develop a 8.28 acre site at 38718 Brookside Drive in Apple Valley, CA. The site is comprised of two lots APN's 405-23-6 & 10. The existing site has several single-story residences and out buildings along with limited improvements.

The site currently sheet flows to the southwest and discharges to the north side of Brookside Drive. The project is in Zone X (minimal flooding risk) per FIRM 060650803G Effective August 28, 2008. The site is in a DWR Awareness Floodplain for Little San Gorgonio Creek.

The existing soils are Hydrologic Soils Group A per the Riverside County Hydrology Manual (RCHM).

The project proposes to remove all existing structures and redevelop the entire site with seven (7) single-story self-storage buildings and covered RV parking. The project will disturb 8.24 AC. Existing drainage patterns will be maintained.

**Design Criteria:**

The project design is based on the RCHM. The following standards apply to the project:

- 100-Year Design Storm
- Storm Drain Pipes – 100 Year

**Hydrology Summary:**

The 2-YR, 10-YR and 100-YR runoff was calculated using Hydraflow modelling software. The 2, 10 & 100-YR IDF curves were entered from the RCHM Plate D.4.1 for Cherry Valley. Time of Concentrations were calculated in Hydraflow based on the overland flow length and basin slope using the FAA Method.

Existing and Proposed 2-YR, 10-YR, and 100-YR flows were calculated to verify proposed condition flows from the site (Southwest corner) did not exceed existing condition flows.

**Existing Conditions**

The existing site has several single-story residences and out buildings along with limited improvements. The existing site drains to the southwest where flows exit the site via a roadside swale along the north side of Brookside Drive and flow west.

**Existing Basin E-1**

Existing Basin E-1 encompasses the entire site.

Existing Conditions

| Sub-Basin | AREA (AC) | AREA (SM) | L | TC(MIN) | C | Q2 | Q10 | Q100 |
|---|---|---|---|---|---|---|---|---|
| E-1 | 8.27 | 0.0131 | 1,341 | 53 | 0.03 | 0.01 | 0.2 | 0.4 |

**Proposed Conditions**

The proposed project consists of re-developing the entire site and constructing seven (7) single story self-storage buildings and covered RV parking. Existing drainage patterns will be maintained. The proposed condition the project is divided into ten (10) sub-basins.

**Proposed Sub-Basin P-1**

Proposed Basin P-1 encompasses RV Parking at the northwest portion of the project site. Runoff sheet flows to a valley gutter which drains south to a catch basin where it routed to Retention Basin 1.

**Proposed Sub-Basin P-2**

Proposed Basin P-2 encompasses RV Parking at the northern portion of the project site. Runoff sheet flows to a valley gutter which drains south to a catch basin where it routed to Retention Basin 1.

**Proposed Sub-Basin P-3**

Proposed Basin P-2 encompasses RV Parking at the northeast portion of the project site. Runoff sheet flows to a valley gutter which drains south to a catch basin where it routed to Retention Basin 1.

**Proposed Sub-Basin P-4**

Proposed Basin P-4 is located in the middle portion of the site. Runoff from the building roof downspouts and sheet flows are collected in a valley gutter which drains south to a catch basin where it routed to Retention Basin 2.

**Proposed Sub-Basin P-5**

Proposed Basin P-5 is located in the middle portion of the site. Runoff from the building roof downspouts and sheet flows are collected in a valley gutter which drains south to a catch basin where it routed to Retention Basin 2.

**Proposed Sub-Basin P-6**

Proposed Basin P-6 is located in the middle portion of the site. Runoff from the building roof downspouts and sheet flows are collected in a valley gutter which drains south to a catch basin where it routed to Retention Basin 2.

**Proposed Sub-Basin P-7**

Proposed Basin P-7 is located in the middle portion of the site. Runoff from the building roof downspouts and sheet flows are collected in a valley gutter which drains south to a catch basin where it routed to Retention Basin 2.

**Proposed Sub-Basin P-8**

Proposed Basin P-8 contains Retention Basin 2, the adjacent drive isle, and building. Runoff from the building roof downspouts and sheet flows are collected in curb and gutter which drains west to catch basins where it routed to Retention Basin 2.

**Proposed Sub-Basin P-9**

Proposed Basin P-9 contains Retention Basin 3, the adjacent driveway, customer service building, and parking. Runoff from the building roof downspouts and sheet flows are collected in curb and gutter which drains south to catch basins where it routed to Retention Basin 3.

**Proposed Sub-Basin P-10**

Proposed Basin P-10 is the road right-of-way on Brookside Drive and includes the widening of Brookside, addition of sidewalk, and the project driveway. Runoff flows west to the edge of the project. Additional retention is provided in Retention Basin 3 to mitigate for the runoff from Basin P-10.

**From NOAA Atlas 14**

**I hr Precipitation = 1.84**

**3 hr Precipiation = 2.54**

**6 hr Precipitation = 3.46**

**24 hr Precipitation = 6.93**

**Areal Adjustment Factor (Plate E-5.8) = 100%**

**Slope of Rainfall Intensity – Duration Curve (Plate D-4.6) = 0.53**

Proposed Conditions

| Sub-Basin | AREA (AC) | L (FT) | Elev Diff (FT) | TC(MIN) | C | Q10 | Q100 |
|---|---|---|---|---|---|---|---|
| P-1 | 0.57 | 439 | 10 | 6 | 0.9 | 1.7 | 2.5 |
| P-2 | 1.24 | 486 | 12 | 6 | 0.9 | 3.6 | 5.5 |
| P-3 | 1.43 | 472 | 11.6 | 8 | 0.82 | 3.3 | 5.0 |
| P-4 | 0.79 | 533 | 11.7 | 6 | 0.9 | 2.3 | 3.5 |
| P-5 | 0.78 | 525 | 10.3 | 7 | 0.9 | 2.1 | 3.2 |
| P-6 | 1.06 | 555 | 10.3 | 7 | 0.9 | 2.9 | 4.3 |
| P-7 | 1.22 | 555 | 10.3 | 7 | 0.9 | 3.3 | 5.0 |
| P-8 | 0.64 | 300 | 5.6 | 13 | 0.6 | 0.8 | 1.2 |
| P-9 | 0.36 | 205 | 6.3 | 11 | 0.48 | 0.4 | 0.6 |
| P-10 | 0.15 | 130 | 3.0 | 6 | 0.84 | 0.4 | 0.6 |

**Retention Basins**

Proposed condition flows are routed to three (3) retention basis for complete capture and infiltration (ouflow = 0 CFS). Infiltration rates were determined based on the is based Inland Foundation Engineering June 2, 2023 Infiltration Testing Report and applying a Factor of Safety of 3 (Design Handbook for LID Table 1-1 Option 2).

| Basin | Measured Infiltration Rate (Average of 2 tests, in/hr) | Factor of Safety | Design Infiltration Rate (in/hr) |
|---|---|---|---|
| 1 | 26 | 3 | 8.7 |
| 2 | 17.5 | 3 | 5.8 |
| 3 | 17.5 | 3 | 5.8 |

| Basin | BASIN INVERT (FT) | BASIN TOP (FT) | 100-YR INFLOW(CFS) | 100-YR-OUTFLOW (CFS) | OVERFLOW | 100-YR VOLUME (CF) | STAGE (FT) |
|---|---|---|---|---|---|---|---|
| 1 | 2673.0 | 2678.0 | 11.8 | 0 | UPSTREAM CATCHBASIN | 4,864 | 2675.42 |
| 2 | 2662.0 | 2666.2 | 16.1 | 0 | UPSTREAM CATCHBASIN | 6,650 | 2664.4 |
| 3 | 2659.0 | 2662.0 | 0.6 | 0 | UPSTREAM CATCHBASIN | 356 | 2659.79 |

Basin Drawdown Calcs (100-YR)

| Basin | DEPTH (FT) | VOL (CF) | BOTTOM AREA (SF) | I (FT/HR) | VOL/HR (CF) | TIME (HR) |
|---|---|---|---|---|---|---|
| 1 | 2.4 | 4,864 | 1,848 | 0.73 | 1,349 | 3.6 |
| 2 | 2.4 | 6,650 | 2,617 | 0.48 | 1,256 | 5.3 |
| 3 | 1.1 | 356 | 852 | 0.48 | 409 | 0.9 |

See Hydraflow model output for complete results.

**Hydraulics**

The Hydraflow Express computer program was used to calculate normal depth pipe flow capacity and size proposed storm drain pipes and perimeter V-Ditches. Storm Drains are sized for the 100-YR storm per the RCHM. Headwalls and Rip-Rap are provided at the outlets of storm drain pipes

Riprap Sizing (Per Standard 314)

| Storm Drain Diameter (IN) | Riprap Class | Width of Riprap (FT) | Length of Riprap (FT) | Depth of Riprap (FT) |
|---|---|---|---|---|
| 12 | ¼ TON | 6 | 10 | 3.3 |
| 18 | ¼ TON | 6 | 10 | 3.3 |

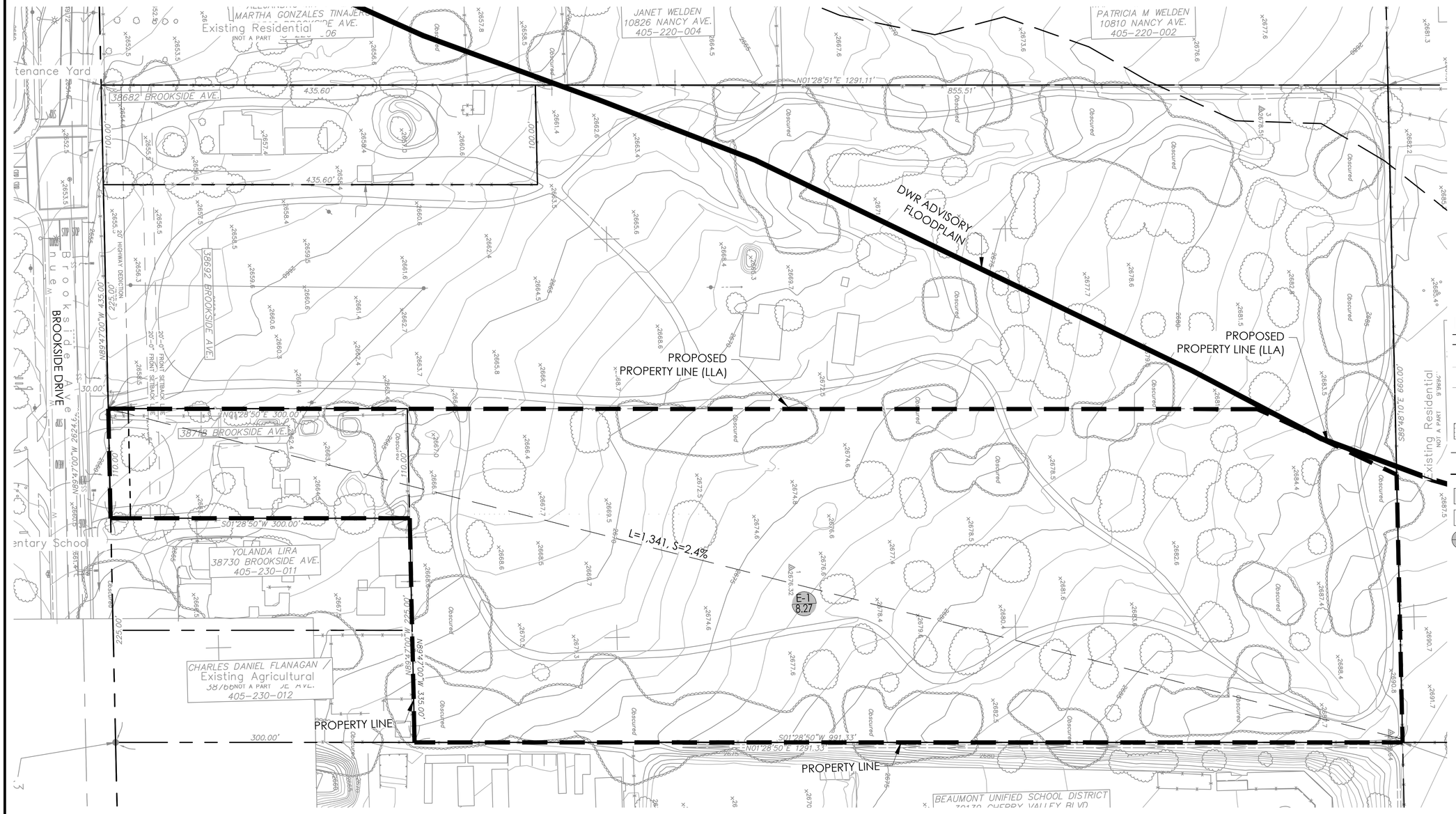
## Storm Water Quality

Stormwater is routed to three (3) infiltration basins for peak attenuation and water quality management. One hundred percent of site runoff is infiltrated. See separate Water Quality Management Plan for the project.

## Conclusion

Existing drainage patterns be maintained. 2, 10 and 100 year flows are routed to three retention basins to mitigate peak flows to less than existing (100-YR runoff is fully contained in the retention basins).

# ATTACHMENTS




## LEGEND

- PROPERTY LINE
- 102.0 — EXISTING CONTOURS
- SD — EXISTING STORM DRAIN
- PROPOSED DRAIN INLET
- PROPOSED LANDSCAPE
- 102 — PROPOSED CONTOURS
- 10" SD — PROPOSED STORM DRAIN
- PROPOSED AC PAVEMENT
- PROPOSED PCC PAVEMENT
- SUBAREA ACREAGE — SUBAREA / ACREAGE

0 50 100 150 feet

1"=50'

## SUB-BASIN TABLE

| SUBAREA | AREA (AC) | L (FT) | Tc (MIN) | I2(in/hr) | I10(in/hr) | I 100(in/hr) | C | Q2 | Q10 | Q100 |
|---|---|---|---|---|---|---|---|---|---|---|
| E-1 | 8.27 | 1,341 | 53 | 0.31 | 0.98 | 1.47 | 0.03 | 0.01 | 0.23 | 0.37 |

| NO. | REVISIONS | RECMD'D | APPRV'D | DATE |
|---|---|---|---|---|
| 1 | | | | |

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RECOMMENDED FOR APPROVAL:

OCTOBER 20, 2023

OWNER/DEVELOPER

**AMS GROUP, LLC**
**4758 RODEO LANE**
**LA VERNE, CA 91750**
**(626) 922-6343**

GEOTECHNICAL/GEOLOGICAL FIRM

**INLAND FOUNDATION ENGINEERING**
**1310 S. SANTA FE AVE.**
**SAN JACINTO, CA 92581**
**(951) 654-1555**

SOILS ENGINEER DATE

SEAL

CIVIL ENGINEERING FIRM

**STRAND ENGINEERING, INC.**
1001 Avenida Pico, Ste. C-121, San Clemente, CA 92673 (949) 431-0610

UNDER THE RESPONSIBLE CHARGE OF:

CIVIL ENGINEER DATE

SEAL

REGISTERED PROFESSIONAL ENGINEER
WILLIAM FREDERICK STRAND
No. C 65712
exp. 9/30/25
CIVIL
STATE OF CALIFORNIA

RIVERSIDE COUNTY
APPROVED BY:

CITY ENGINEER LIC. DATE

# EXISTING DRAINAGE FOR CHERRY VALLEY STORAGE

38718 BROOKSIDE DRIVE, CHERRY VALLEY, CA

GRADING PERMIT NO.

SHEET 1 OF 3

JOB NO. 1036

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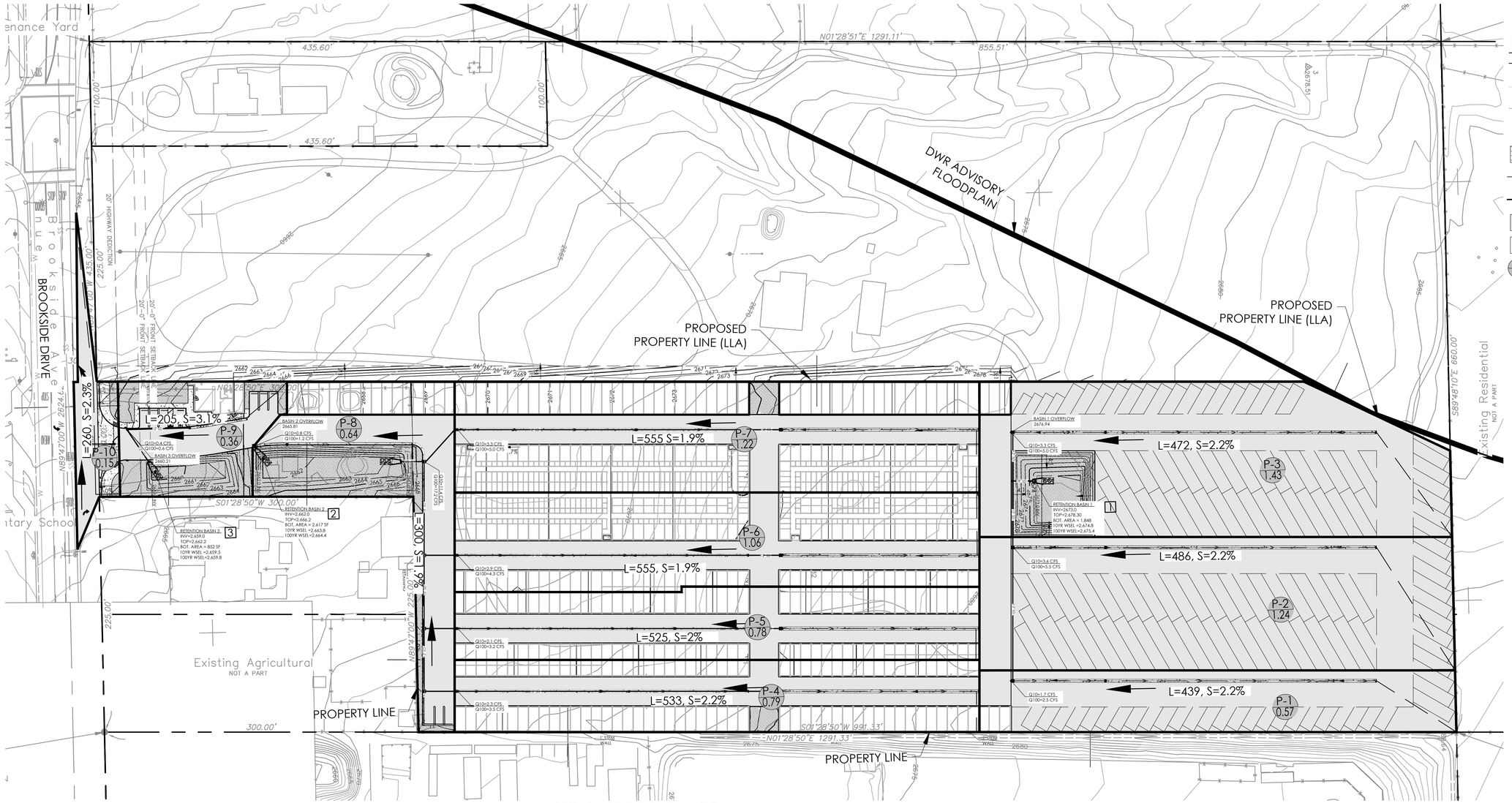


## LEGEND

- PROPERTY LINE
- 2660 — EXISTING CONTOURS
- SD — EXISTING STORM DRAIN
- PROPOSED DRAIN INLET
- PROPOSED LANDSCAPE
- 2670 — PROPOSED CONTOURS
- 10" SD — PROPOSED STORM DRAIN
- PROPOSED AC PAVEMENT
- PROPOSED PCC PAVEMENT
- SUBAREA ACREAGE — SUBAREA /DRAINAGE MANAGEMENT AREA
- 1 — STRUCTURAL BMP - RETENTION BASIN 1
- 2 — STRUCTURAL BMP - RETENTION BASIN 2
- 3 — STRUCTURAL BMP - RETENTION BASIN 3

## SOURCE CONTROL BMPS

- STREET SWEEPING
- LANDSCAPE/OUTDOOR PESTICIDE
- REFUGE AREAS
- INLET STENCILS

0 50 100 150 feet

1"=50'

## SUB-BASIN/DRAINAGE MANAGEMENT AREA TABLE

| SUBAREA/ DMA | AREA (AC) | L (FT) | Tc (MIN) | C | Q10 (CFS) | Q100 (CFS) |
|---|---|---|---|---|---|---|
| P-1 | 0.57 | 439 | 6 | 0.9 | 1.7 | 2.5 |
| P-2 | 1.24 | 486 | 6 | 0.9 | 3.6 | 5.5 |
| P-3 | 1.43 | 472 | 8 | 0.82 | 3.3 | 5.0 |
| P-4 | 0.79 | 533 | 6 | 0.9 | 2.3 | 3.5 |
| P-5 | 0.78 | 525 | 7 | 0.9 | 2.1 | 3.2 |
| P-6 | 1.06 | 555 | 7 | 0.9 | 2.9 | 4.3 |
| P-7 | 1.22 | 555 | 7 | 0.9 | 3.3 | 5.0 |
| P-8 | 0.64 | 300 | 13 | 0.6 | 0.8 | 1.2 |
| P-9 | 0.36 | 205 | 11 | 0.48 | 0.4 | 0.6 |
| P-10 | 0.15 | 260 | 6 | 0.84 | 0.4 | 0.6 |

## STRUCTURAL BMP TABLE

| BMP | BMP Type | Trib Area | DCV | Vol Provided | Latitude | Longitude |
|---|---|---|---|---|---|---|
| 1 | RETENTION BASIN | 3.24 AC | 7,783 CF | 14,940 CF | 116°59'13.25" | 33°57'50.17" |
| 2 | RETENTION BASIN | 4.50 AC | 10,859 CF | 15,936 CF | 116°59'12.64" | 33°57'43.96" |
| 3 | RETENTION BASIN | 0.36 AC | 732* | 2,933 CF | 116°59'12.38" | 33°57'42.82" |

* - BASIN 3 IS SIZED FOR SUBAREA P-9 + OVERDETAINS FOR SUBAREA P-10

| NO. | REVISIONS | RECMD'D | APPRV'D | DATE |
|---|---|---|---|---|
| 1 | | | | |

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NOVEMBER 27, 2023

OWNER/DEVELOPER
**AMS GROUP, LLC**
**4758 RODEO LANE**
**LA VERNE, CA 91750**
**(626) 922-6343**

GEOTECHNICAL/GEOLOGICAL FIRM
**INLAND FOUNDATION ENGINEERING**
**1310 S. SANTA FE AVE.**
**SAN JACINTO, CA 92581**
**(951) 654-1555**

SOILS ENGINEER DATE

SEAL

CIVIL ENGINEERING FIRM
**STRAND ENGINEERING, INC.**
1001 Avenida Pico, Ste. C-121, San Clemente, CA 92673 (949) 431-0610

UNDER THE RESPONSIBLE CHARGE OF:

CIVIL ENGINEER DATE

SEAL
REGISTERED PROFESSIONAL ENGINEER WILLIAM FREDERICK STRAND No. C 65712 exp. 9/30/25 CIVIL STATE OF CALIFORNIA
NOT FOR CONSTRUCTION

RIVERSIDE COUNTY
APPROVED BY:

CITY ENGINEER LIC. DATE

PROPOSED DRAINAGE
FOR
CHERRY VALLEY STORAGE
38718 BROOKSIDE DRIVE, CHERRY VALLEY, CA

GRADING PERMIT NO.

SHEET 2 OF 3

JOB NO. 1036

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# CHERRY VALLEY STORAGE

## 38718 BROOKSIDE DRIVE
## RIVERSIDE COUNTY
## STATE OF CALIFORNIA
## APN: 405-230-010
## CUP230006

### CONSTRUCTION NOTES:

1. SAWCUT EX. PAVEMENT
2. INSTALL 6" CURB AND GUTTER PER STD. 200
3. INSTALL DRIVEWAY PER STD. 207A
4. INSTALL PCC SIDEWALK PER STD. 401
5. INSTALL AC PAVEMENT (3"AC/6"AB)
6. INSTALL A1-6 CURB PER SPPWC STD. 120-2
7. INSTALL 3' WIDE PCC VALLEY GUTTER
8. INSTALL CURB RAMP CASE A PER STD. 403
9. INSTALL 4" WHITE STRIPING
10. INSTALL ACCESSIBLE PARKING STRIPING AND SIGNAGE
11. 8' FREESTANDING BLOCK WALL PER ARCHITECTURE
12. INSTALL DETAIL DETAIL 27C PER CAMUTCD
13. INSTALL TYPE IV (R) ARROW PER CAMUTCD
14. INSTALL TYPE VI (R) ARROW PER CAMUTCD
15. INSTALL 3' WIDE CONC. V-DITCH
16. INSTALL CONCRETE WHEELSTOPS MIN. 2' FROM CURB

### FIRE CONSTRUCTION NOTES:

F1. 8" FIRE BACKFLOW & FDC PER BCVWD PLATE 7
F2. INSTALL 8" DIP FIRE LINE (CL150) PER BCVWD PLATE 6-2
F3. INSTALL FH PER BCVWD PLATE 1

### WATER CONSTRUCTION NOTES

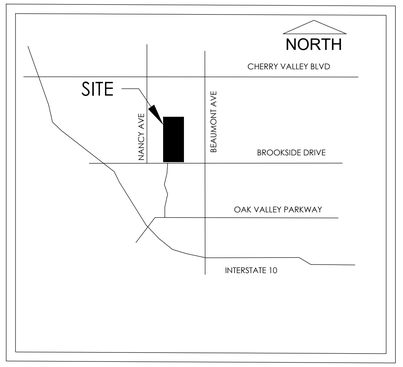
W1. INSTALL 1" DOMESTIC SERVICE PER BCVWD PLATE 6-3
W2. INSTALL 1 TYPE K COPPER WATER LINE PER BCVWD PLATE 6-2
W3. INSTALL 1" IRRIGATION SERVICE PER BCVWD PLATE 6-3 W/ REDUCED PRESSURE BACKFLOW IN CAGE

### STORM DRAIN CONSTRUCTION NOTES

D1. INSTALL HDPP STORM DRAIN LINE (HP STORM OR EQUAL)
D2. INSTALL 24"X24" CONCRETE CATCH BASIN (OLDCASTLE OR EQUAL)
D3. INSTALL NYLOPLAST DRAIN BASIN
D4. INSTALL FLARED END SECTION
D5. INSTALL PIPE OUTLET (HEADWALL AND RIPRAP PER STD. 314
D6. INSTALL 3' CURB CUT

### SEWER CONSTRUCTION NOTES

S1. INSTALL 6" PVC SEWER
S2. INSTALL ADVANCED TREATMENT UNIT SEPTIC SYSTEM
S3. INSTALL SEEPAGE PITS PER GEOTECH REPORT




VICINITY MAP
NOT TO SCALE

### LEGAL DESCRIPTION

ADJUSTED PARCEL PER THE LOT LINE ADJUSTMENT BEING PROCESSED CONCURRENTLY.

APN 405-230-010
AREA: 8.38 AC

### CIVIL ENGINEER

STRAND ENGINEERING, INC.
CONTACT: WILLIAM STRAND, PE
1001 AVENIDA PICO C-121
SAN CLEMENTE, CA 92673
(949) 431-0610

### ARCHITECT

arclogica
CONTACT: LINDSEY ENGELS
(949) 409-1259

### UTILITY CONTACT INFORMATION

WATER: BEAUMONT CHERRY VALLEY WATER DISTRICT (951) 845-9581
SEWER: SEPTIC
STORM DRAINAGE: RIVERSIDE COUNTY (951) 955-1200
ELECTRIC: SOUTHERN CALIFORNIA EDISON (800) 611-1911

### BENCHMARK

COUNTY OF RIVERSIDE BENCHMARK C-2-4-65, ON TOP OF BRIDGE WING WALL AT THE SOUTHWEST CORNER OF BROOKSIDE AVE. AND CHERRY AVE.

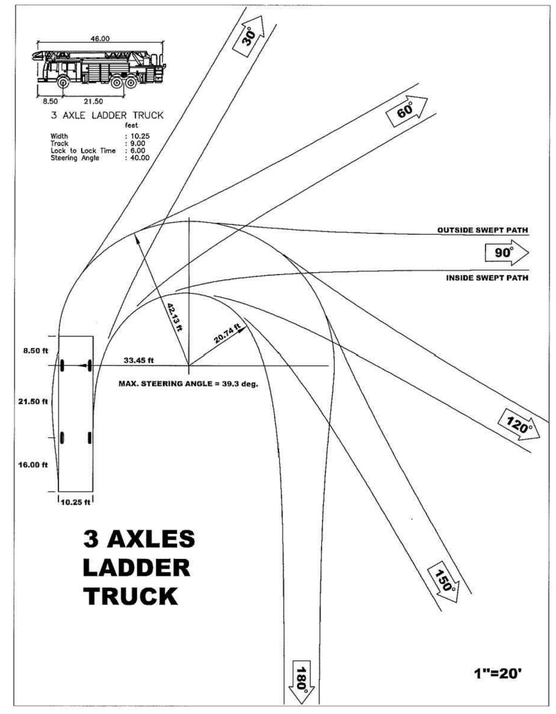
ELEV = 2758.083
DATUM: NGVD 29

### SOURCE OF TOPOGRAPHY

TOPOGRAPHIC SURVEY CONDUCTED 6/6/2022 BY
TERRASCRIBE, INC

### EARTHWORK

CUT = 14,500
FILL= 12,500
NET IMPORT= 6,000




TURNING TEMPLATE USED FOR LEFT IN AND OUT OF SITE AT BROOKSIDE

| NO. | REVISIONS | RECMD'D | APPRV'D | DATE |
|---|---|---|---|---|
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SOILS ENGINEER DATE

SEAL

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SEAL

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NOT FOR CONSTRUCTION

RIVERSIDE COUNTY
APPROVED BY:

CITY ENGINEER LIC. DATE

PRELIMINARY GRADING PLAN
FOR
CHERRY VALLEY STORAGE

38718 BROOKSIDE DRIVE, CHERRY VALLEY, CA

GRADING PERMIT NO.

SHEET 1 OF 3

JOB NO. 1036

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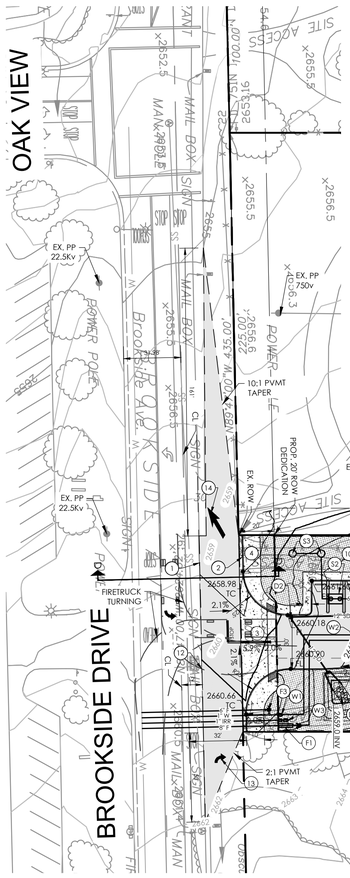
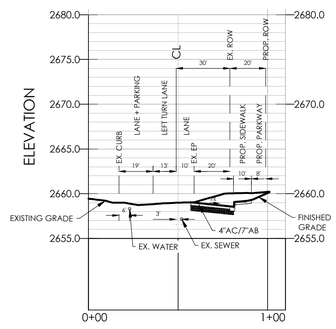
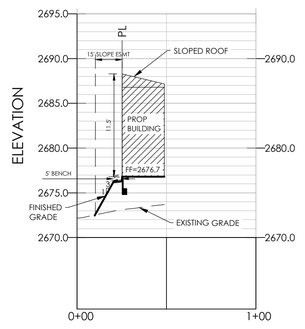
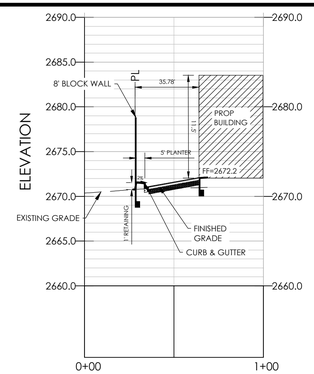


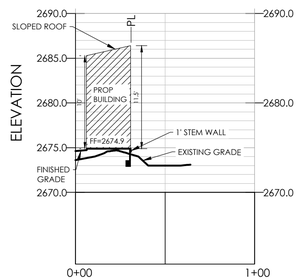

## BROOKSIDE DRIVE
1"=40'



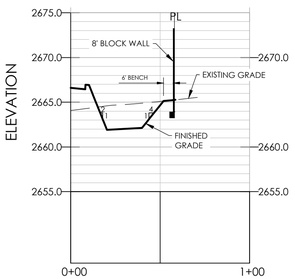

## SECTION A-A
1"=40'



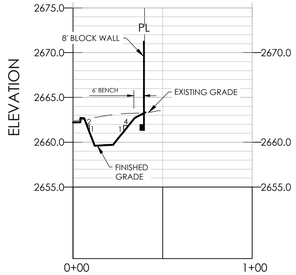

## SECTION B-B
1"=40'




## SECTION C-C
1"=40'




## BASIN 2
1"=40'




## BASIN 3
1"=40'

0 20 40 80 120 feet
1"=40'

## LEGEND

- S — EX. SEWER LINE
- W — EX. WATER LINE
- SD — EX. STORM DRAIN LINE
- ELEC — EX. UNDERGROUND ELECTRICAL
- TELE — EX. TELEPHONE
- 2672 — EX. CONTOUR LINE
- WATER VALVE
- FIRE HYDRANT
- EX. PARKING LOT LIGHT
- DRAIN BASIN
- 102.00' — SPOT ELEVATION
- 2682 — PROP. CONTOUR LINE
- F — PROP. FIRE LINE
- SD — PROP. STORM DRAIN LINE
- PROP. MASONRY WALL
- AC PVMT
- CONCRETE
- LANDSCAPE

NOTE: PAD GRADE = FINISHED FLOOR MINUS 0.67'

| NO. | REVISIONS | RECM'D | APPRV'D | DATE |
|---|---|---|---|---|
| 1 | | | | |

811 Know what's below. Call before you dig.

RECOMMENDED FOR APPROVAL:

NOVEMBER 27, 2023

OWNER/DEVELOPER
**AMS GROUP, LLC**
**4758 RODEO LANE**
**LA VERNE, CA 91750**
**(626) 922-6343**

GEOTECHNICAL/GEOLOGICAL FIRM
**INLAND FOUNDATION ENGINEERING**
**1310 S. SANTA FE AVE.**
**SAN JACINTO, CA 92581**
**(951) 654-1555**

SOILS ENGINEER — DATE

SEAL

CIVIL ENGINEERING FIRM
**STRAND ENGINEERING, INC.**
1001 Avenida Pico, Ste. C-121, San Clemente, CA 92673 (949) 431-0610

UNDER THE RESPONSIBLE CHARGE OF:

CIVIL ENGINEER — DATE

SEAL
REGISTERED PROFESSIONAL ENGINEER — WILLIAM FREDERICK STRAND — No. C 65712 — exp. 9/30/25 — CIVIL — STATE OF CALIFORNIA

RIVERSIDE COUNTY
APPROVED BY:

CITY ENGINEER — LIC. — DATE

# PRELIMINARY GRADING PLAN
# FOR
# CHERRY VALLEY STORAGE

**38718 BROOKSIDE DRIVE, CHERRY VALLEY, CA**

GRADING PERMIT NO.

SHEET 2 OF 3

JOB NO. 1036

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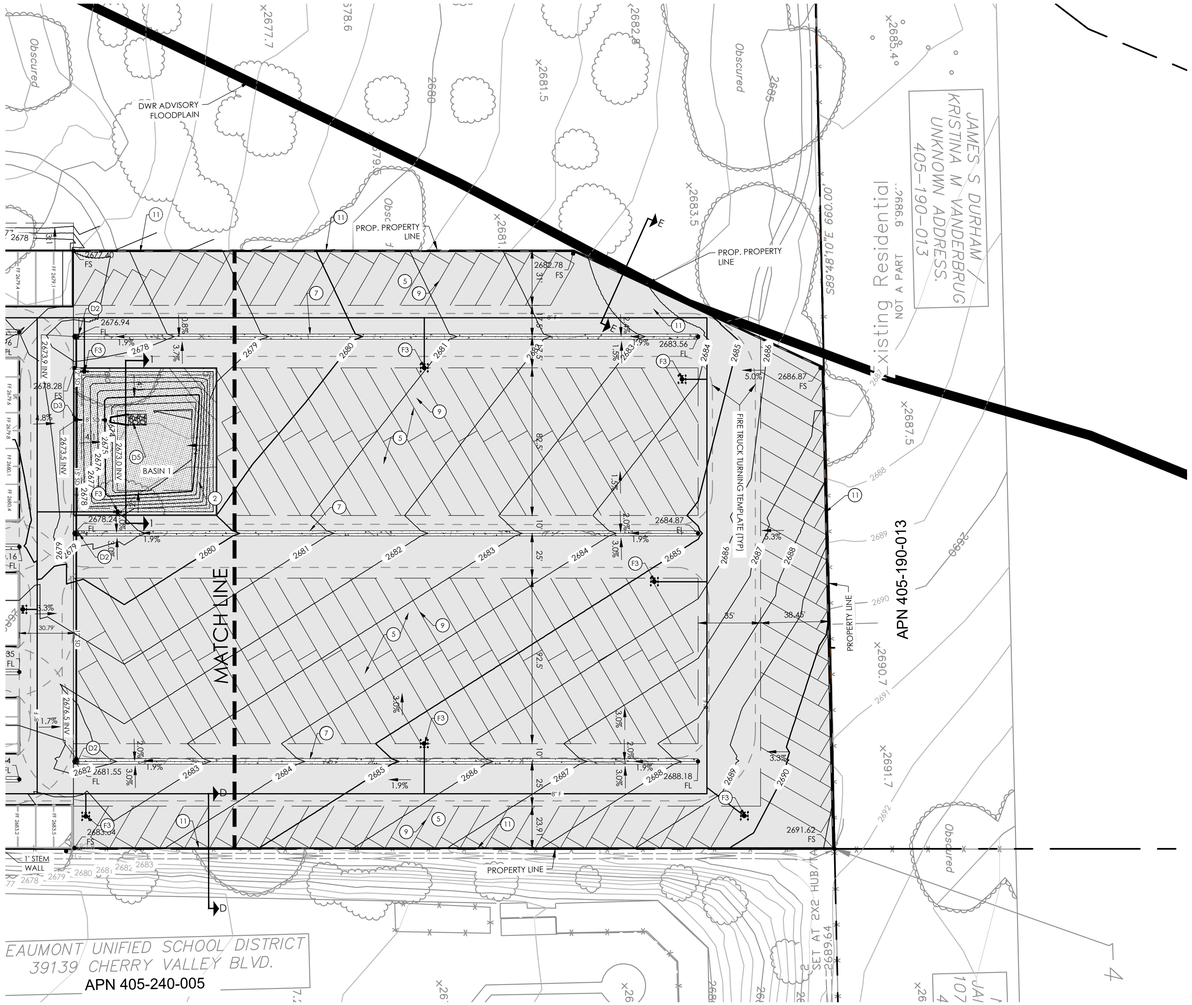
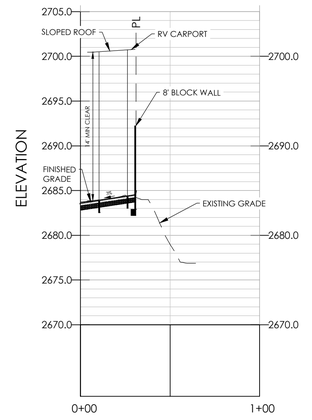
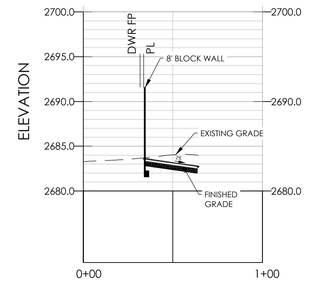
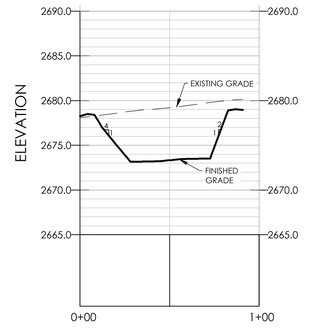



SECTION D-D
1"=40'



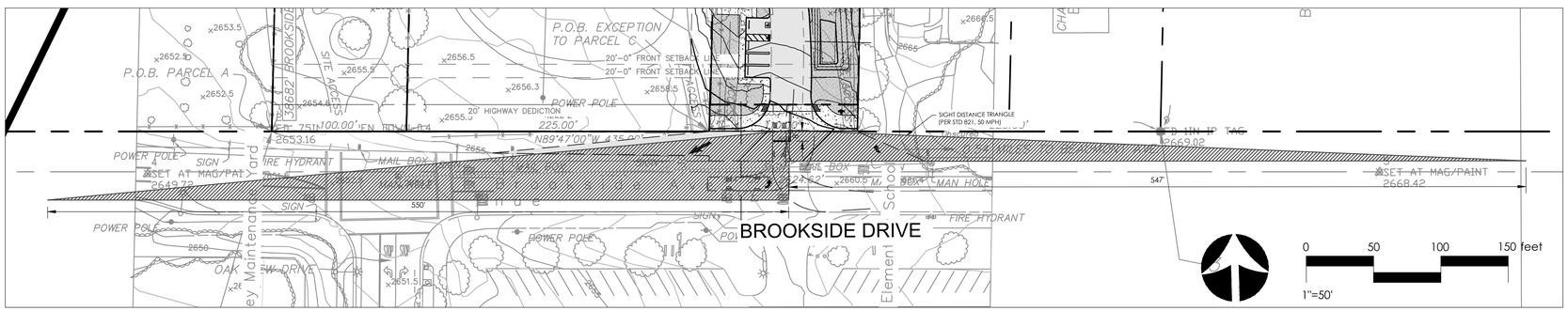

SECTION E-E
1"=40'




BASIN 1 SECTION
1"=40'

## LEGEND

- S — EX. SEWER LINE
- W — EX. WATER LINE
- SD — EX. STORM DRAIN LINE
- ELEC — EX. UNDERGROUND ELECTRICAL
- TELE — EX. TELEPHONE
- 2672 — EX. CONTOUR LINE
- WATER VALVE
- FIRE HYDRANT
- EX. PARKING LOT LIGHT
- DRAIN BASIN
- 102.00' — SPOT ELEVATION
- 2682 — PROP. CONTOUR LINE
- F — PROP. FIRE LINE
- SD — PROP. STORM DRAIN LINE
- PROP. MASONRY WALL
- AC PVMT
- CONCRETE
- LANDSCAPE




SITE DISTANCE EXHIBIT

0 20 40 80 120 feet
1"=40'

0 50 100 150 feet
1"=50'

| NO. | REVISIONS | RECM'D | APPRV'D | DATE |
|---|---|---|---|---|
| | | | | |

811 Know what's below. Call before you dig.

RECOMMENDED FOR APPROVAL:

NOVEMBER 27, 2023

OWNER/DEVELOPER
**AMS GROUP, LLC**
**4758 RODEO LANE**
**LA VERNE, CA 91750**
**(626) 922-6343**

GEOTECHNICAL/GEOLOGICAL FIRM
**INLAND FOUNDATION ENGINEERING**
**1310 S. SANTA FE AVE.**
**SAN JACINTO, CA 92581**
**(951) 654-1555**

SOILS ENGINEER — DATE

SEAL

CIVIL ENGINEERING FIRM
**STRAND ENGINEERING, INC.**
1001 Avenida Pico, Ste. C-121, San Clemente, CA 92673 (949) 431-0610

UNDER THE RESPONSIBLE CHARGE OF:

CIVIL ENGINEER — DATE

SEAL
REGISTERED PROFESSIONAL ENGINEER
WILLIAM FREDERICK STRAND
No. C 65712
exp. 9/30/25
CIVIL
STATE OF CALIFORNIA

RIVERSIDE COUNTY
APPROVED BY:

CITY ENGINEER — LIC. — DATE

# PRELIMINARY GRADING PLAN
# FOR
# CHERRY VALLEY STORAGE

**38718 BROOKSIDE DRIVE, CHERRY VALLEY, CA**

GRADING PERMIT NO.

SHEET 3 OF 3

JOB NO. 1036

C:\Users\stran\OneDrive - Strand Engineering Inc\Projects\1036 Brookside Avenue Self Storage\Engineering\ConDocs\Sheet Files\1036-GR.dwg, GRADING NORTH, Nov 28, 2023 11:14am, stran

# National Flood Hazard Layer FIRMette

FEMA

116°59'32"W 33°57'58"N


116°58'54"W 33°57'28"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

*Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020*

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

**SPECIAL FLOOD HAZARD AREAS**
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

**OTHER AREAS OF FLOOD HAZARD**
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

**OTHER AREAS**
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

**GENERAL STRUCTURES**
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**MAP PANELS**
- Digital Data Available
- No Digital Data Available
- Unmapped

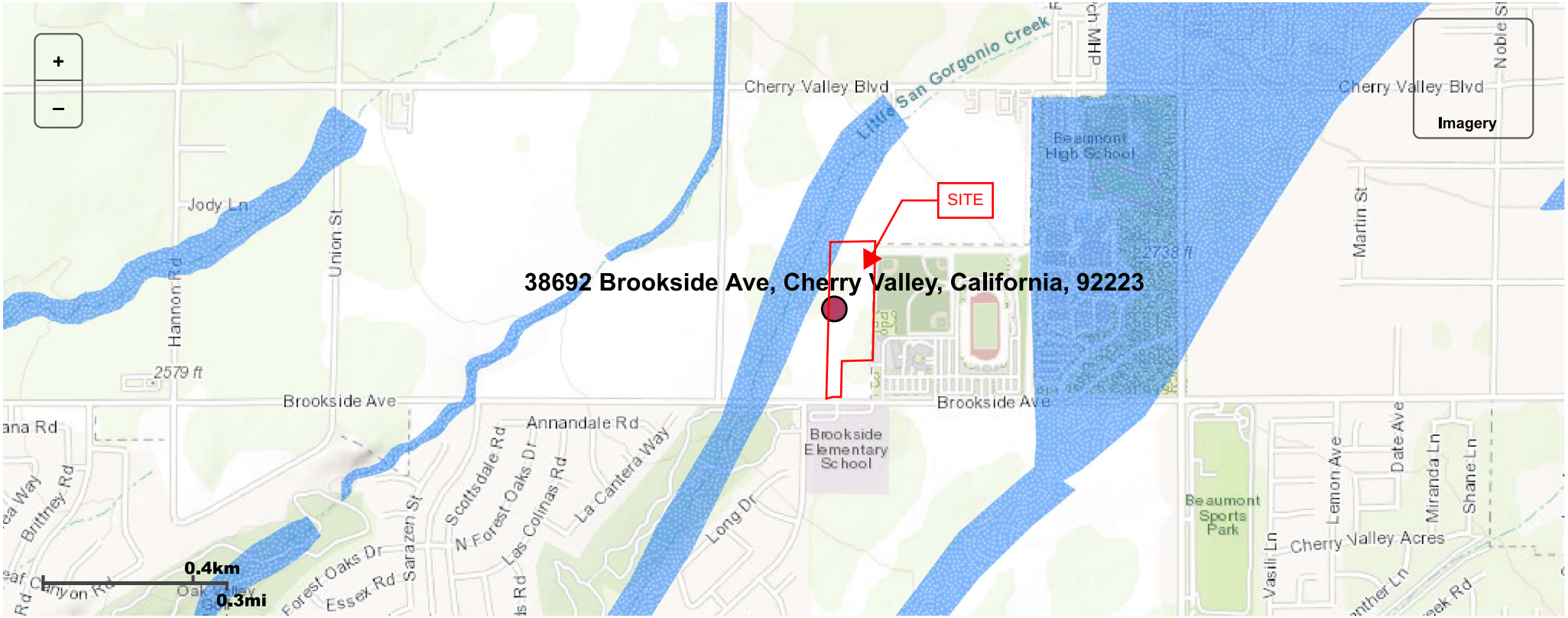
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/11/2023 at 4:12 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



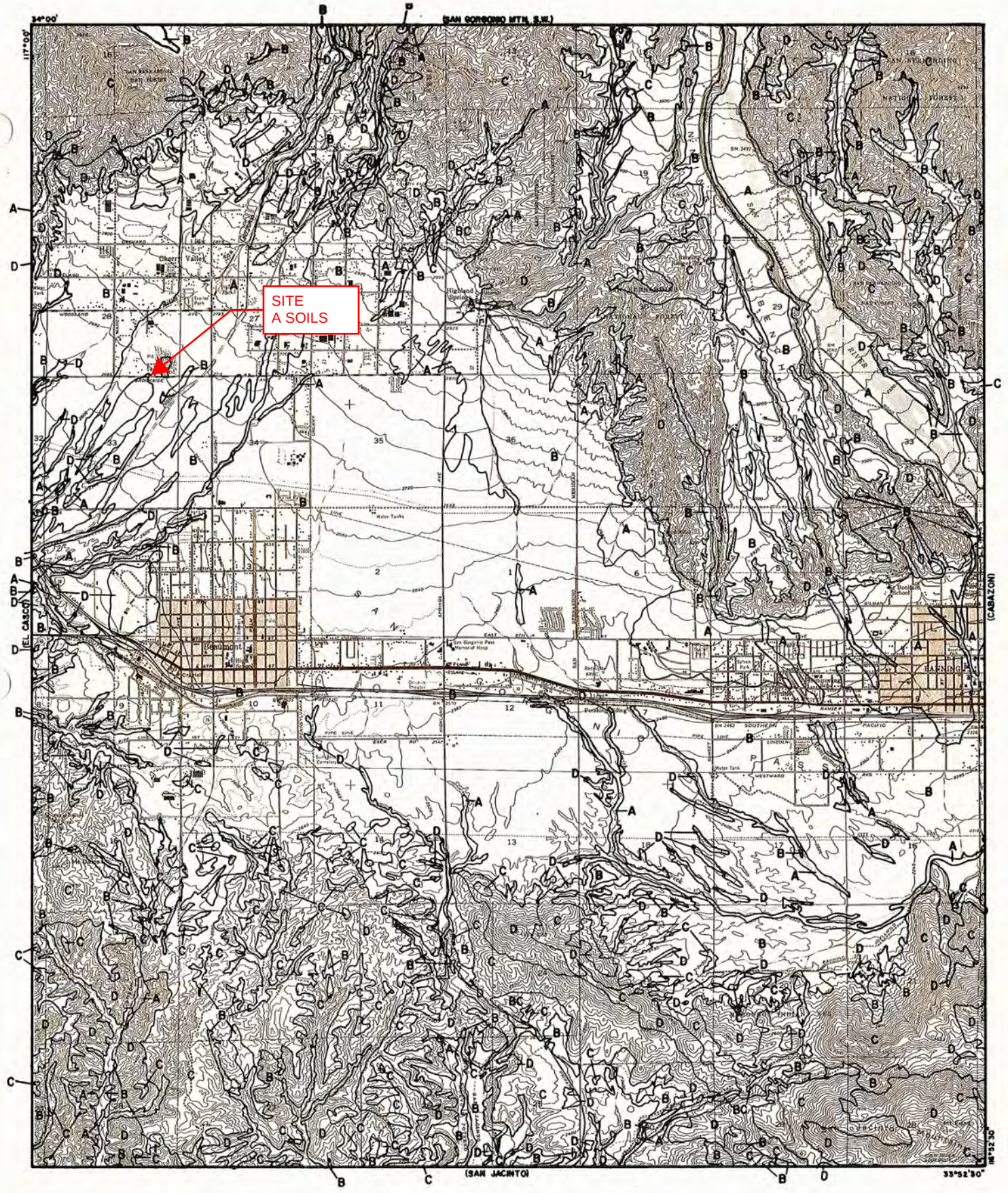

**100-Year Floodplains**

**FEMA/DWR Awareness/Regional Studies /USACE Comprehensive Study**

## FLOOD HAZARD

**NOTE: FEMA is currently updating the Flood Insurance Rate Map (FIRM) inventory through its Map Modernization Program. The updated maps will be added to this site as they are available, however, the digital information for many California counties has not been completed. Please be sure to check on-line at FEMA's Map Service Center website to view the most current FIRMs and use the search function for a "Public Flood Map." Your local Community Map Repository can provide information on how to view or obtain copies of FIRMs."**

Your location is IN or NEAR an area of Low hazard of flooding.




**LEGEND**

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

N

0 FEET 5000

# HYDROLOGIC SOILS GROUP MAP FOR BEAUMONT

PLATE C-1.19

# RAINFALL INTENSITY–INCHES PER HOUR

| CATHEDRAL CITY | | | CHERRY VALLEY | | | CORONA | | | DESERT HOT SPRINGS | | | ELSINORE - WILDOMAR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DURATION MINUTES | FREQUENCY 10 YEAR | 100 YEAR | DURATION MINUTES | FREQUENCY 10 YEAR | 100 YEAR | DURATION MINUTES | FREQUENCY 10 YEAR | 100 YEAR | DURATION MINUTES | FREQUENCY 10 YEAR | 100 YEAR | DURATION MINUTES | FREQUENCY 10 YEAR | 100 YEAR |
| 5 | 4.14 | 6.76 | 5 | 3.65 | 5.49 | 5 | 3.10 | 4.78 | 5 | 4.39 | 6.76 | 5 | 3.23 | 4.94 |
| 6 | 3.73 | 6.08 | 6 | 3.30 | 4.97 | 6 | 2.84 | 4.38 | 6 | 3.95 | 6.08 | 6 | 2.96 | 4.53 |
| 7 | 3.41 | 5.56 | 7 | 3.03 | 4.56 | 7 | 2.64 | 4.07 | 7 | 3.62 | 5.56 | 7 | 2.75 | 4.21 |
| 8 | 3.15 | 5.15 | 8 | 2.82 | 4.24 | 8 | 2.47 | 3.81 | 8 | 3.35 | 5.15 | 8 | 2.58 | 3.95 |
| 9 | 2.95 | 4.81 | 9 | 2.64 | 3.97 | 9 | 2.34 | 3.60 | 9 | 3.13 | 4.81 | 9 | 2.44 | 3.73 |
| 10 | 2.77 | 4.52 | 10 | 2.49 | 3.75 | 10 | 2.22 | 3.43 | 10 | 2.94 | 4.52 | 10 | 2.32 | 3.54 |
| 11 | 2.62 | 4.28 | 11 | 2.36 | 3.56 | 11 | 2.12 | 3.27 | 11 | 2.78 | 4.28 | 11 | 2.21 | 3.39 |
| 12 | 2.49 | 4.07 | 12 | 2.25 | 3.39 | 12 | 2.04 | 3.14 | 12 | 2.65 | 4.07 | 12 | 2.12 | 3.25 |
| 13 | 2.38 | 3.88 | 13 | 2.16 | 3.25 | 13 | 1.96 | 3.02 | 13 | 2.53 | 3.88 | 13 | 2.04 | 3.13 |
| 14 | 2.28 | 3.72 | 14 | 2.07 | 3.12 | 14 | 1.89 | 2.92 | 14 | 2.42 | 3.72 | 14 | 1.97 | 3.02 |
| 15 | 2.19 | 3.58 | 15 | 1.99 | 3.00 | 15 | 1.83 | 2.82 | 15 | 2.32 | 3.58 | 15 | 1.91 | 2.92 |
| 16 | 2.11 | 3.44 | 16 | 1.92 | 2.90 | 16 | 1.77 | 2.73 | 16 | 2.24 | 3.44 | 16 | 1.85 | 2.83 |
| 17 | 2.04 | 3.32 | 17 | 1.86 | 2.80 | 17 | 1.72 | 2.66 | 17 | 2.16 | 3.32 | 17 | 1.80 | 2.75 |
| 18 | 1.97 | 3.22 | 18 | 1.80 | 2.71 | 18 | 1.68 | 2.58 | 18 | 2.09 | 3.22 | 18 | 1.75 | 2.67 |
| 19 | 1.91 | 3.12 | 19 | 1.75 | 2.64 | 19 | 1.63 | 2.52 | 19 | 2.03 | 3.12 | 19 | 1.70 | 2.60 |
| 20 | 1.85 | 3.03 | 20 | 1.70 | 2.56 | 20 | 1.59 | 2.46 | 20 | 1.97 | 3.03 | 20 | 1.66 | 2.54 |
| 22 | 1.75 | 2.86 | 22 | 1.61 | 2.43 | 22 | 1.52 | 2.35 | 22 | 1.86 | 2.86 | 22 | 1.59 | 2.43 |
| 24 | 1.67 | 2.72 | 24 | 1.54 | 2.32 | 24 | 1.46 | 2.25 | 24 | 1.77 | 2.72 | 24 | 1.52 | 2.33 |
| 26 | 1.59 | 2.60 | 26 | 1.47 | 2.22 | 26 | 1.40 | 2.17 | 26 | 1.69 | 2.60 | 26 | 1.46 | 2.24 |
| 28 | 1.52 | 2.49 | 28 | 1.41 | 2.13 | 28 | 1.36 | 2.09 | 28 | 1.62 | 2.49 | 28 | 1.41 | 2.16 |
| 30 | 1.46 | 2.39 | 30 | 1.36 | 2.05 | 30 | 1.31 | 2.02 | 30 | 1.55 | 2.39 | 30 | 1.37 | 2.09 |
| 32 | 1.41 | 2.30 | 32 | 1.31 | 1.98 | 32 | 1.27 | 1.96 | 32 | 1.50 | 2.30 | 32 | 1.33 | 2.03 |
| 34 | 1.36 | 2.22 | 34 | 1.27 | 1.91 | 34 | 1.23 | 1.90 | 34 | 1.45 | 2.22 | 34 | 1.29 | 1.97 |
| 36 | 1.32 | 2.15 | 36 | 1.23 | 1.85 | 36 | 1.20 | 1.85 | 36 | 1.40 | 2.15 | 36 | 1.25 | 1.92 |
| 38 | 1.28 | 2.09 | 38 | 1.20 | 1.80 | 38 | 1.17 | 1.81 | 38 | 1.36 | 2.09 | 38 | 1.22 | 1.87 |
| 40 | 1.24 | 2.02 | 40 | 1.16 | 1.75 | 40 | 1.14 | 1.76 | 40 | 1.32 | 2.02 | 40 | 1.19 | 1.82 |
| 45 | 1.16 | 1.89 | 45 | 1.09 | 1.64 | 45 | 1.08 | 1.66 | 45 | 1.23 | 1.89 | 45 | 1.13 | 1.72 |
| 50 | 1.09 | 1.78 | 50 | 1.03 | 1.55 | 50 | 1.03 | 1.58 | 50 | 1.16 | 1.78 | 50 | 1.07 | 1.64 |
| 55 | 1.03 | 1.68 | 55 | .98 | 1.47 | 55 | .98 | 1.51 | 55 | 1.09 | 1.68 | 55 | 1.02 | 1.56 |
| 60 | .98 | 1.60 | 60 | .93 | 1.40 | 60 | .94 | 1.45 | 60 | 1.04 | 1.60 | 60 | .98 | 1.50 |
| 65 | .94 | 1.53 | 65 | .89 | 1.34 | 65 | .90 | 1.40 | 65 | .99 | 1.53 | 65 | .94 | 1.44 |
| 70 | .90 | 1.46 | 70 | .85 | 1.29 | 70 | .87 | 1.35 | 70 | .95 | 1.46 | 70 | .91 | 1.39 |
| 75 | .86 | 1.41 | 75 | .82 | 1.24 | 75 | .84 | 1.30 | 75 | .91 | 1.41 | 75 | .88 | 1.35 |
| 80 | .83 | 1.35 | 80 | .79 | 1.20 | 80 | .82 | 1.26 | 80 | .88 | 1.35 | 80 | .85 | 1.31 |
| 85 | .80 | 1.31 | 85 | .77 | 1.16 | 85 | .80 | 1.23 | 85 | .85 | 1.31 | 85 | .83 | 1.27 |
| SLOPE = .580 | | | SLOPE = .550 | | | SLOPE = .480 | | | SLOPE = .580 | | | SLOPE = .480 | | |

**RCFC & WCD**

HYDROLOGY MANUAL

STANDARD INTENSITY–DURATION CURVES DATA

PLATE D-4.1 (2 of 6)

C Value Calculations (Area Weighted)

| Basin | Impervious Area | Impervious C Value | Pervious Area | Pervious C Values | Runoff Factor |
|---|---|---|---|---|---|
| P-1 | 0.57 | 0.9 | 0 | 0 | 0.90 |
| P-2 | 1.24 | 0.9 | 0 | 0 | 0.90 |
| P-3 | 1.3 | 0.9 | 0.13 | 0 | 0.82 |
| P-4 | 0.79 | 0.9 | 0 | 0 | 0.90 |
| P-5 | 0.78 | 0.9 | 0 | 0 | 0.90 |
| P-6 | 1.06 | 0.9 | 0 | 0 | 0.90 |
| P-7 | 1.22 | 0.9 | 0 | 0 | 0.90 |
| P-8 | 0.43 | 0.9 | 0.21 | 0 | 0.60 |
| P-9 | 0.19 | 0.9 | 0.17 | 0 | 0.48 |
| P-10 | 0.14 | 0.9 | 0.01 | 0 | 0.84 |
| Total | 7.72 | 0.9 | 0.52 | 0 | 0.84 |

C Values from RCHM Plate E6.3 (C=0.9 for commercial, C=0 for natural)

# BASIN 1 STAGE STORAGE

Basin 1
Project:
Basin Description:

| Contour Elevation | Contour Area (sq. ft) | Depth (ft) | Incremental Volume Avg. End (cu. ft) | Cumulative Volume Avg. End (cu. ft) |
|---|---|---|---|---|
| 2,673.000 | 60.70 | N/A | N/A | 0.00 |
| 2,674.000 | 2,110.64 | 1.000 | 1085.67 | 1085.67 |
| 2,675.000 | 2,819.52 | 1.000 | 2465.08 | 3550.75 |
| 2,676.000 | 3,431.84 | 1.000 | 3125.68 | 6676.43 |
| 2,677.000 | 4,133.05 | 1.000 | 3782.44 | 10458.87 |
| 2,678.000 | 4,828.40 | 1.000 | 4480.72 | 14939.59 |

# BASIN 2 STAGE STORAGE

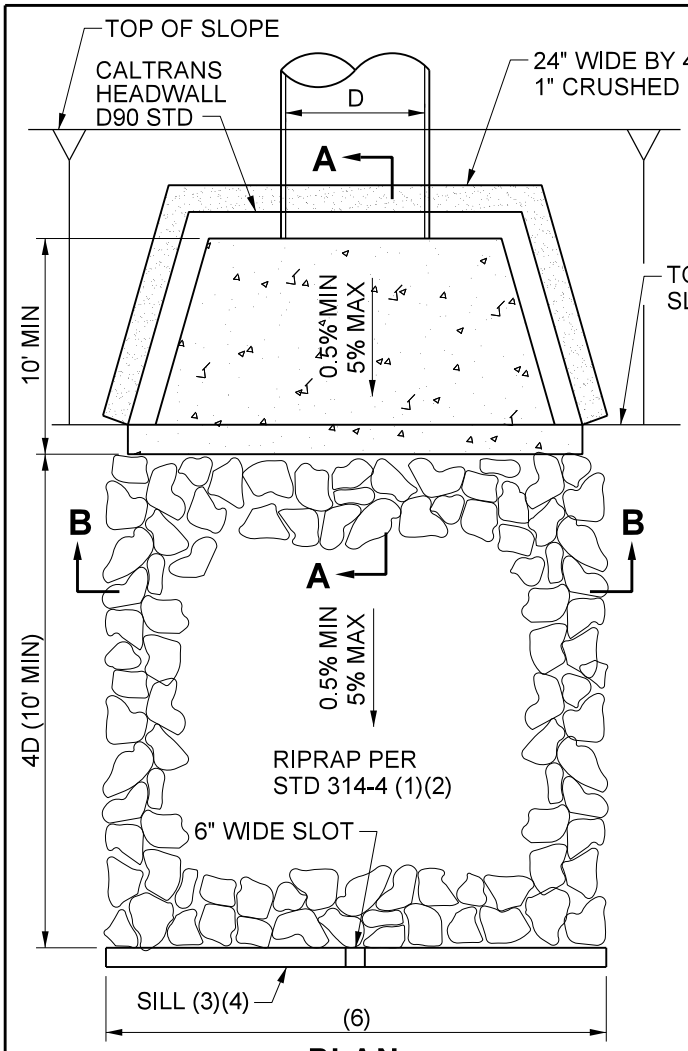
Basin 2
Project:
Basin Description:

| Contour Elevation | Contour Area (sq. ft) | Depth (ft) | Incremental Volume Avg. End (cu. ft) | Cumulative Volume Avg. End (cu. ft) |
|---|---|---|---|---|
| 2,662.000 | 773.99 | N/A | N/A | 0.00 |
| 2,663.000 | 2,653.72 | 1.000 | 1713.86 | 1713.86 |
| 2,664.000 | 3,795.29 | 1.000 | 3224.51 | 4938.36 |
| 2,665.000 | 4,860.57 | 1.000 | 4327.93 | 9266.30 |
| 2,666.000 | 6,035.67 | 1.000 | 5448.12 | 14714.41 |
| 2,666.200 | 6,185.09 | 0.200 | 1222.08 | 15936.49 |

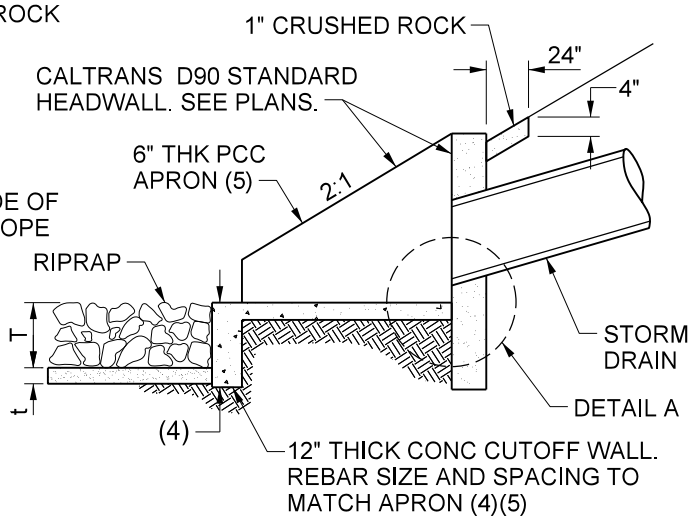
BASIN 3 STAGE STORAGE

Basin 3
Project:
Basin Description:

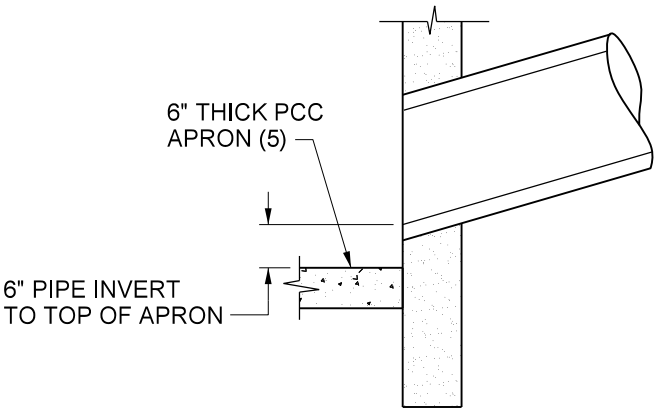
| Contour Elevation | Contour Area (sq. ft) | Depth (ft) | Incremental Volume Avg. End (cu. ft) | Cumulative Volume Avg. End (cu. ft) |
|---|---|---|---|---|
| 2,659.000 | 185.40 | N/A | N/A | 0.00 |
| 2,660.000 | 715.42 | 1.000 | 450.41 | 450.41 |
| 2,661.000 | 1,232.14 | 1.000 | 973.78 | 1424.19 |
| 2,662.000 | 1,786.02 | 1.000 | 1509.08 | 2933.27 |



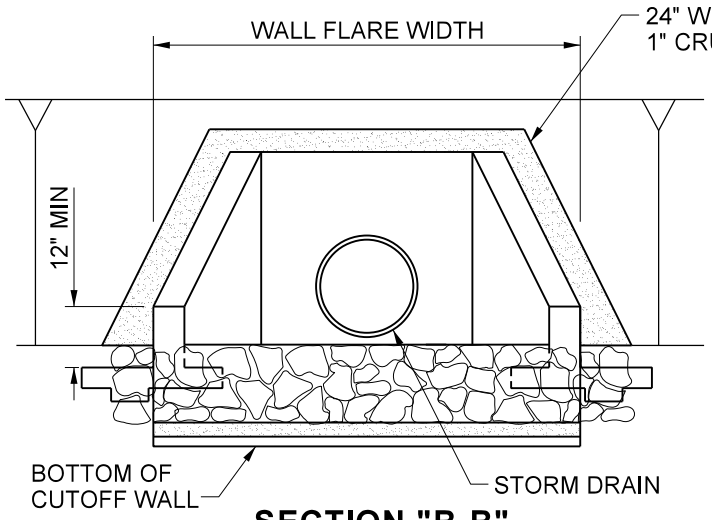

**PLAN**




**SECTION "A-A"**




**DETAIL A**




**SECTION "B-B"**

NOT TO SCALE

**NOTES:**

1. PLANS SHALL SPECIFY FOR THIS STANDARD:
   (A) RIPRAP CLASS AND THICKNESS (T)
   (B) FILTER BLANKET MATERIAL AND THICKNESS (t).
2. ADDITIONAL RIPRAP MAY BE NECESSARY FOR STEEP APPLICATIONS (> 5%).
3. ADD 12" THICK CONCRETE SILL WHEN D>36", OR WHEN REQUIRED BY THE ENGINEER - SEE STD 314-4.
4. CUTOFF WALL AND SILL DEPTH TO BE 4" OR RIPRAP THICKNESS (T) PLUS FILTER THICKNESS (t) WHICHEVER IS GREATER.
5. 10' LONG (MIN) BY 6" THICK CONCRETE APRON WITH #4 BARS AT 18" OC.
6. RIPRAP PAD WIDTH TO BE THE GREATER OF THE WALL FLARE WIDTH OR 10'.

PREPARED UNDER THE SUPERVISION OF:

Mark Lancaster 11/30/22

DIRECTOR OF TRANSPORTATION MARK LANCASTER, P.E. DATE

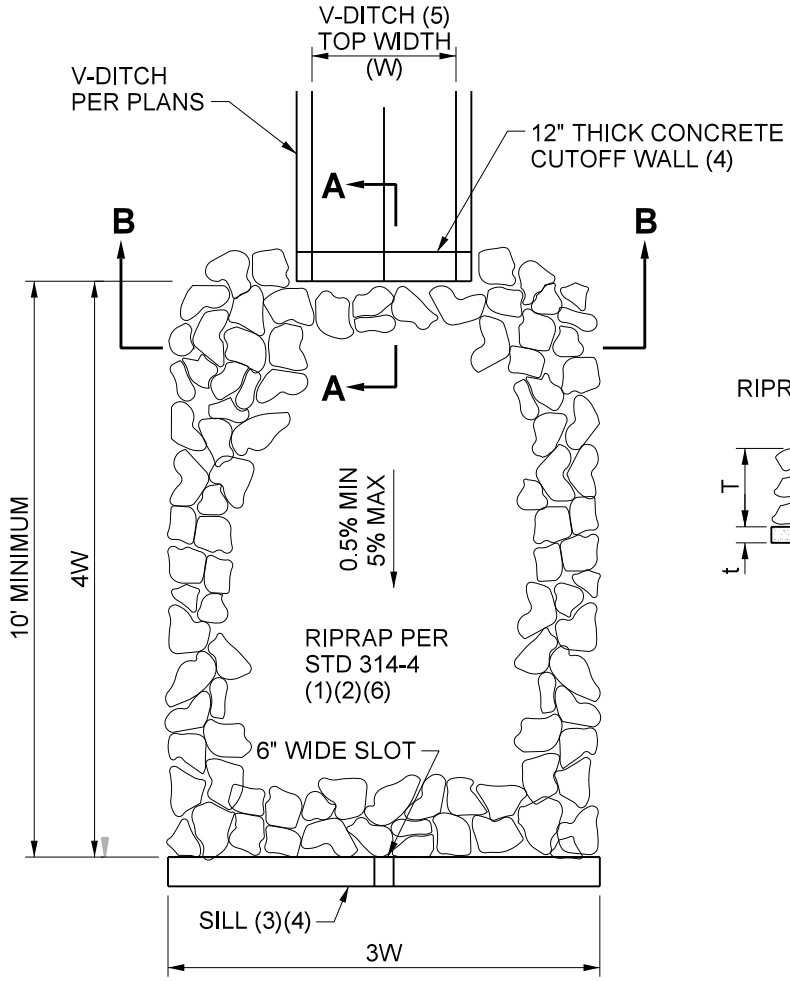
| REVISION DESCRIPTION | MARK | DATE | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

REGISTERED PROFESSIONAL ENGINEER
MARK ALAN LANCASTER
C48048
CIVIL
STATE OF CALIFORNIA

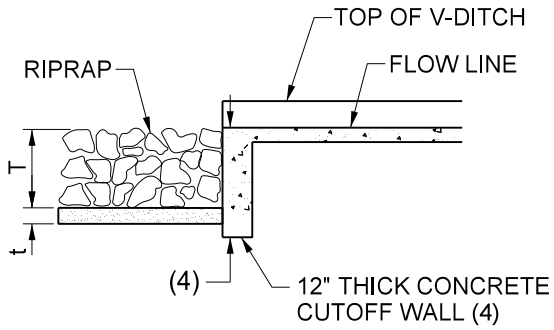
COUNTY OF RIVERSIDE

# RIPRAP ENERGY DISSIPATOR AND APRON AT WINGWALL STORM DRAIN OUTFALL

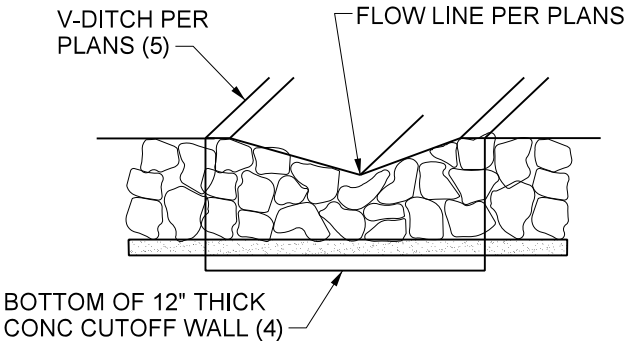
**STANDARD No. 314 (1 OF 4)**




**PLAN**




**SECTION "A-A"**




**SECTION "B-B"**

**NOTES:**

1. PLANS SHALL SPECIFY FOR THIS STANDARD:
   (A) RIPRAP CLASS AND THICKNESS (T)
   (B) FILTER BLANKET MATERIAL AND THICKNESS (t).
2. ADDITIONAL RIPRAP MAY BE NECESSARY FOR STEEP APPLICATIONS (> 5%).
3. ADD 12" THICK CONCRETE SILL WHEN W>36", OR WHEN REQUIRED BY THE ENGINEER - SEE STD 314-4.
4. CUTOFF WALL AND SILL DEPTH TO BE 4' OR RIPRAP THICKNESS (T) PLUS FILTER THICKNESS (t) WHICHEVER IS GREATER.
5. DETAIL MAY BE UTILIZED FOR CIRCULAR CONCRETE DITCH ALSO.
6. FOR 3' WIDE DITCH AT SLOPE OF <5% AND A FLOW RATE < 3.0 CFS, ENERGY DISSIPATOR MAY BE 6' BY 6' No. 2 BACKING PER STD 314-4.

NOT TO SCALE

PREPARED UNDER THE SUPERVISION OF:

Mark Lancaster 11/30/22

DIRECTOR OF TRANSPORTATION DATE
MARK LANCASTER, P.E.

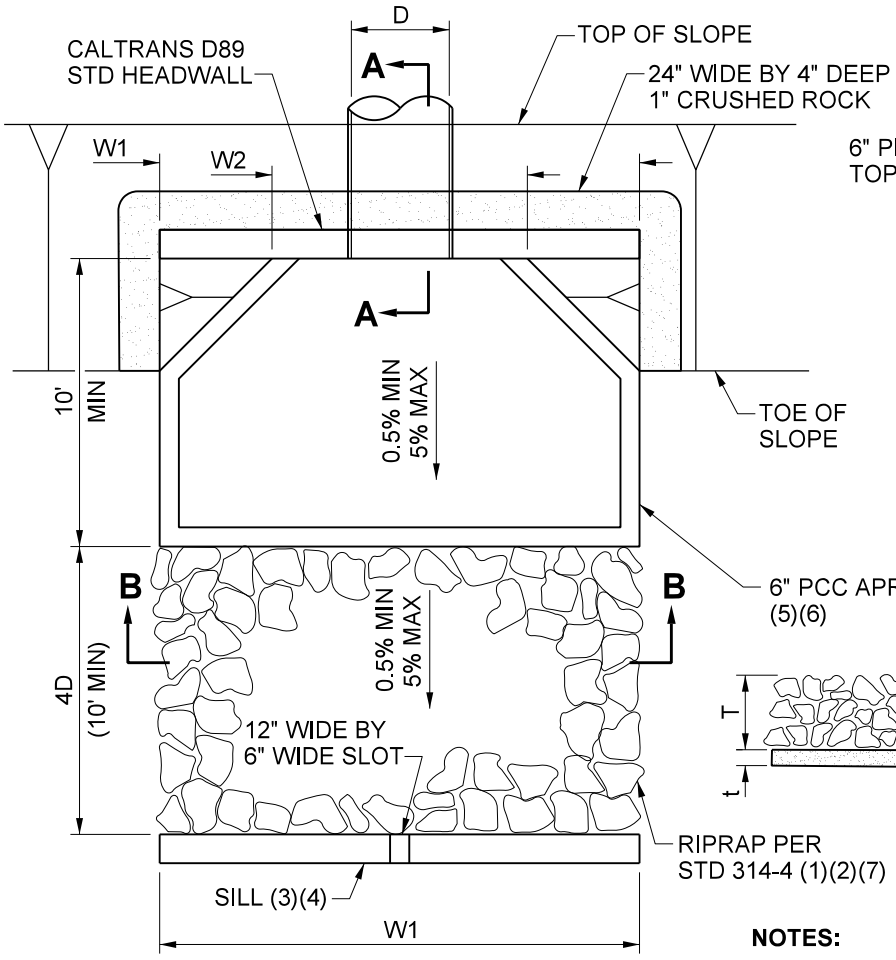
| REVISION DESCRIPTION | MARK | DATE | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

REGISTERED PROFESSIONAL ENGINEER
MARK ALAN LANCASTER
C48048
CIVIL
STATE OF CALIFORNIA

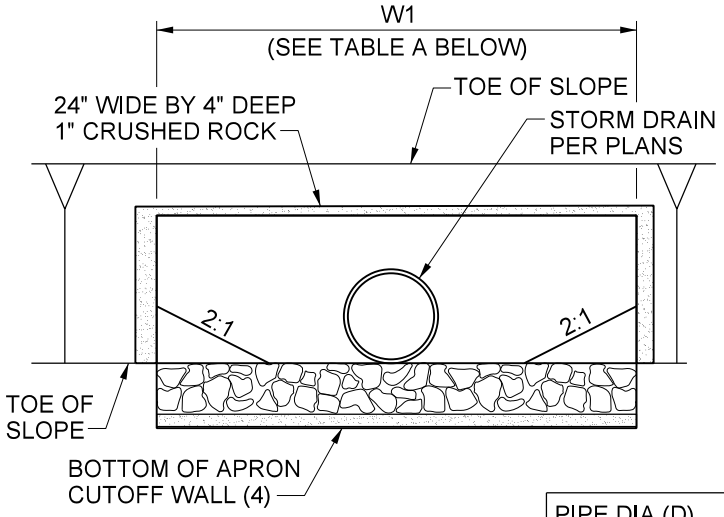
COUNTY OF RIVERSIDE

# RIPRAP ENERGY DISSIPATOR AT V-DICTH OUTFALL

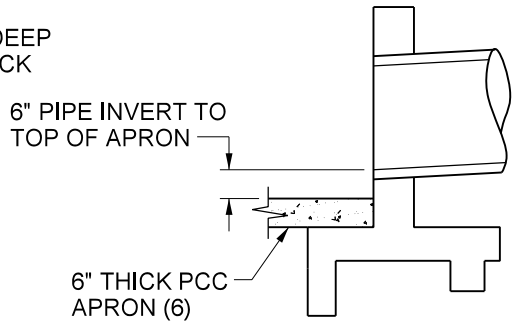
**STANDARD No. 314 (2 OF 4)**



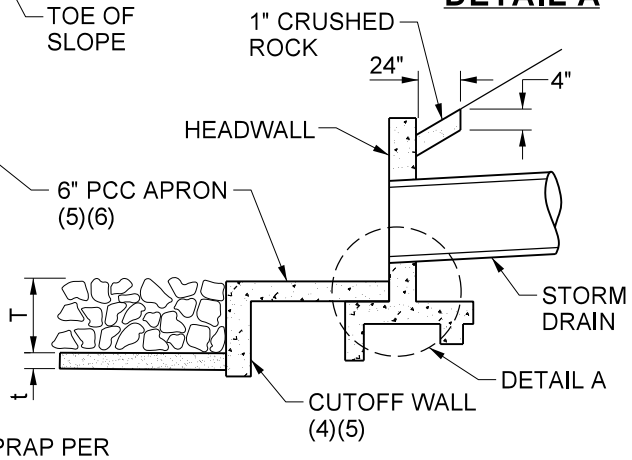

## PLAN




## SECTION "B-B"




## DETAIL A




## SECTION "A-A"

**NOTES:**

1. PLANS SHALL SPECIFY FOR THIS STANDARD:
   (A) RIPRAP CLASS AND THICKNESS (T)
   (B) FILTER BLANKET MATERIAL AND THICKNESS (t).
2. ADDITIONAL RIPRAP MAY BE NECESSARY FOR STEEP APPLICATIONS (> 5%).
3. ADD 12" THICK CONCRETE SILL WHEN D>36", OR WHEN REQUIRED BY THE ENGINEER - SEE STD 314-4.
4. CUTOFF WALL AND SILL DEPTH TO BE 4' OR RIPRAP THICKNESS (T) PLUS FILTER THICKNESS (t) WHICHEVER IS GREATER.
5. CUTOFF WALL TO BE ON BOTH SIDES AND END OF PCC APRON ADJACENT TO RIPRAP.
6. 10' LONG BY 6" THICK CONCRETE APRON WITH #4 BARS AT 18" OC. APRON WIDTH TO MATCH HEADWALL WIDTH (W1).
7. RIPRAP WIDTH TO EQUAL HEADWALL WIDTH (W1).

## TABLE A

| PIPE DIA (D) | 18" | 21" | 24" | 27" | 30" | 36" | 42" | 48" | 54" |
|---|---|---|---|---|---|---|---|---|---|
| WALL WIDTH (W1) | 12.7' | 13.7' | 14.7' | 15.7' | 16.7' | 18.7' | 20.7' | 22.7' | 25.2' |
| APRON WIDTH (W2) | 4.0' | 4.0' | 4.0' | 4.0' | 4.0' | 4.0' | 4.0' | 4.0' | 4.5' |

NOT TO SCALE

PREPARED UNDER THE SUPERVISION OF:

Mark Lancaster 11/30/22

DIRECTOR OF TRANSPORTATION DATE
MARK LANCASTER, P.E.

| REVISION DESCRIPTION | MARK | DATE | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

REGISTERED PROFESSIONAL ENGINEER
MARK ALAN LANCASTER
C48048
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

# RIPRAP ENERGY DISSIPATOR AND APRON AT STRAIGHT HEADWALL OUTFALL

**STANDARD No. 314 (3 OF 4)**

## RIPRAP ENERGY DISSIPATER SIZING TABLE

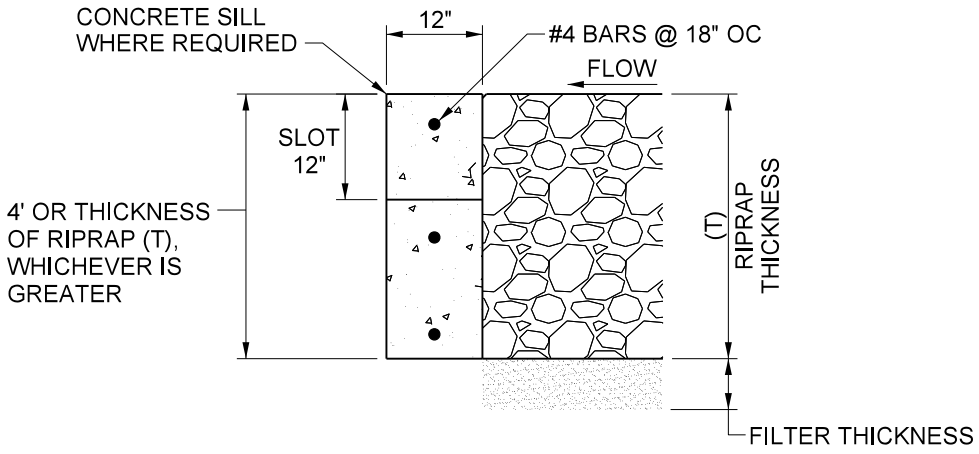
| DESIGN VELOCITY (FT/SEC) | RIPRAP CLASS | RIPRAP THICKNESS (T) PLACEMENT METHOD A * | RIPRAP THICKNESS (T) PLACEMENT METHOD B * | FILTER MATERIAL ** | FILTER THICKNESS (t) |
|---|---|---|---|---|---|
| 6-8 | NO. 2 BACKING | N/A | 1.25' | 1" CRUSHED ROCK | 0.5' |
| 8-13 | 1/4 TON | N/A | 3.3' | 1" CRUSHED ROCK | 0.75' |
| 13-15 | 1/2 TON | 3.4' | 4.3' | 1" CRUSHED ROCK | 1.0' |
| 15-17 | 1 TON | 4.3' | 5.4' | 1" CRUSHED ROCK | 1.0' |
| 17-20 | 2 TON | 5.4' | N/A | 1" CRUSHED ROCK | 1.0' |

* FOR RIPRAP GRADATION AND PLACEMENT METHOD DESCIPTIONS SEE CALTRANS STD SPECIFICATIONS SECTION 72-2

** SEE 1" CRUSHED ROCK GRADATION THIS SHEET

## 1" CRUSHED ROCK GRADATION

| SIEVE SIZE | PERCENT (%) PASSING |
|---|---|
| 1-1/2" (37.5 mm) | 100 |
| 1" (25.0 mm) | 90-100 |
| 3/4" (19.0 mm) | 30-60 |
| 1/2" (12.5 mm) | 0-20 |
| 3/8" (9.5 mm) | - |
| No. 4 (4.75 mm) | 0-5 |
| No. 8 (2.36 mm) | - |
| ASTM C131 Testing Grading | A |




NOT TO SCALE

PREPARED UNDER THE SUPERVISION OF:

Mark Lancaster 11/30/22

DIRECTOR OF TRANSPORTATION MARK LANCASTER, P.E. DATE

| REVISION DESCRIPTION | MARK | DATE | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

REGISTERED PROFESSIONAL ENGINEER · MARK ALAN LANCASTER · C48048 · CIVIL · STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

# RIPRAP ENERGY DISSIPATOR SIZING AND CONCRETE SILL

**STANDARD No. 314 (4 OF 4)**

# Channel Report

12" STORM @2% CAPACITY

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jan 26 2023

## <Name>

**Circular**

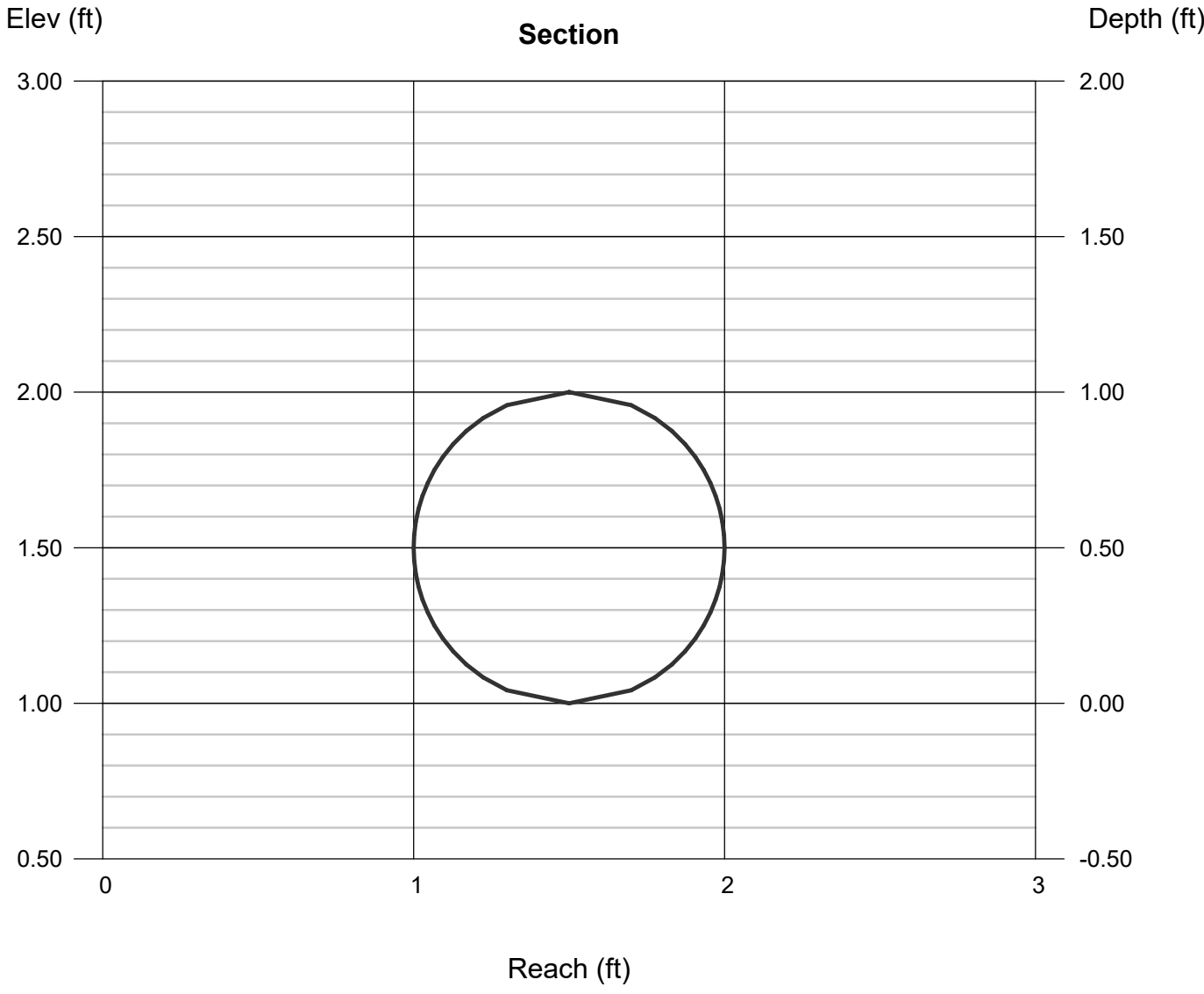
| | |
|---|---|
| Diameter (ft) | = 1.00 |
| Invert Elev (ft) | = 1.00 |
| Slope (%) | = 2.00 |
| N-Value | = 0.013 |

**Calculations**

| | |
|---|---|
| Compute by: | Known Depth |
| Known Depth (ft) | = 1.00 |

**Highlighted**

| | |
|---|---|
| Depth (ft) | = 1.00 |
| Q (cfs) | = 5.036 |
| Area (sqft) | = 0.79 |
| Velocity (ft/s) | = 6.41 |
| Wetted Perim (ft) | = 3.14 |
| Crit Depth, Yc (ft) | = 0.92 |
| Top Width (ft) | = 0.00 |
| EGL (ft) | = 1.64 |



# Channel Report

15 IN STORM CAPACITY @ 2%

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Oct 16 2023

## <Name>

**Circular**

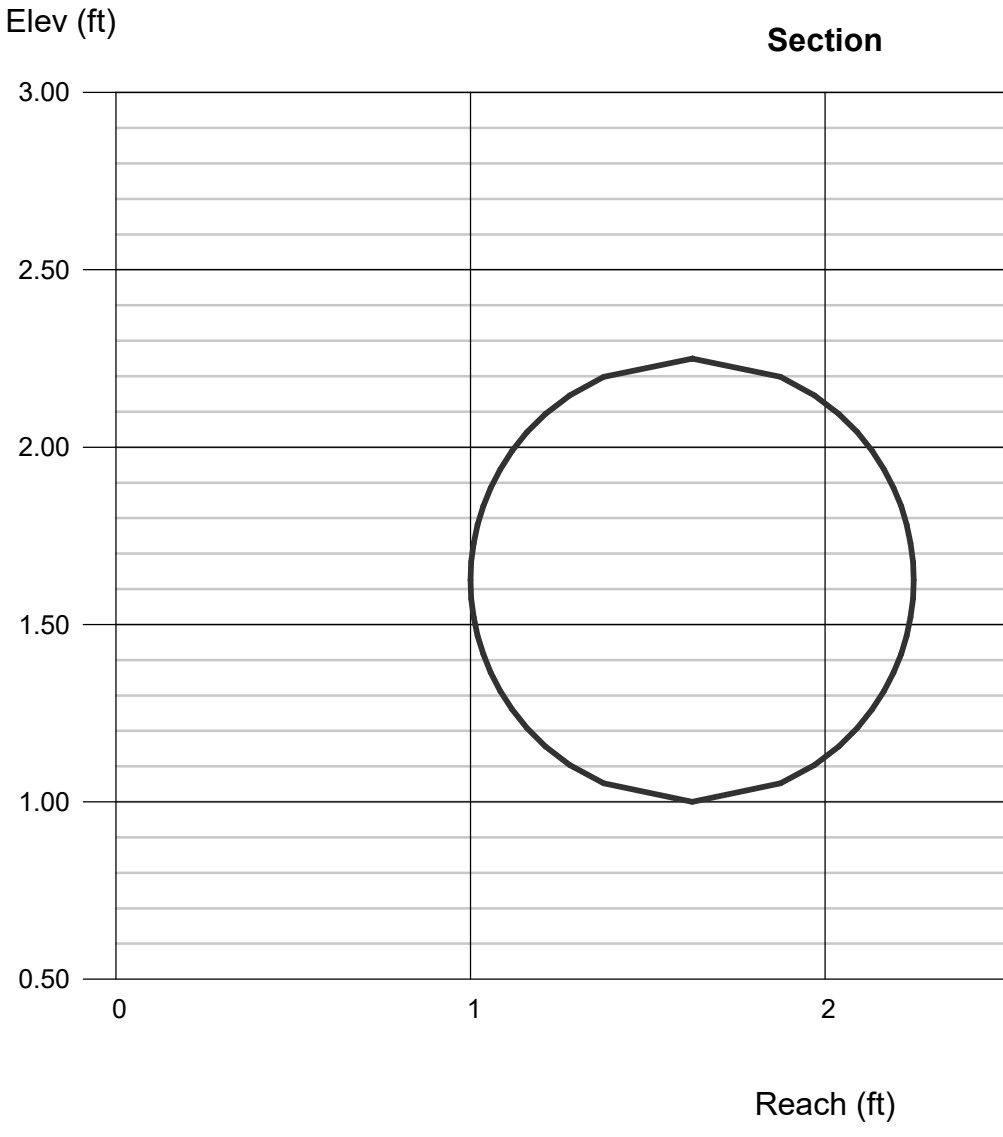
| | |
|---|---|
| Diameter (ft) | = 1.25 |
| Invert Elev (ft) | = 1.00 |
| Slope (%) | = 2.00 |
| N-Value | = 0.013 |

**Calculations**

| | |
|---|---|
| Compute by: | Known Depth |
| Known Depth (ft) | = 1.25 |

**Highlighted**

| | |
|---|---|
| Depth (ft) | = 1.25 |
| Q (cfs) | = 9.132 |
| Area (sqft) | = 1.23 |
| Velocity (ft/s) | = 7.44 |
| Wetted Perim (ft) | = 3.93 |
| Crit Depth, Yc (ft) | = 1.16 |
| Top Width (ft) | = 0.00 |
| EGL (ft) | = 2.11 |



# Channel Report

18" STORM @2% CAPACITY

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Feb 9 2023

## <Name>

**Circular**

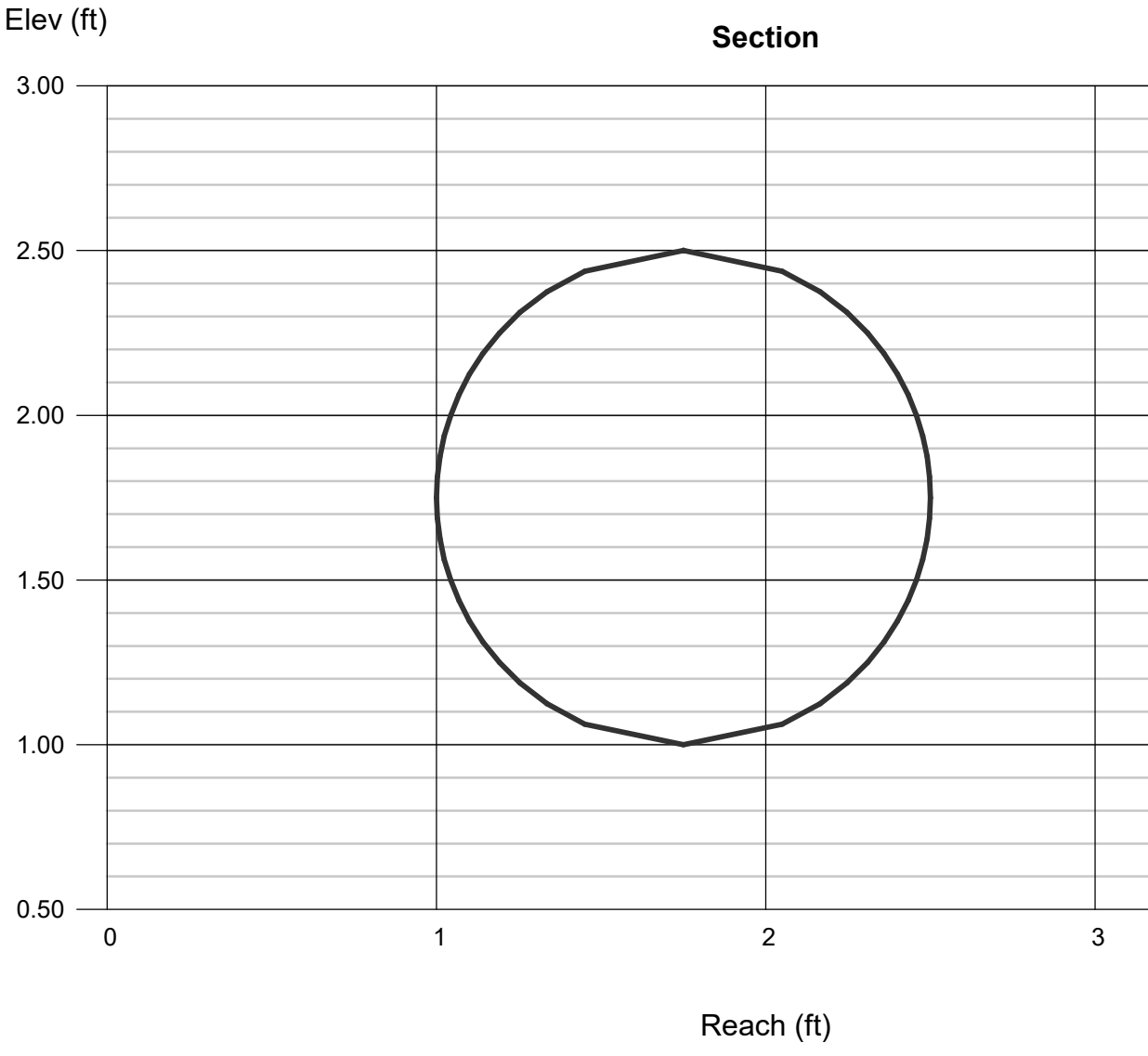
| | |
|---|---|
| Diameter (ft) | = 1.50 |
| Invert Elev (ft) | = 1.00 |
| Slope (%) | = 2.00 |
| N-Value | = 0.013 |

**Calculations**

| | |
|---|---|
| Compute by: | Known Depth |
| Known Depth (ft) | = 1.50 |

**Highlighted**

| | |
|---|---|
| Depth (ft) | = 1.50 |
| Q (cfs) | = 14.85 |
| Area (sqft) | = 1.77 |
| Velocity (ft/s) | = 8.40 |
| Wetted Perim (ft) | = 4.71 |
| Crit Depth, Yc (ft) | = 1.41 |
| Top Width (ft) | = 0.00 |
| EGL (ft) | = 2.60 |



# Channel Report

18" STORM @5% CAPACITY

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Feb 9 2023

## <Name>

**Circular**

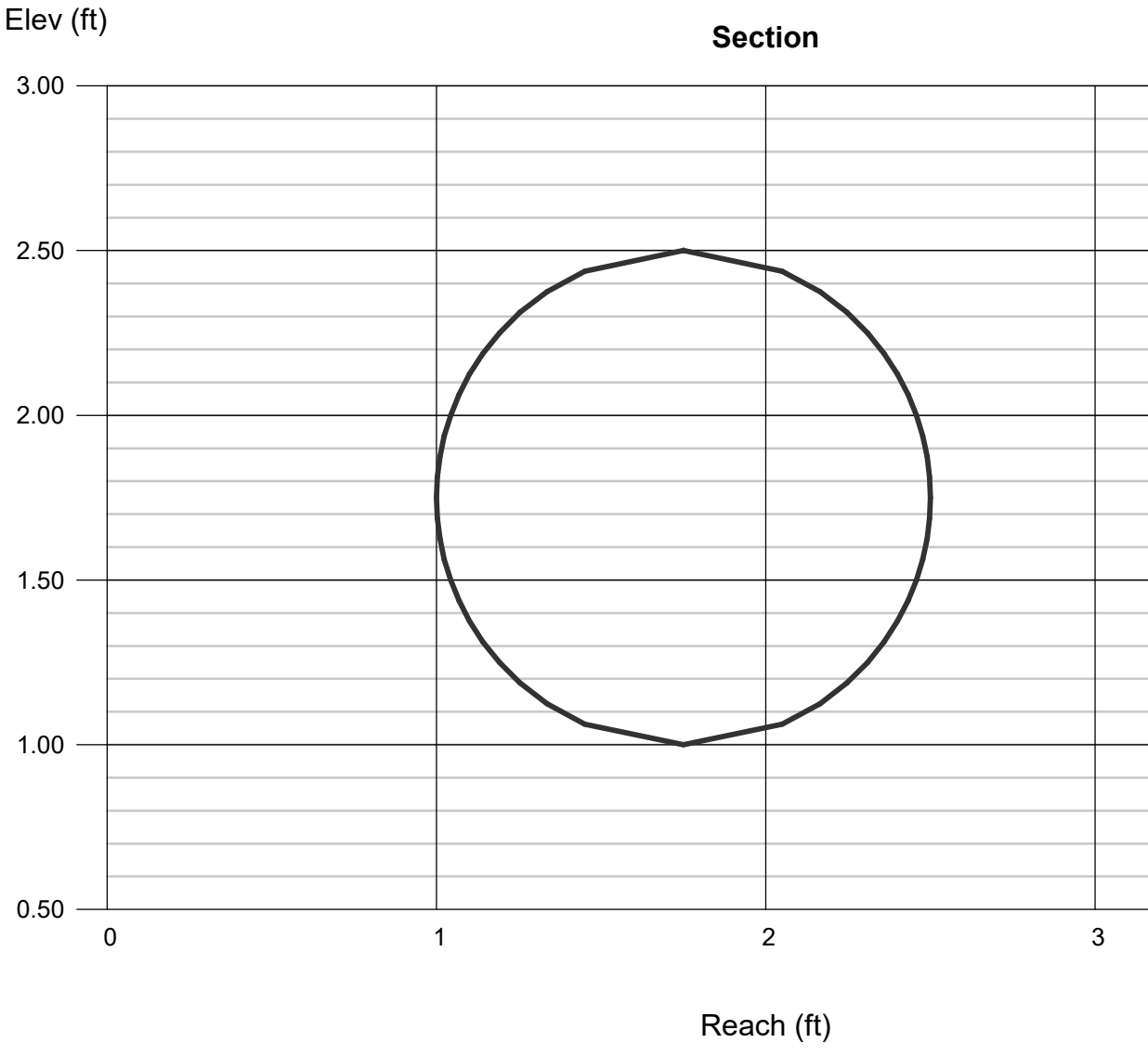
| | |
|---|---|
| Diameter (ft) | = 1.50 |
| Invert Elev (ft) | = 1.00 |
| Slope (%) | = 5.00 |
| N-Value | = 0.013 |

**Calculations**

| | |
|---|---|
| Compute by: | Known Depth |
| Known Depth (ft) | = 1.50 |

**Highlighted**

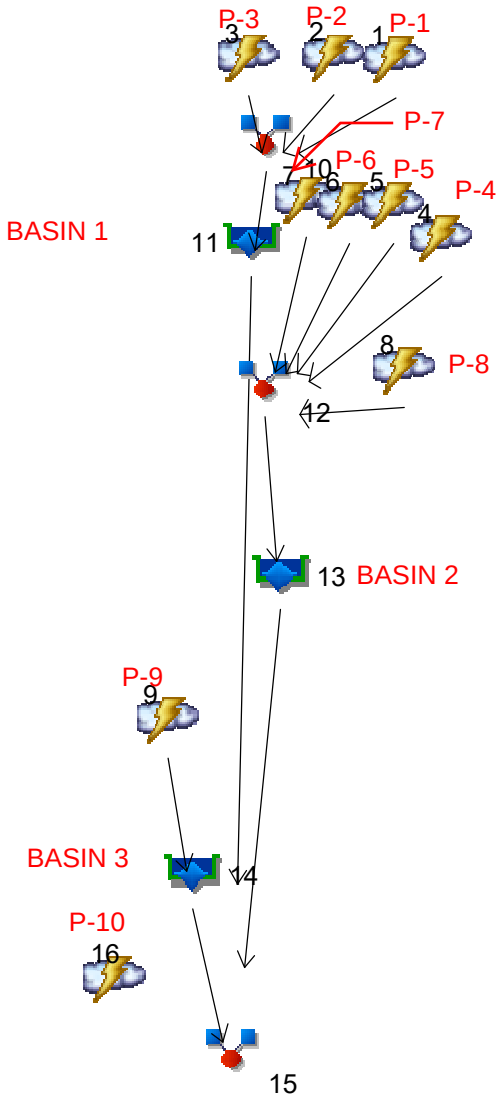
| | |
|---|---|
| Depth (ft) | = 1.50 |
| Q (cfs) | = 23.48 |
| Area (sqft) | = 1.77 |
| Velocity (ft/s) | = 13.29 |
| Wetted Perim (ft) | = 4.71 |
| Crit Depth, Yc (ft) | = 1.49 |
| Top Width (ft) | = 0.00 |
| EGL (ft) | = 4.24 |



# Watershed Model Schematic



PROPOSED CONDITIONS HYDRAFLOW MODEL




## Legend

| Hyd. | Origin | Description |
|---|---|---|
| 1 | Rational | P-1 |
| 2 | Rational | P-2 |
| 3 | Rational | P-3 |
| 4 | Rational | P-4 |
| 5 | Rational | P-5 |
| 6 | Rational | P-6 |
| 7 | Rational | P-7 |
| 8 | Rational | P-8 |
| 9 | Rational | P-9 |
| 10 | Combine | <no description> |
| 11 | Reservoir | Pond 1 |
| 12 | Combine | <no description> |
| 13 | Reservoir | Pond 2 |
| 14 | Reservoir | Pond 3 |
| 15 | Combine | Point of Compliance |
| 16 | Rational | P-10 |

# Hydraflow Table of Contents

# Hydrograph Return Period Recap



| Hyd. No. | Hydrograph type (origin) | Inflow hyd(s) | Peak Outflow (cfs) | | | | | | | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | |
| 1 | Rational | ------ | ------- | 0.560 | ------- | ------- | 1.678 | ------- | ------- | 2.536 | P-1 |
| 2 | Rational | ------ | ------- | 1.219 | ------- | ------- | 3.649 | ------- | ------- | 5.518 | P-2 |
| 3 | Rational | ------ | ------- | 1.104 | ------- | ------- | 3.281 | ------- | ------- | 4.958 | P-3 |
| 4 | Rational | ------ | ------- | 0.777 | ------- | ------- | 2.325 | ------- | ------- | 3.515 | P-4 |
| 5 | Rational | ------ | ------- | 0.709 | ------- | ------- | 2.112 | ------- | ------- | 3.192 | P-5 |
| 6 | Rational | ------ | ------- | 0.963 | ------- | ------- | 2.870 | ------- | ------- | 4.338 | P-6 |
| 7 | Rational | ------ | ------- | 1.108 | ------- | ------- | 3.303 | ------- | ------- | 4.993 | P-7 |
| 8 | Rational | ------ | ------- | 0.278 | ------- | ------- | 0.825 | ------- | ------- | 1.246 | P-8 |
| 9 | Rational | ------ | ------- | 0.137 | ------- | ------- | 0.407 | ------- | ------- | 0.614 | P-9 |
| 10 | Combine | 1, 2, 3, | ------- | 2.607 | ------- | ------- | 7.788 | ------- | ------- | 11.77 | <no description> |
| 11 | Reservoir | 10 | ------- | 0.000 | ------- | ------- | 0.000 | ------- | ------- | 0.000 | Pond 1 |
| 12 | Combine | 4, 5, 6, 7, 8, | ------- | 3.576 | ------- | ------- | 10.67 | ------- | ------- | 16.12 | <no description> |
| 13 | Reservoir | 12 | ------- | 0.000 | ------- | ------- | 0.000 | ------- | ------- | 0.000 | Pond 2 |
| 14 | Reservoir | 9 | ------- | 0.000 | ------- | ------- | 0.000 | ------- | ------- | 0.000 | Pond 3 |
| 15 | Combine | 11, 13, 14 | ------- | 0.000 | ------- | ------- | 0.000 | ------- | ------- | 0.000 | Point of Compliance |
| 16 | Rational | ------ | ------- | 0.138 | ------- | ------- | 0.412 | ------- | ------- | 0.623 | P-10 |

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Rational | 0.560 | 1 | 6 | 202 | ------ | ------ | ------ | P-1 |
| 2 | Rational | 1.219 | 1 | 6 | 439 | ------ | ------ | ------ | P-2 |
| 3 | Rational | 1.104 | 1 | 8 | 530 | ------ | ------ | ------ | P-3 |
| 4 | Rational | 0.777 | 1 | 6 | 280 | ------ | ------ | ------ | P-4 |
| 5 | Rational | 0.709 | 1 | 7 | 298 | ------ | ------ | ------ | P-5 |
| 6 | Rational | 0.963 | 1 | 7 | 404 | ------ | ------ | ------ | P-6 |
| 7 | Rational | 1.108 | 1 | 7 | 465 | ------ | ------ | ------ | P-7 |
| 8 | Rational | 0.278 | 1 | 13 | 217 | ------ | ------ | ------ | P-8 |
| 9 | Rational | 0.137 | 1 | 11 | 90 | ------ | ------ | ------ | P-9 |
| 10 | Combine | 2.607 | 1 | 6 | 1,170 | 1, 2, 3, | ------ | ------ | <no description> |
| 11 | Reservoir | 0.000 | 1 | 65 | 0 | 10 | 2673.90 | 979 | Pond 1 |
| 12 | Combine | 3.576 | 1 | 7 | 1,664 | 4, 5, 6, 7, 8, | ------ | ------ | <no description> |
| 13 | Reservoir | 0.000 | 1 | 20 | 0 | 12 | 2662.81 | 1,381 | Pond 2 |
| 14 | Reservoir | 0.000 | 1 | 18 | 0 | 9 | 2659.18 | 79.4 | Pond 3 |
| 15 | Combine | 0.000 | 1 | 20 | 0 | 11, 13, 14 | ------ | ------ | Point of Compliance |
| 16 | Rational | 0.138 | 1 | 6 | 50 | ------ | ------ | ------ | P-10 |

# Hydrograph Report



## Hyd. No. 1

P-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.560 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 202 cuft |
| Drainage area | = | 0.570 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 1.092 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |

# FAA Formula Tc Worksheet

Tc = 1.8(1.1 - C) x Flow length^0.5 / Watercourse slope^0.333 Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

## Hyd. No. 1

P-1

**Description**

| | |
|---|---|
| Flow length (ft) | = 439.00 |
| Watercourse slope (%) | = 2.20 |
| Runoff coefficient (C) | = 0.90 |
| **Time of Conc. (min)** | **= 6** |

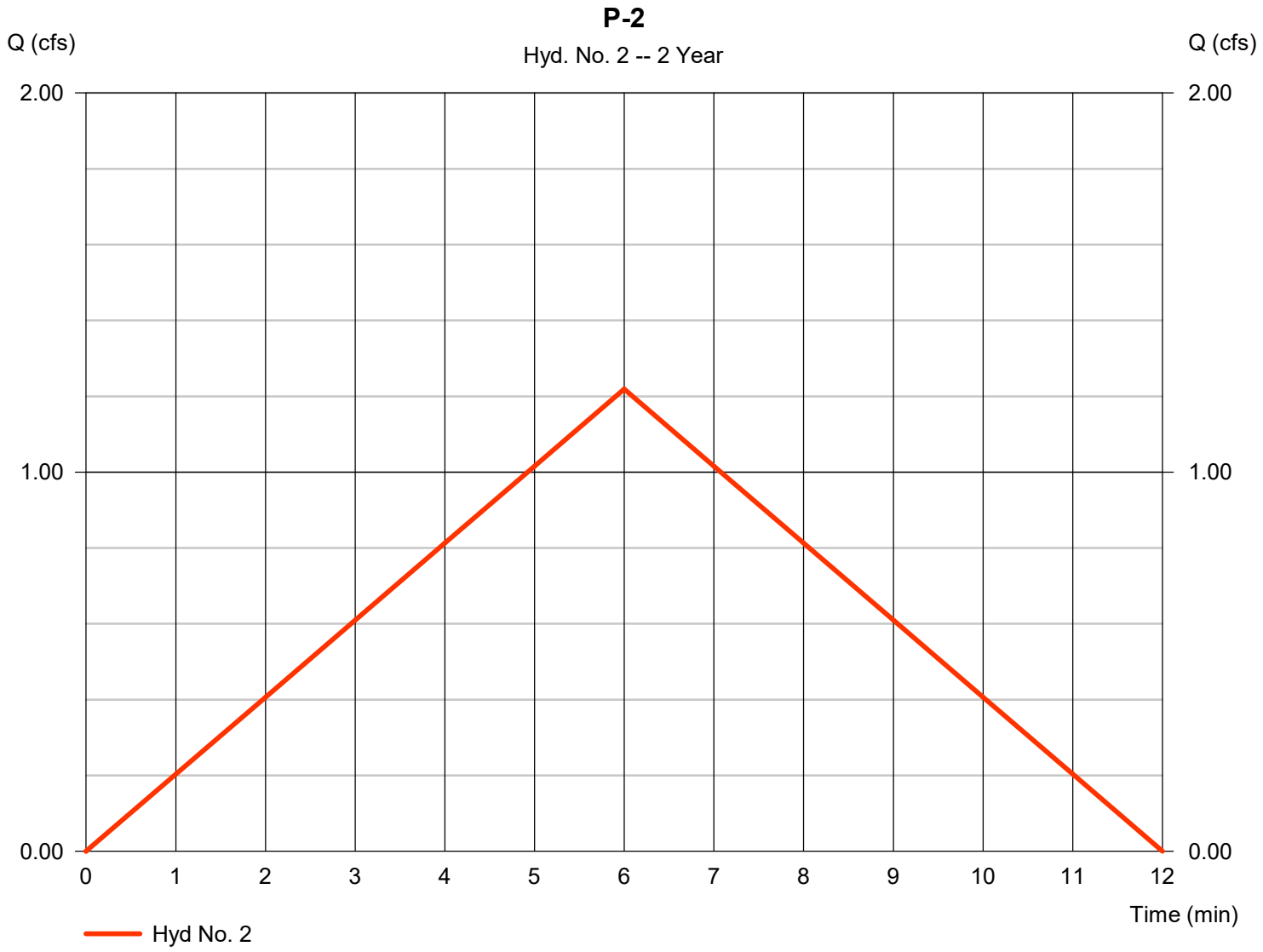
# Hydrograph Report



## Hyd. No. 2

P-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 1.219 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 439 cuft |
| Drainage area | = | 1.240 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 1.092 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet

Tc = 1.8(1.1 - C) x Flow length^0.5 / Watercourse slope^0.333 Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

## Hyd. No. 2

P-2

**Description**

| | |
|---|---|
| Flow length (ft) | = 486.00 |
| Watercourse slope (%) | = 2.20 |
| Runoff coefficient (C) | = 0.90 |
| **Time of Conc. (min)** | **= 6** |

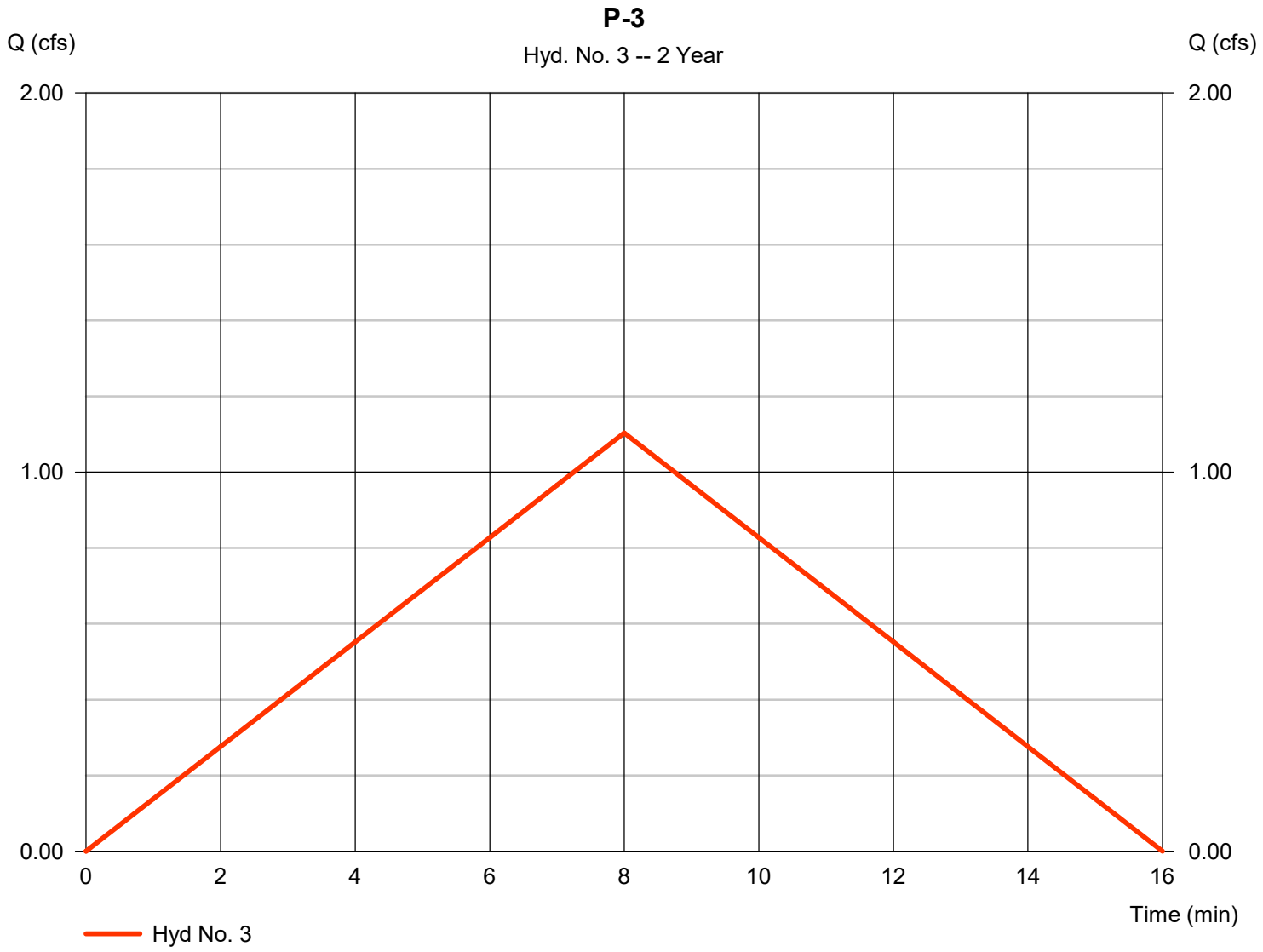
# Hydrograph Report



## Hyd. No. 3

P-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 1.104 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 8 min |
| Time interval | = | 1 min | Hyd. volume | = | 530 cuft |
| Drainage area | = | 1.430 ac | Runoff coeff. | = | 0.82 |
| Intensity | = | 0.941 in/hr | Tc by FAA | = | 8.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 3

P-3

**Description**

| | |
|---|---|
| Flow length (ft) | = 472.00 |
| Watercourse slope (%) | = 2.20 |
| Runoff coefficient (C) | = 0.82 |
| **Time of Conc. (min)** | **= 8** |

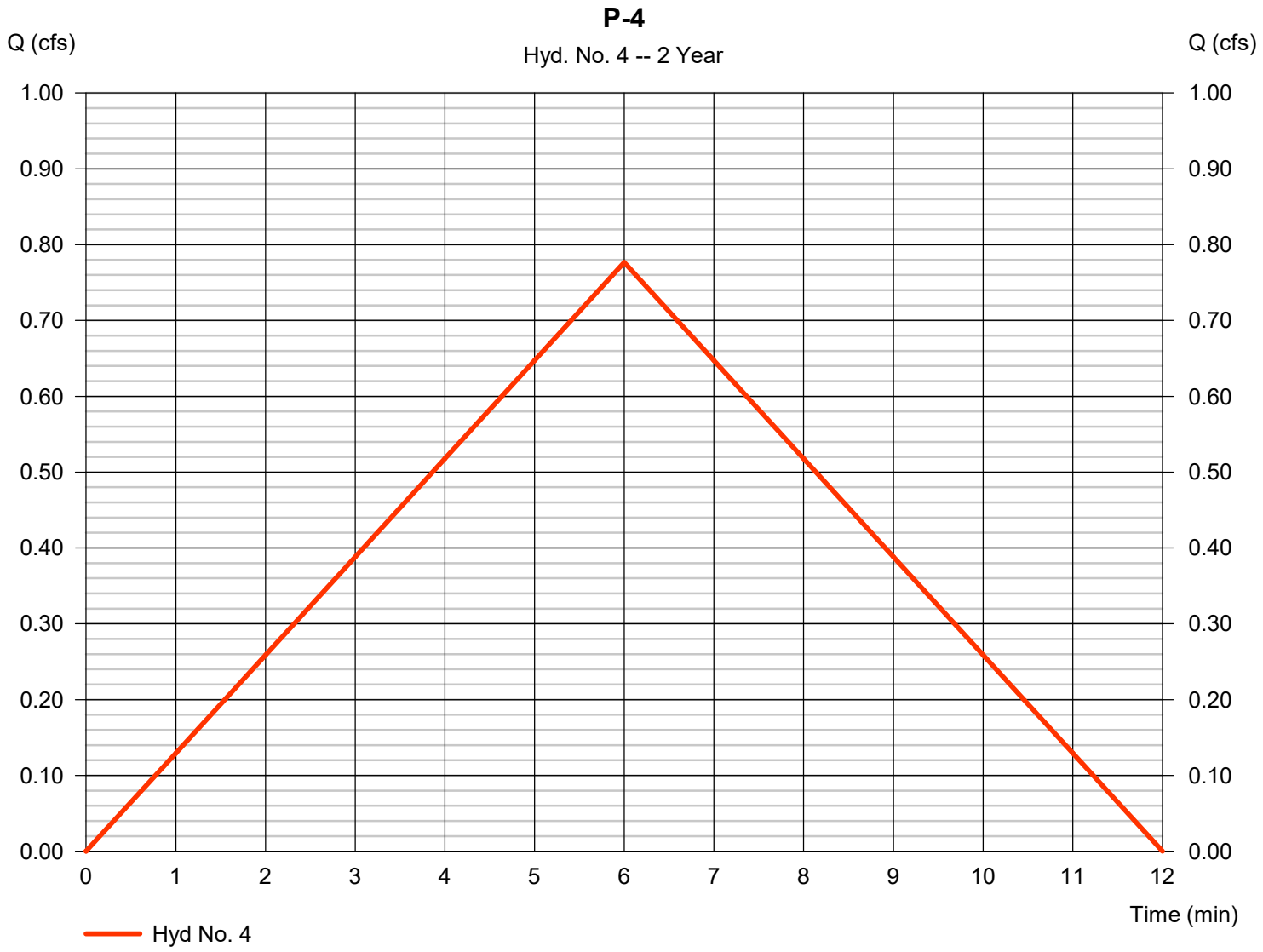
# Hydrograph Report



## Hyd. No. 4

P-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.777 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 280 cuft |
| Drainage area | = | 0.790 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 1.092 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 4

P-4

**Description**

| | |
|---|---|
| Flow length (ft) | = 533.00 |
| Watercourse slope (%) | = 2.20 |
| Runoff coefficient (C) | = 0.90 |
| **Time of Conc. (min)** | **= 6** |

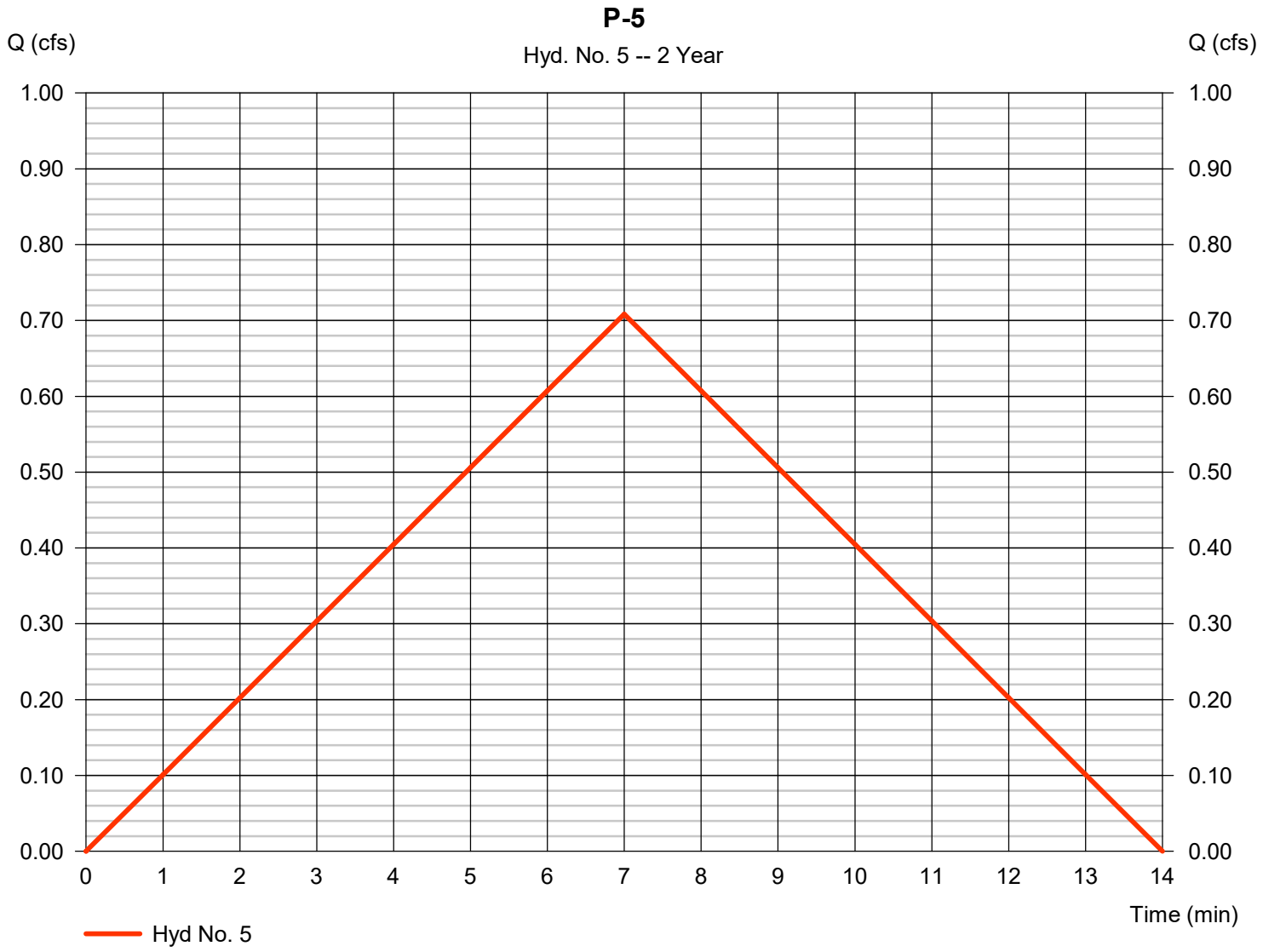
# Hydrograph Report



## Hyd. No. 5

P-5

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.709 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 298 cuft |
| Drainage area | = | 0.780 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 1.009 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 5

P-5

**Description**

| | |
|---|---|
| Flow length (ft) | = 525.00 |
| Watercourse slope (%) | = 2.00 |
| Runoff coefficient (C) | = 0.90 |
| **Time of Conc. (min)** | **= 7** |

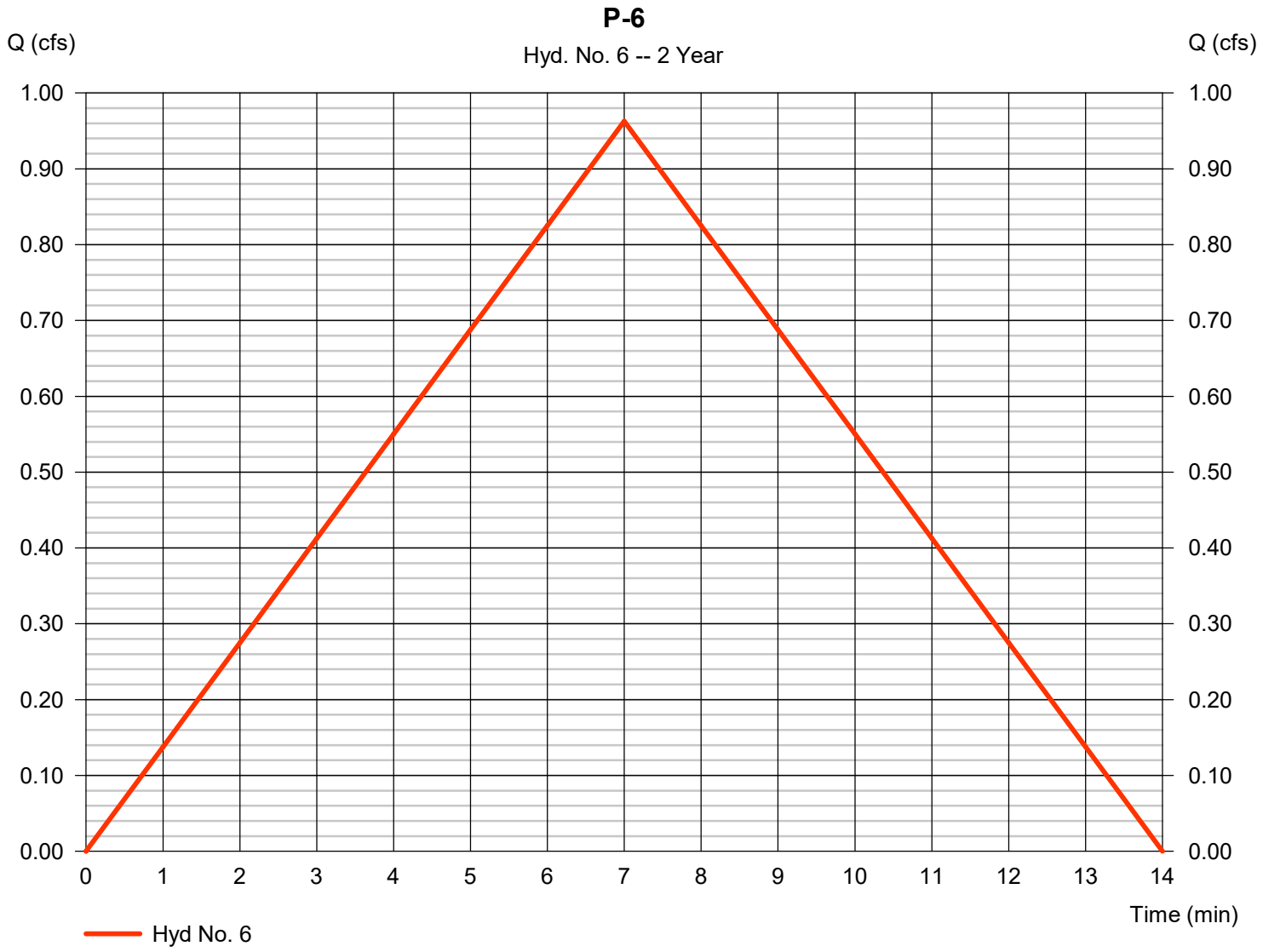
# Hydrograph Report



## Hyd. No. 6

P-6

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.963 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 404 cuft |
| Drainage area | = | 1.060 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 1.009 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 6

P-6

**Description**

| | |
|---|---|
| Flow length (ft) | = 555.00 |
| Watercourse slope (%) | = 1.90 |
| Runoff coefficient (C) | = 0.90 |

**Time of Conc. (min) = 7**

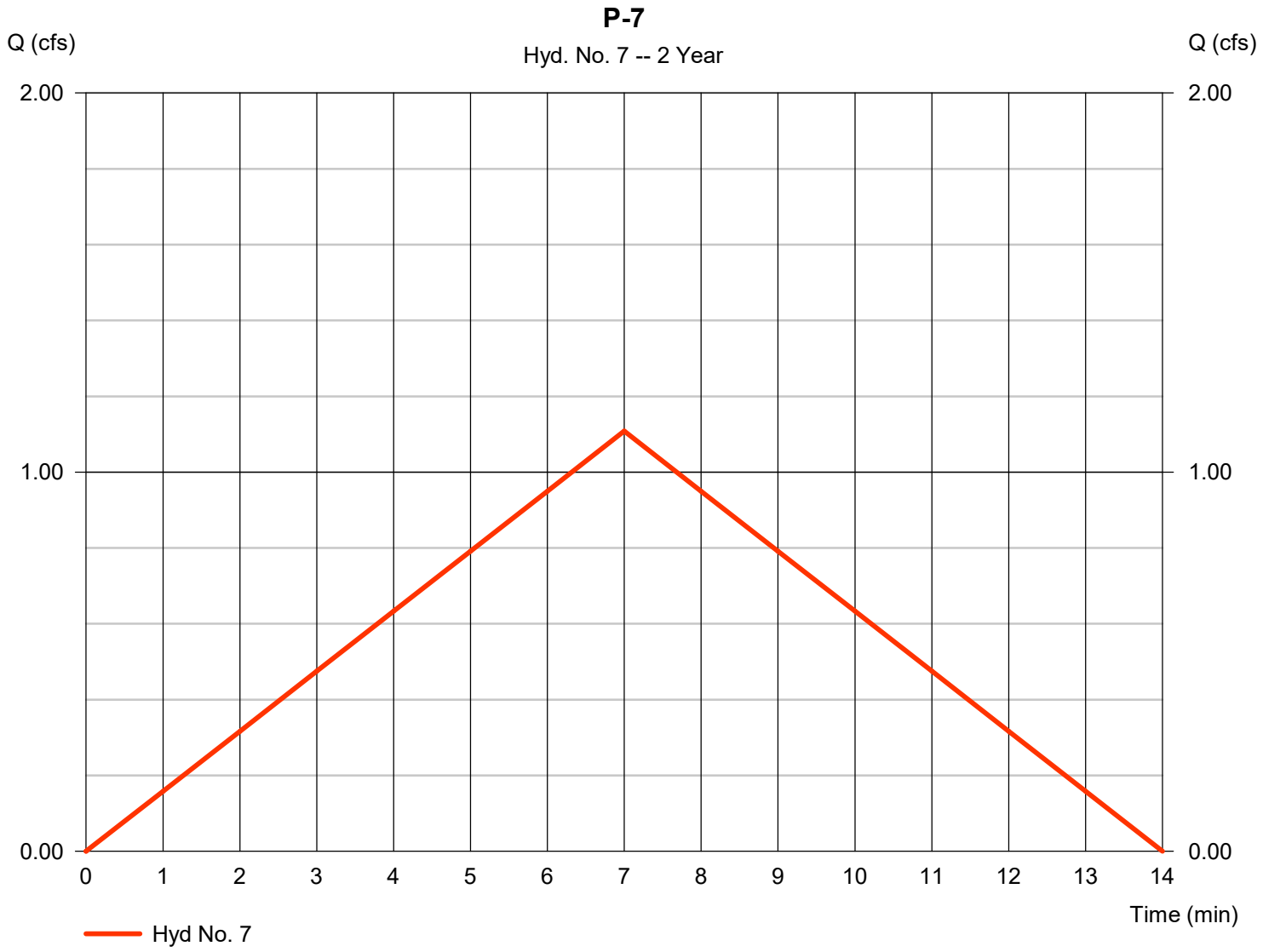
# Hydrograph Report



## Hyd. No. 7

P-7

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 1.108 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 465 cuft |
| Drainage area | = | 1.220 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 1.009 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 7

P-7

**Description**

| | |
|---|---|
| Flow length (ft) | = 555.00 |
| Watercourse slope (%) | = 1.90 |
| Runoff coefficient (C) | = 0.90 |

**Time of Conc. (min) = 7**

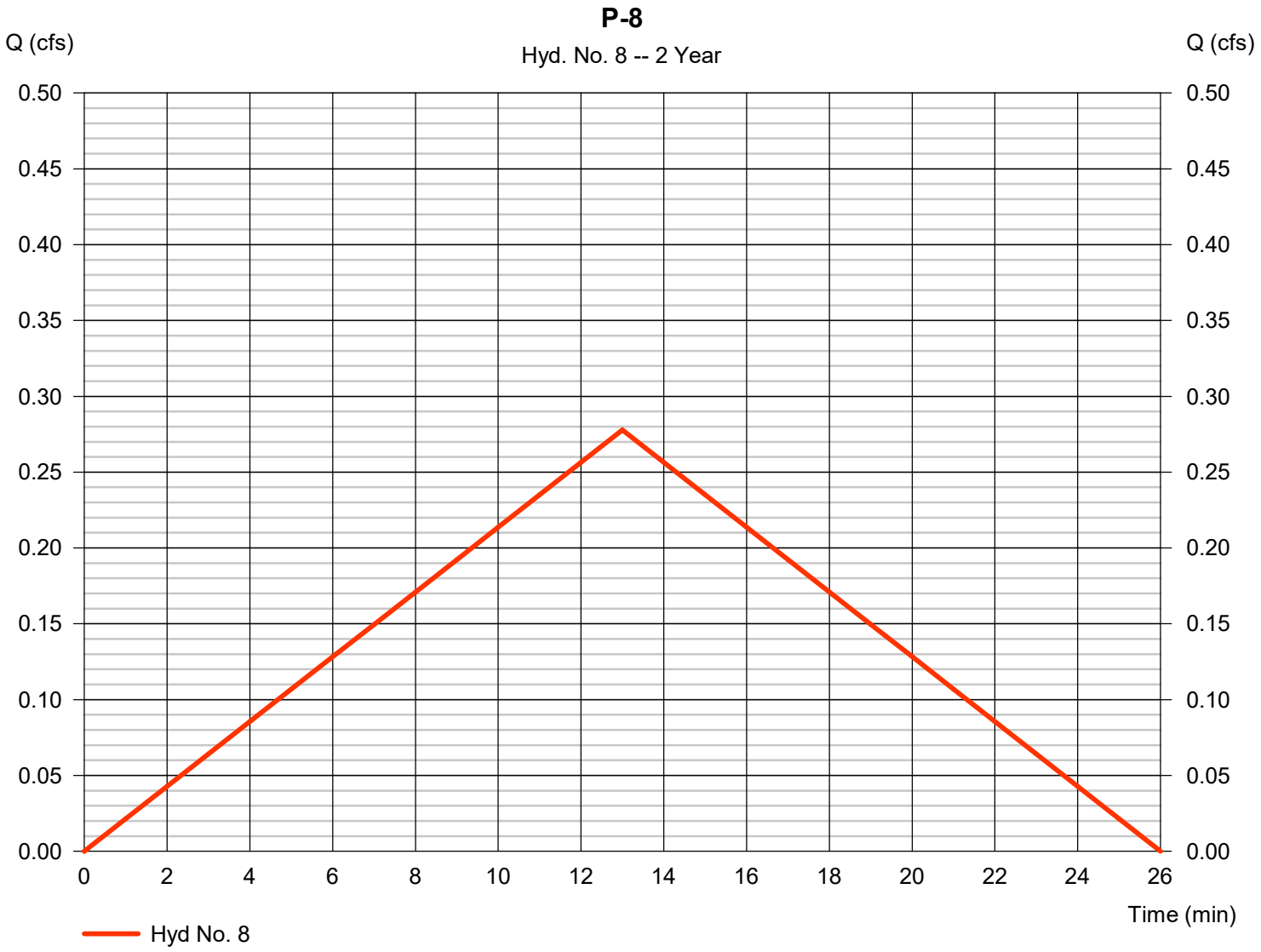
# Hydrograph Report



## Hyd. No. 8

P-8

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.278 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 13 min |
| Time interval | = | 1 min | Hyd. volume | = | 217 cuft |
| Drainage area | = | 0.640 ac | Runoff coeff. | = | 0.6 |
| Intensity | = | 0.724 in/hr | Tc by FAA | = | 13.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 8

P-8

**Description**

| | |
|---|---|
| Flow length (ft) | = 300.00 |
| Watercourse slope (%) | = 1.90 |
| Runoff coefficient (C) | = 0.60 |
| **Time of Conc. (min)** | **= 13** |

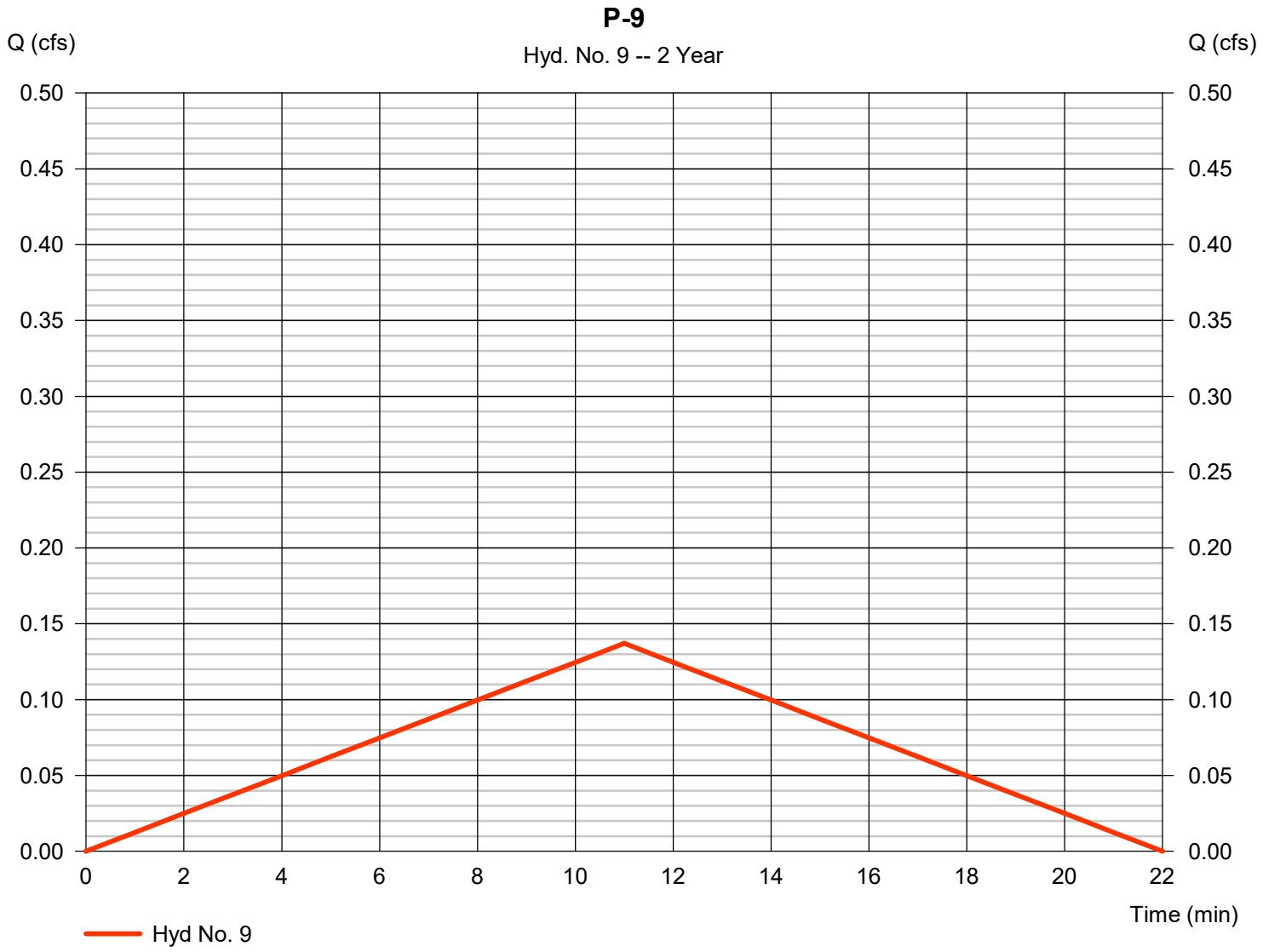
# Hydrograph Report



## Hyd. No. 9

P-9

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.137 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 11 min |
| Time interval | = | 1 min | Hyd. volume | = | 90 cuft |
| Drainage area | = | 0.360 ac | Runoff coeff. | = | 0.48 |
| Intensity | = | 0.793 in/hr | Tc by FAA | = | 11.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 9

P-9

**Description**

| | |
|---|---|
| Flow length (ft) | = 205.00 |
| Watercourse slope (%) | = 3.10 |
| Runoff coefficient (C) | = 0.48 |
| **Time of Conc. (min)** | **= 11** |

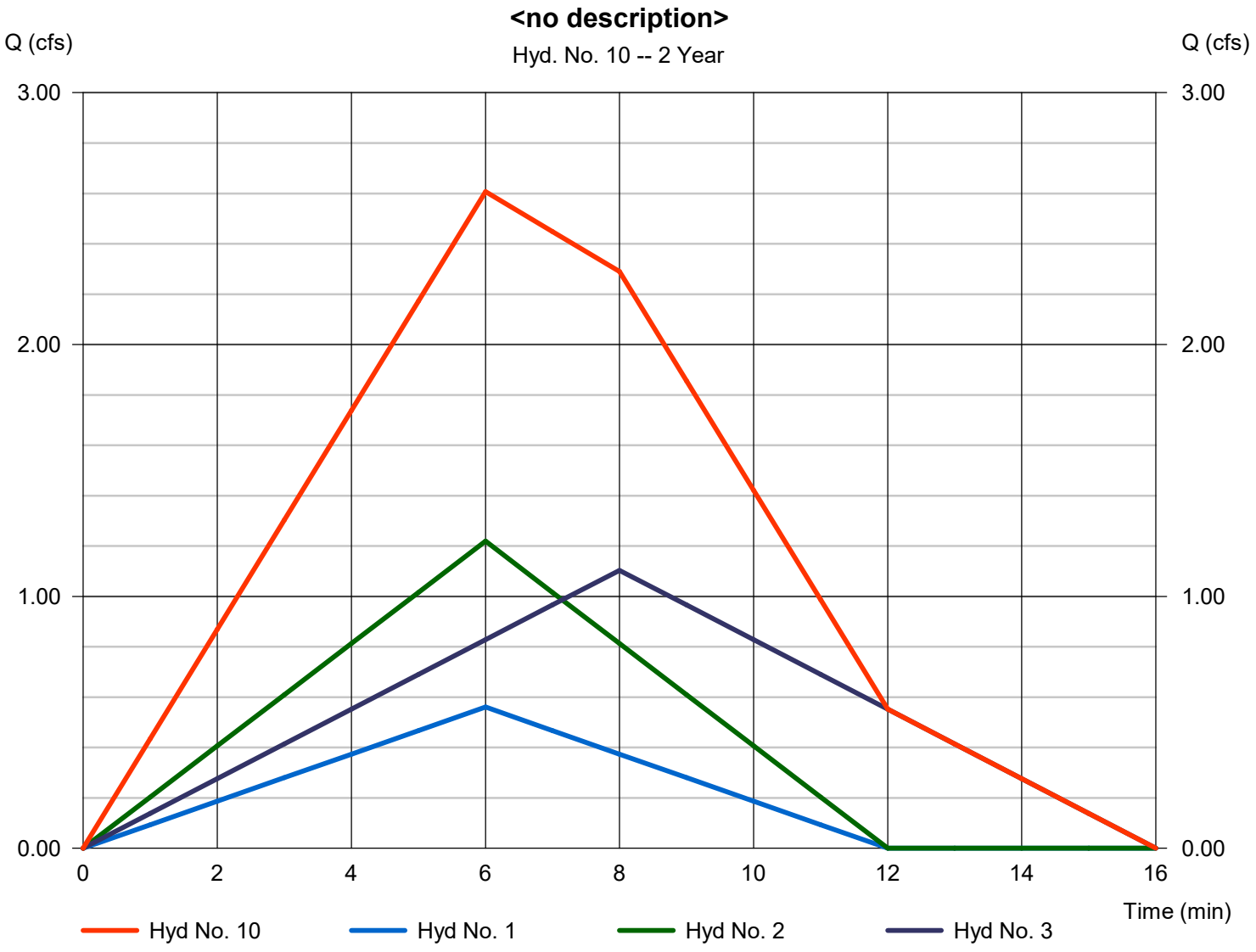
# Hydrograph Report



## Hyd. No. 10

<no description>

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 2.607 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 6 min |
| Time interval | = 1 min | Hyd. volume | = 1,170 cuft |
| Inflow hyds. | = 1, 2, 3 | Contrib. drain. area | = 3.240 ac |



# Hydrograph Report

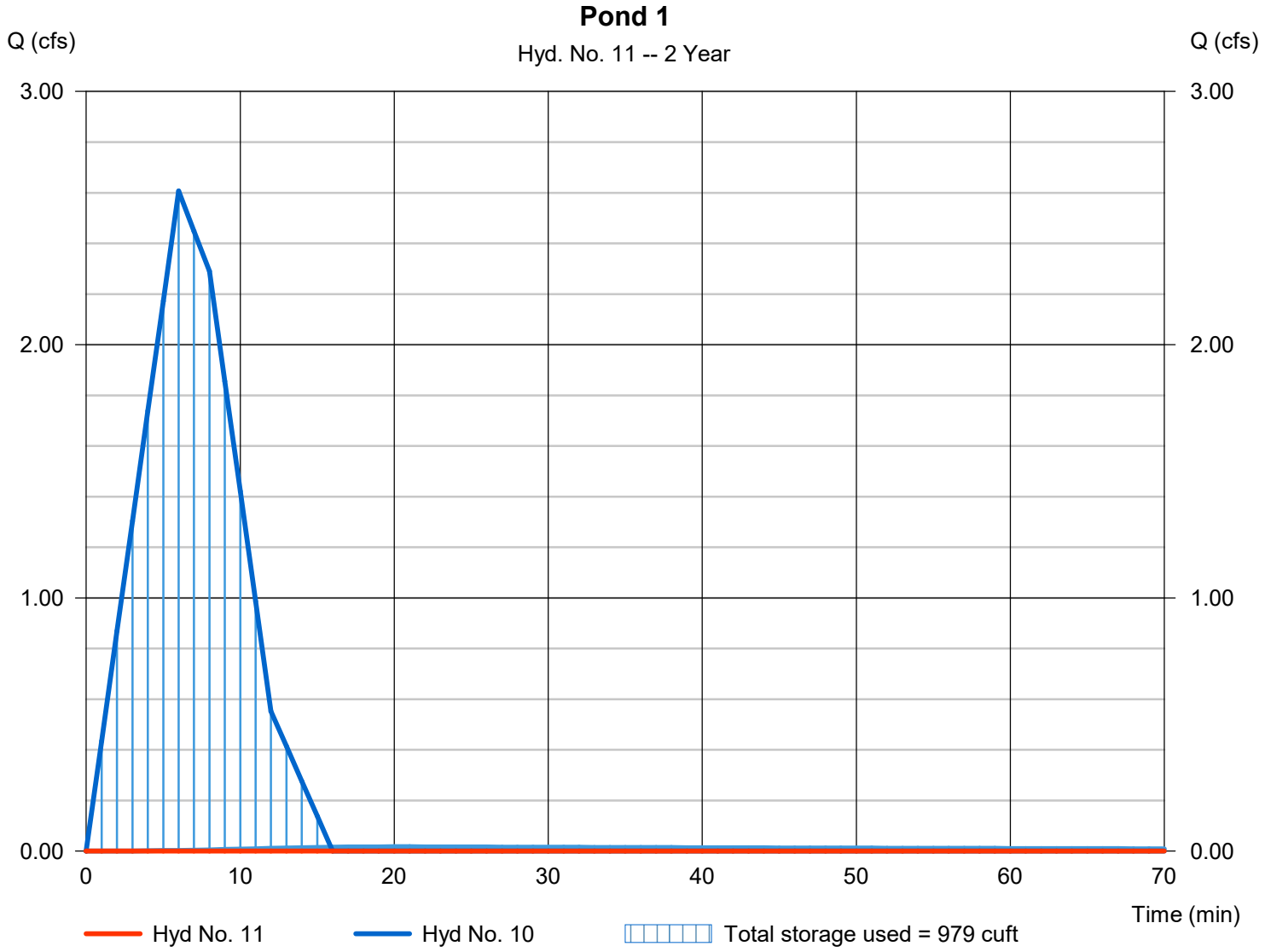


## Hyd. No. 11

Pond 1

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.000 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 65 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyd. No. | = 10 - <no description> | Max. Elevation | = 2673.90 ft |
| Reservoir name | = POND 1 | Max. Storage | = 979 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Pond Report



## Pond No. 2 - POND 1

### Pond Data

**Contours -**User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 2673.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 2673.00 | 61 | 0 | 0 |
| 1.00 | 2674.00 | 2,111 | 1,086 | 1,086 |
| 2.00 | 2675.00 | 2,820 | 2,466 | 3,552 |
| 3.00 | 2676.00 | 3,432 | 3,126 | 6,678 |
| 4.00 | 2677.00 | 4,133 | 3,783 | 10,460 |
| 5.00 | 2678.00 | 4,828 | 4,481 | 14,941 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Span (in)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **No. Barrels** | = 0 | 0 | 0 | 0 |
| **Invert El. (ft)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Length (ft)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 0.00 | 0.00 | 0.00 | n/a |
| **N-Value** | = .013 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | No | No | No |

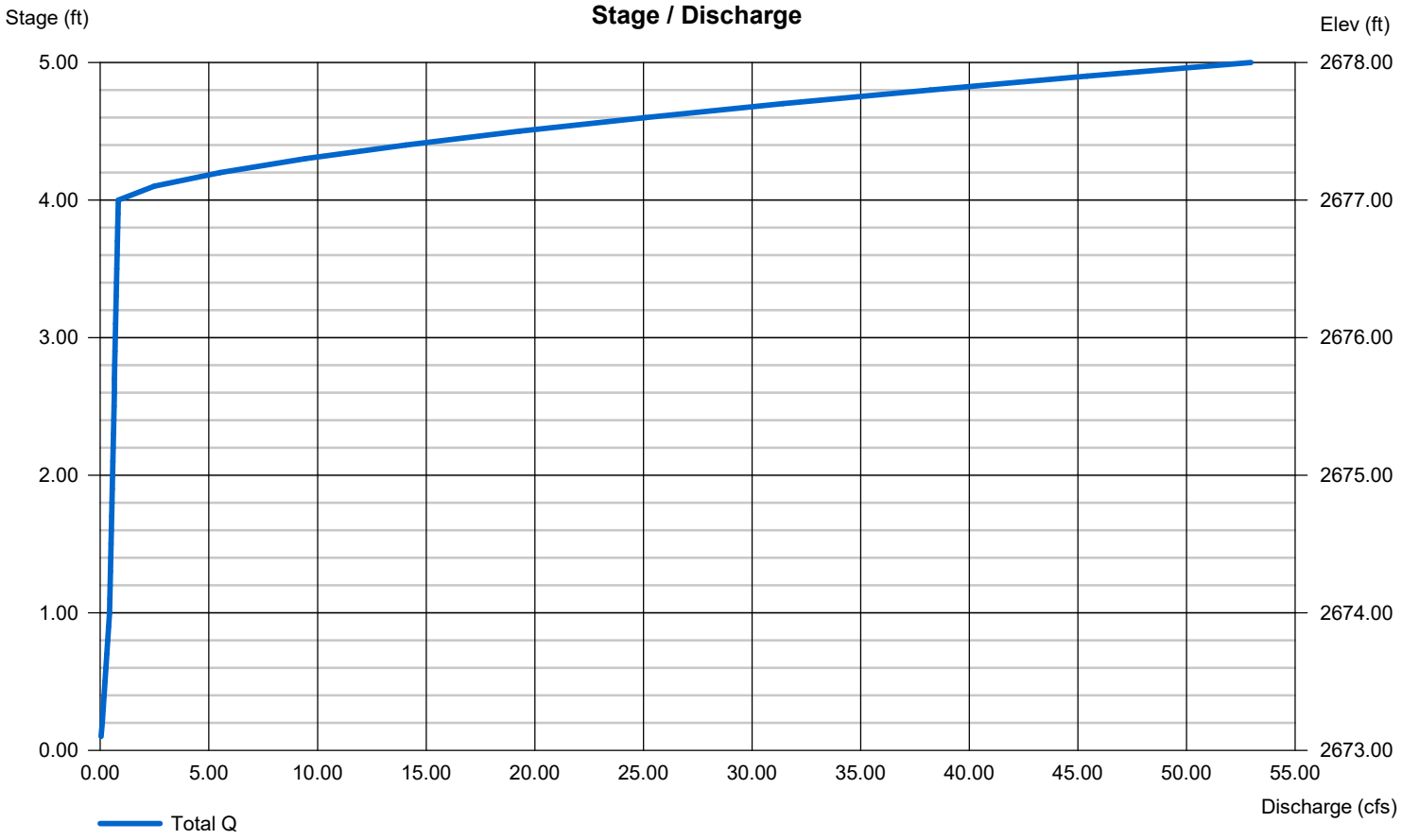
### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 20.00 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 2677.00 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 2.60 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = Broad | --- | --- | --- |
| **Multi-Stage** | = No | No | No | No |

**Exfil.(in/hr)** = 8.700 (by Contour)

**TW Elev. (ft)** = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



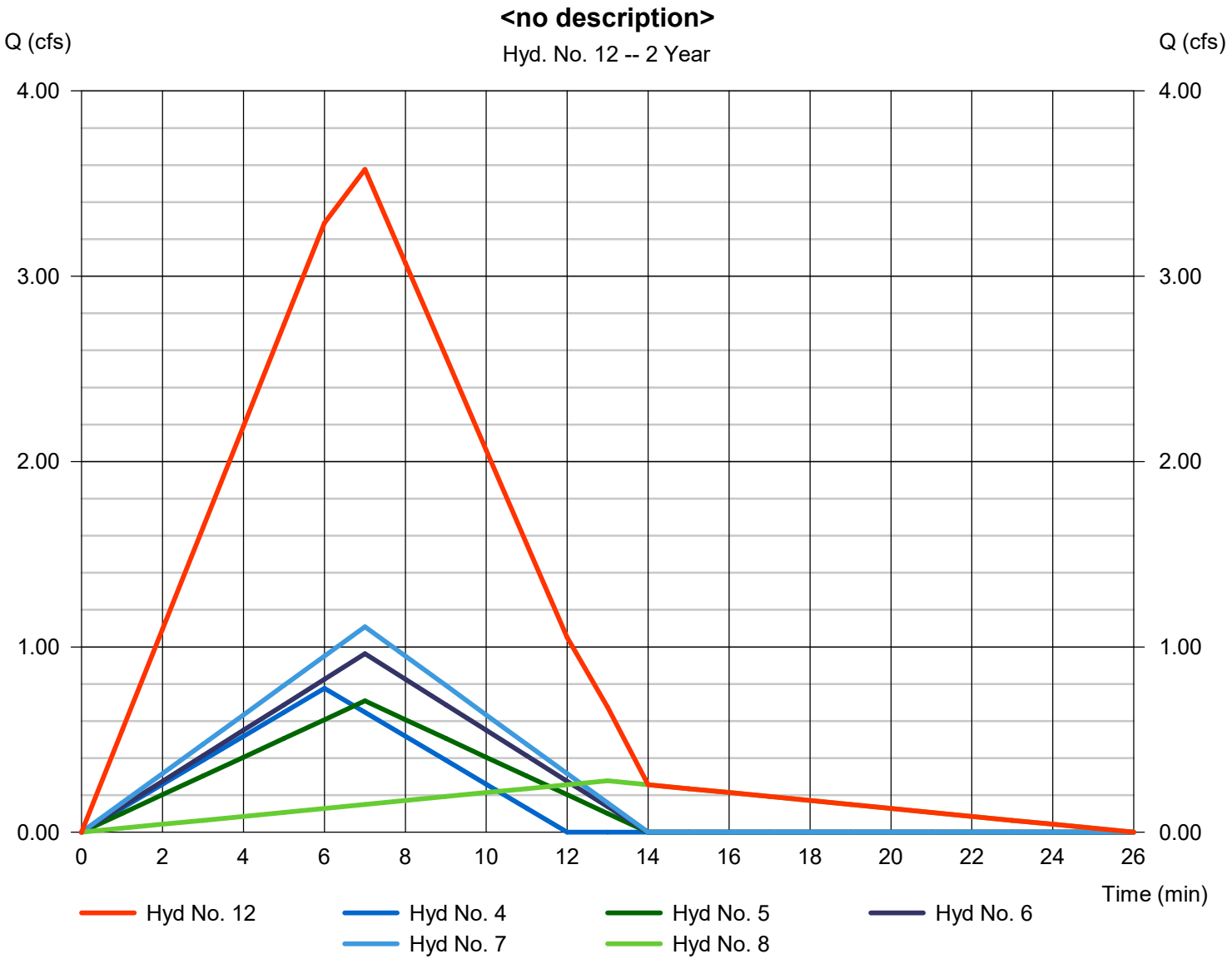
# Hydrograph Report



## Hyd. No. 12

<no description>

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 3.576 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 7 min |
| Time interval | = 1 min | Hyd. volume | = 1,664 cuft |
| Inflow hyds. | = 4, 5, 6, 7, 8 | Contrib. drain. area | = 4.490 ac |



# Hydrograph Report

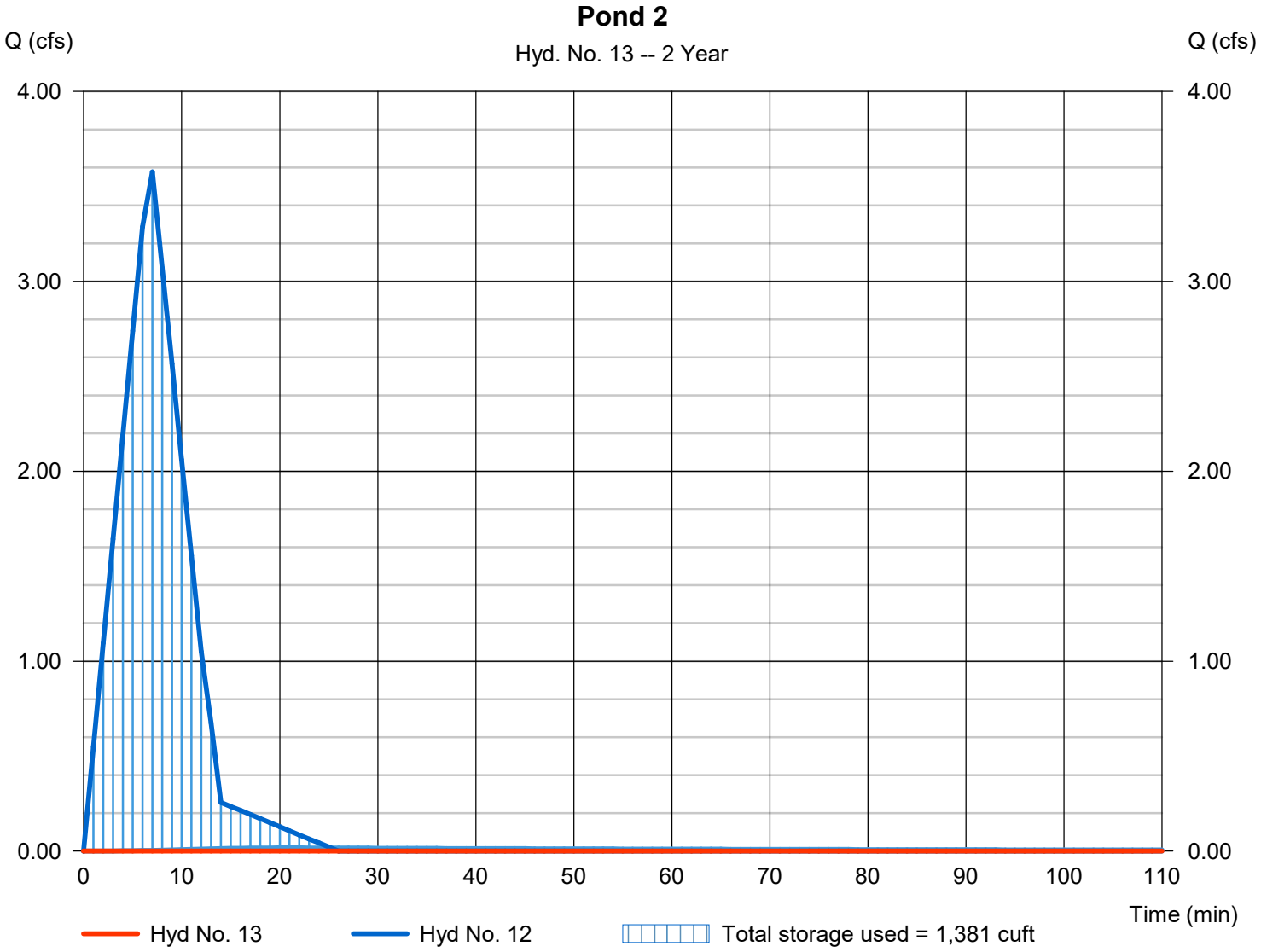


## Hyd. No. 13

Pond 2

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.000 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 20 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyd. No. | = 12 - <no description> | Max. Elevation | = 2662.81 ft |
| Reservoir name | = POND 2 | Max. Storage | = 1,381 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Pond Report



## Pond No. 3 - POND 2

### Pond Data

**Contours -**User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 2662.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 2662.00 | 774 | 0 | 0 |
| 1.00 | 2663.00 | 2,654 | 1,714 | 1,714 |
| 2.00 | 2664.00 | 3,795 | 3,225 | 4,939 |
| 3.00 | 2665.00 | 4,861 | 4,328 | 9,267 |
| 4.00 | 2666.00 | 6,036 | 5,449 | 14,715 |
| 4.20 | 2666.20 | 6,185 | 1,222 | 15,937 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Span (in)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **No. Barrels** | = 0 | 0 | 0 | 0 |
| **Invert El. (ft)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Length (ft)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 0.00 | 0.00 | 0.00 | n/a |
| **N-Value** | = .013 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | No | No | No |

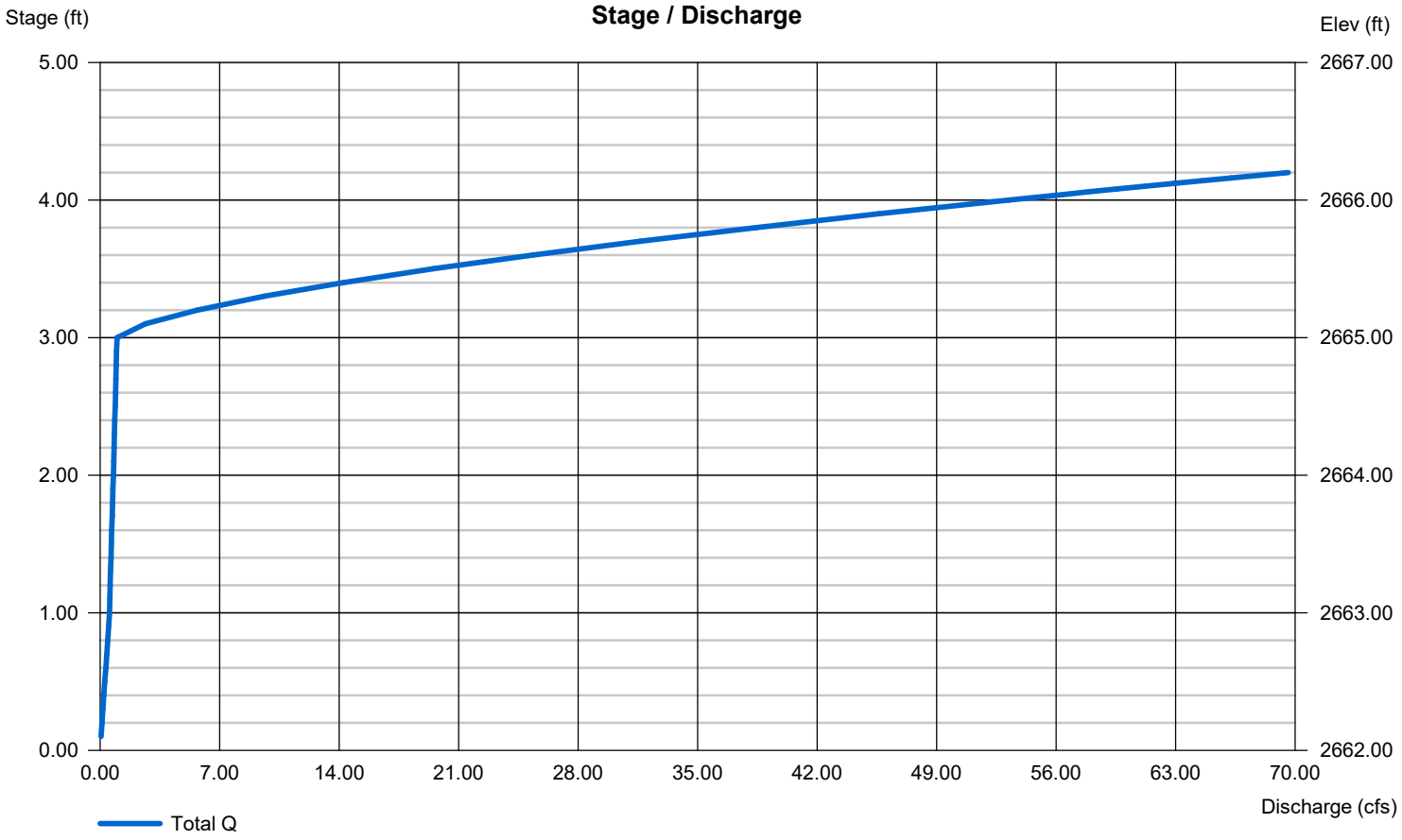
### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 20.00 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 2665.00 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 2.60 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = Broad | --- | --- | --- |
| **Multi-Stage** | = No | No | No | No |

**Exfil.(in/hr)** = 8.700 (by Contour)

**TW Elev. (ft)** = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



# Hydrograph Report

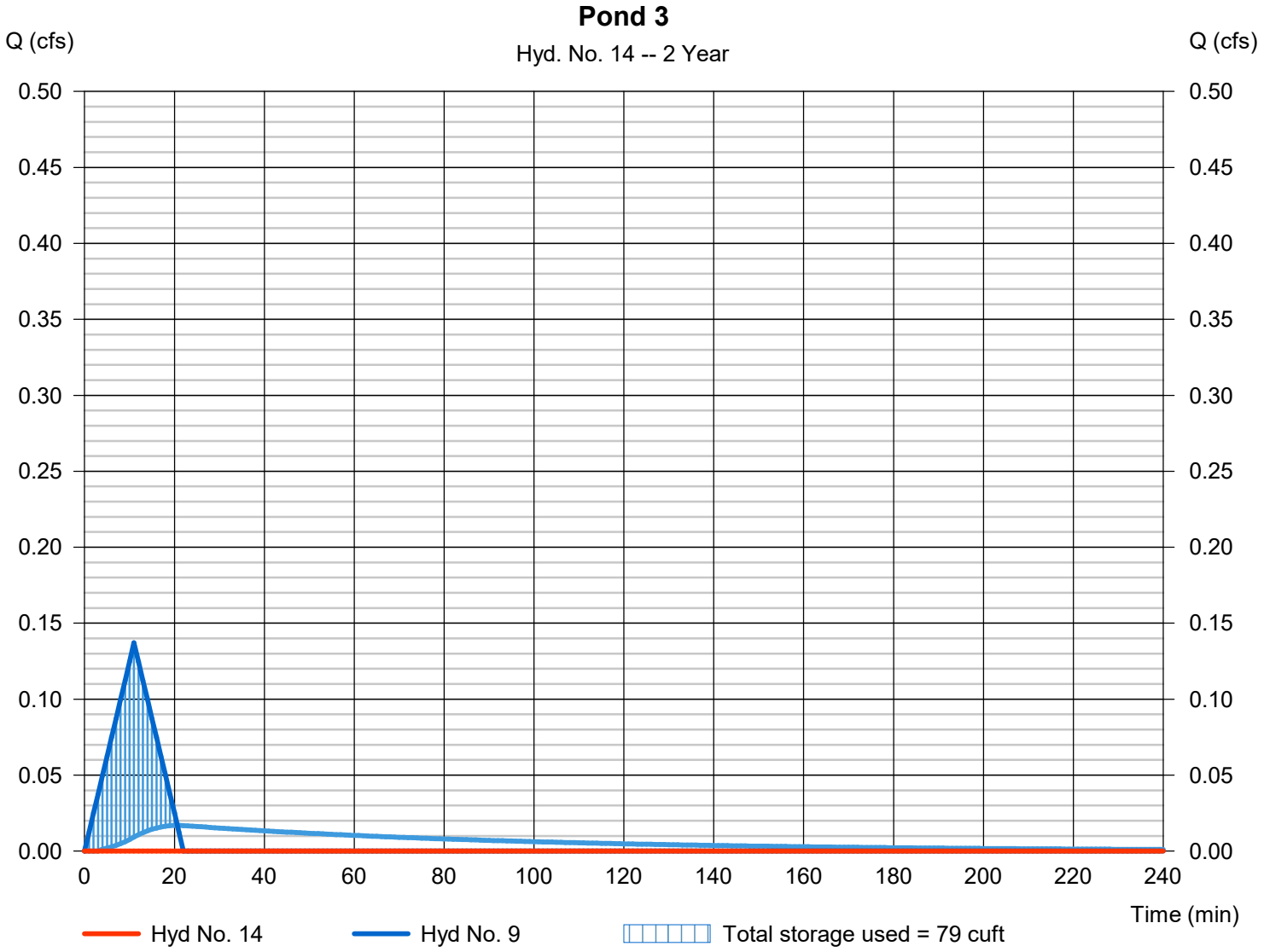


## Hyd. No. 14

Pond 3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 0.000 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 18 min |
| Time interval | = | 1 min | Hyd. volume | = | 0 cuft |
| Inflow hyd. No. | = | 9 - P-9 | Max. Elevation | = | 2659.18 ft |
| Reservoir name | = | POND 3 | Max. Storage | = | 79 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Pond Report



## Pond No. 1 - POND 3

### Pond Data

**Contours -**User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 2659.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 2659.00 | 185 | 0 | 0 |
| 1.00 | 2660.00 | 715 | 450 | 450 |
| 2.00 | 2661.00 | 1,232 | 974 | 1,424 |
| 3.00 | 2662.00 | 1,786 | 1,509 | 2,933 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Span (in)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **No. Barrels** | = 0 | 0 | 0 | 0 |
| **Invert El. (ft)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Length (ft)** | = 0.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 0.00 | 0.00 | 0.00 | n/a |
| **N-Value** | = .013 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | No | No | No |

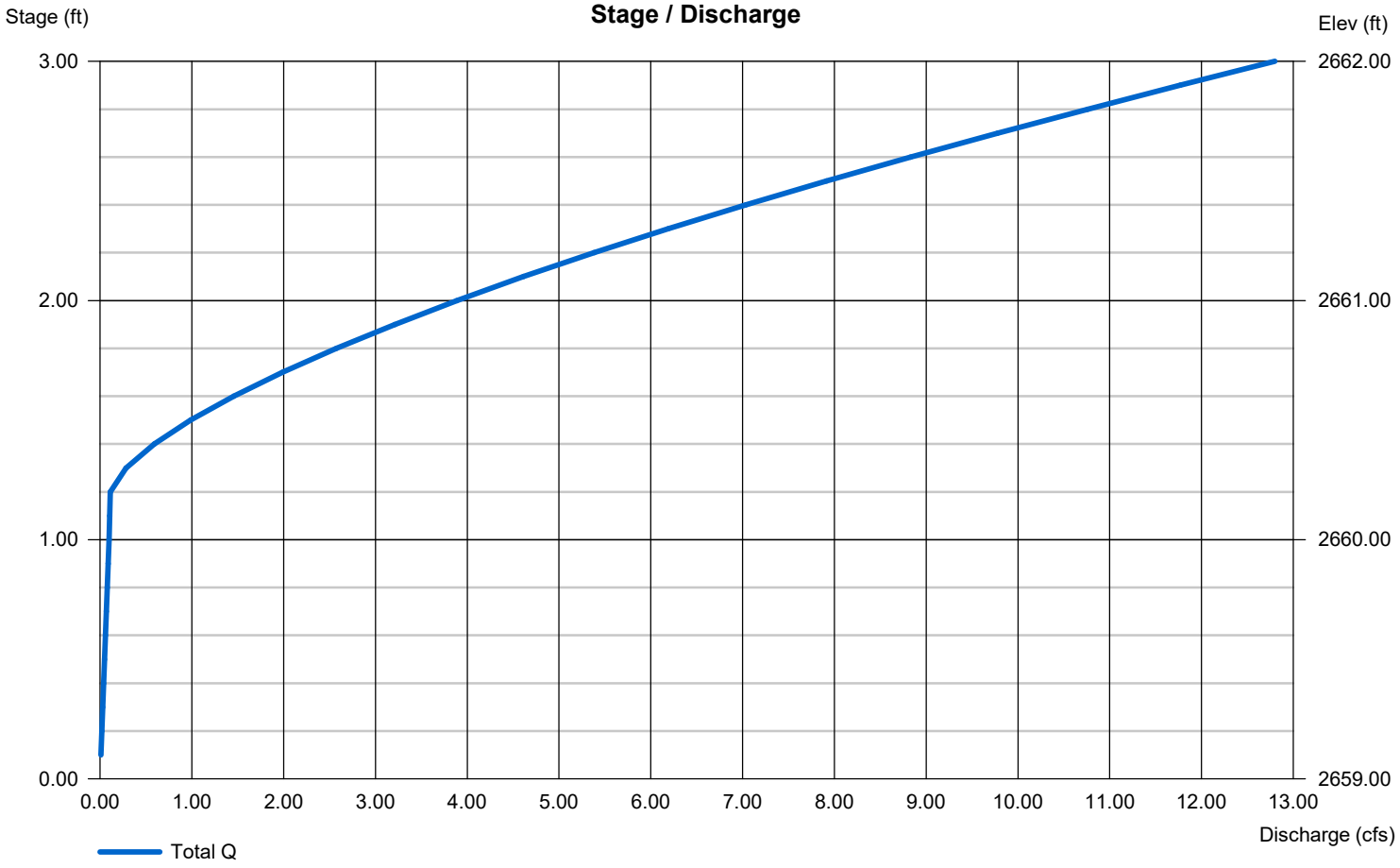
### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 2.00 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 2660.20 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 2.60 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = Broad | --- | --- | --- |
| **Multi-Stage** | = No | No | No | No |

**Exfil.(in/hr)** = 5.800 (by Contour)

**TW Elev. (ft)** = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



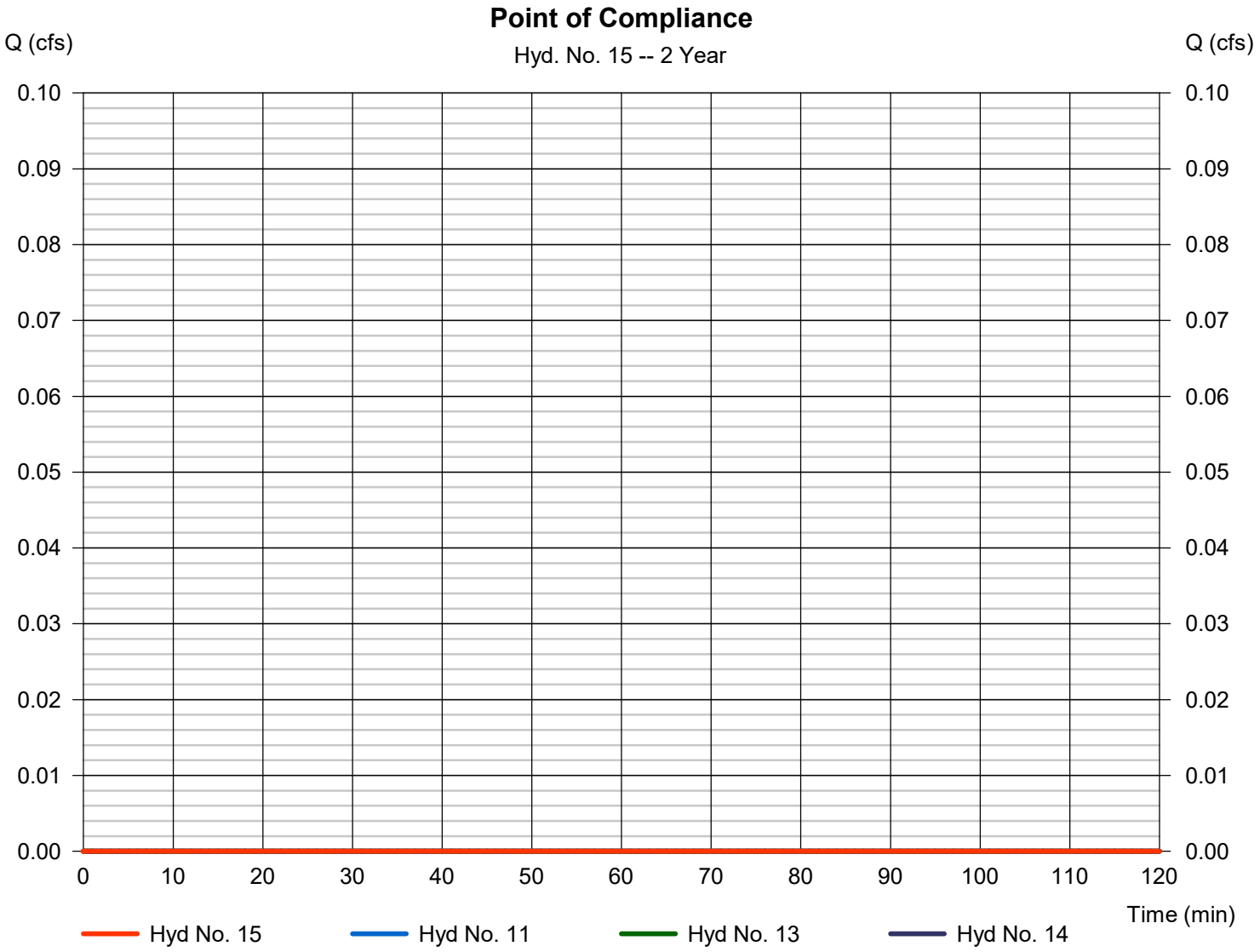
# Hydrograph Report



## Hyd. No. 15

Point of Compliance

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.000 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 20 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyds. | = 11, 13, 14 | Contrib. drain. area | = 0.000 ac |



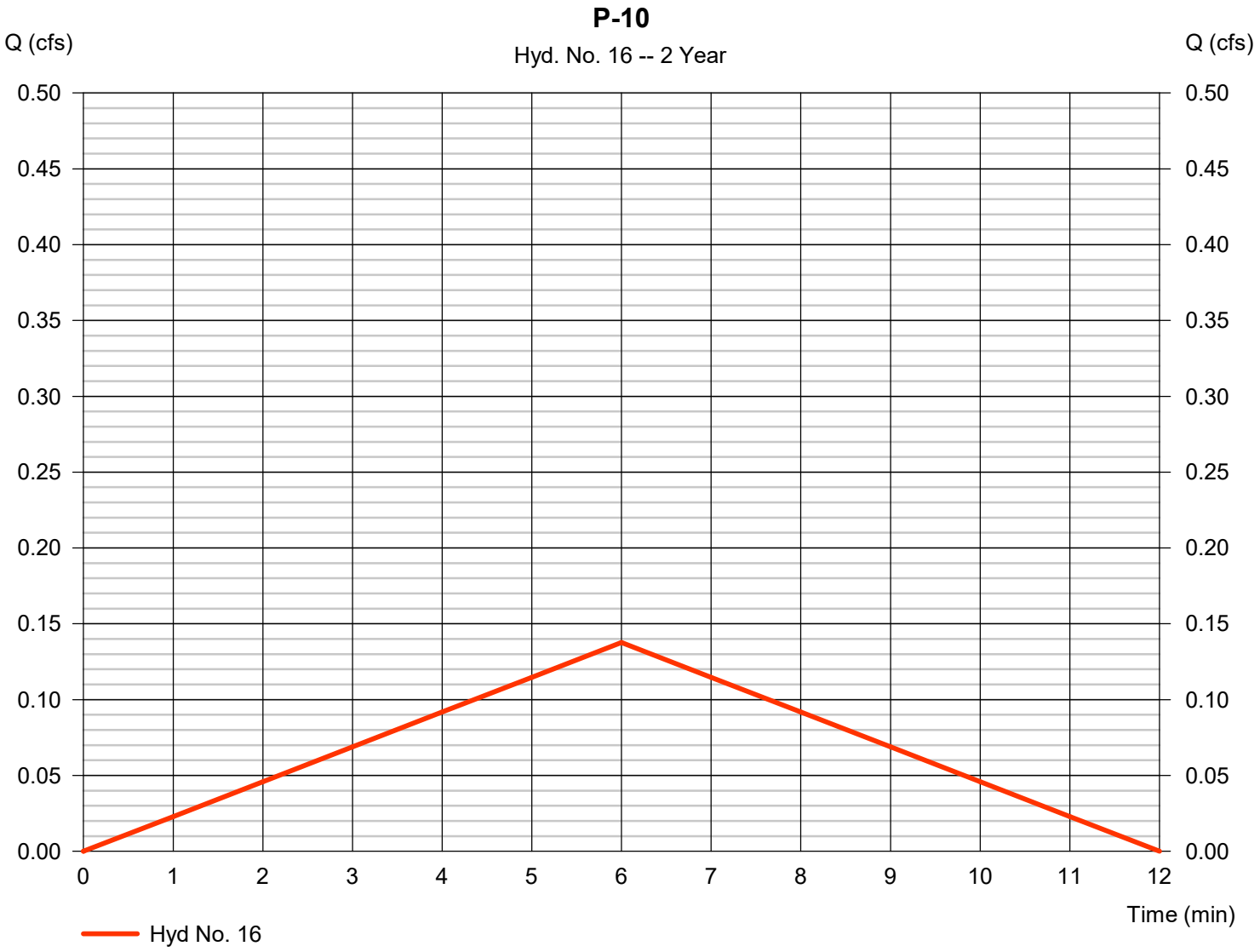
# Hydrograph Report



## Hyd. No. 16

P-10

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.138 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 50 cuft |
| Drainage area | = | 0.150 ac | Runoff coeff. | = | 0.84 |
| Intensity | = | 1.092 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# FAA Formula Tc Worksheet



## Hyd. No. 16

P-10

**Description**

| | |
|---|---|
| Flow length (ft) | = 260.00 |
| Watercourse slope (%) | = 2.30 |
| Runoff coefficient (C) | = 0.84 |

**Time of Conc. (min) = 6**

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Rational | 1.678 | 1 | 6 | 604 | ------ | ------ | ------ | P-1 |
| 2 | Rational | 3.649 | 1 | 6 | 1,314 | ------ | ------ | ------ | P-2 |
| 3 | Rational | 3.281 | 1 | 8 | 1,575 | ------ | ------ | ------ | P-3 |
| 4 | Rational | 2.325 | 1 | 6 | 837 | ------ | ------ | ------ | P-4 |
| 5 | Rational | 2.112 | 1 | 7 | 887 | ------ | ------ | ------ | P-5 |
| 6 | Rational | 2.870 | 1 | 7 | 1,205 | ------ | ------ | ------ | P-6 |
| 7 | Rational | 3.303 | 1 | 7 | 1,387 | ------ | ------ | ------ | P-7 |
| 8 | Rational | 0.825 | 1 | 13 | 643 | ------ | ------ | ------ | P-8 |
| 9 | Rational | 0.407 | 1 | 11 | 268 | ------ | ------ | ------ | P-9 |
| 10 | Combine | 7.788 | 1 | 6 | 3,493 | 1, 2, 3, | ------ | ------ | <no description> |
| 11 | Reservoir | 0.000 | 1 | 109 | 0 | 10 | 2674.83 | 3,141 | Pond 1 |
| 12 | Combine | 10.67 | 1 | 7 | 4,960 | 4, 5, 6, 7, 8, | ------ | ------ | <no description> |
| 13 | Reservoir | 0.000 | 1 | 99 | 0 | 12 | 2663.80 | 4,306 | Pond 2 |
| 14 | Reservoir | 0.000 | 1 | 20 | 0 | 9 | 2659.52 | 235 | Pond 3 |
| 15 | Combine | 0.000 | 1 | 99 | 0 | 11, 13, 14 | ------ | ------ | Point of Compliance |
| 16 | Rational | 0.412 | 1 | 6 | 148 | ------ | ------ | ------ | P-10 |

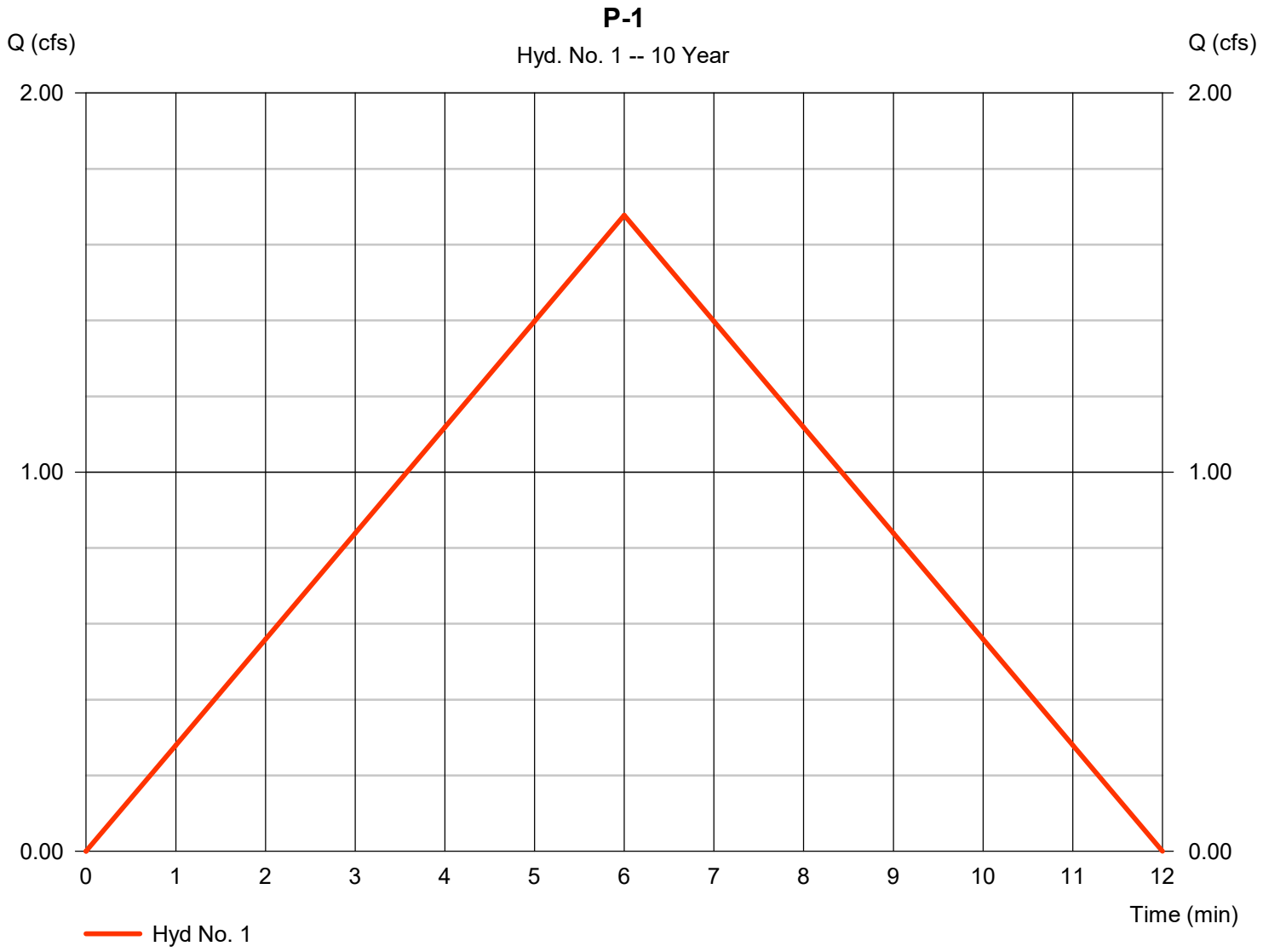
# Hydrograph Report



## Hyd. No. 1

P-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 1.678 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 604 cuft |
| Drainage area | = | 0.570 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 3.270 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



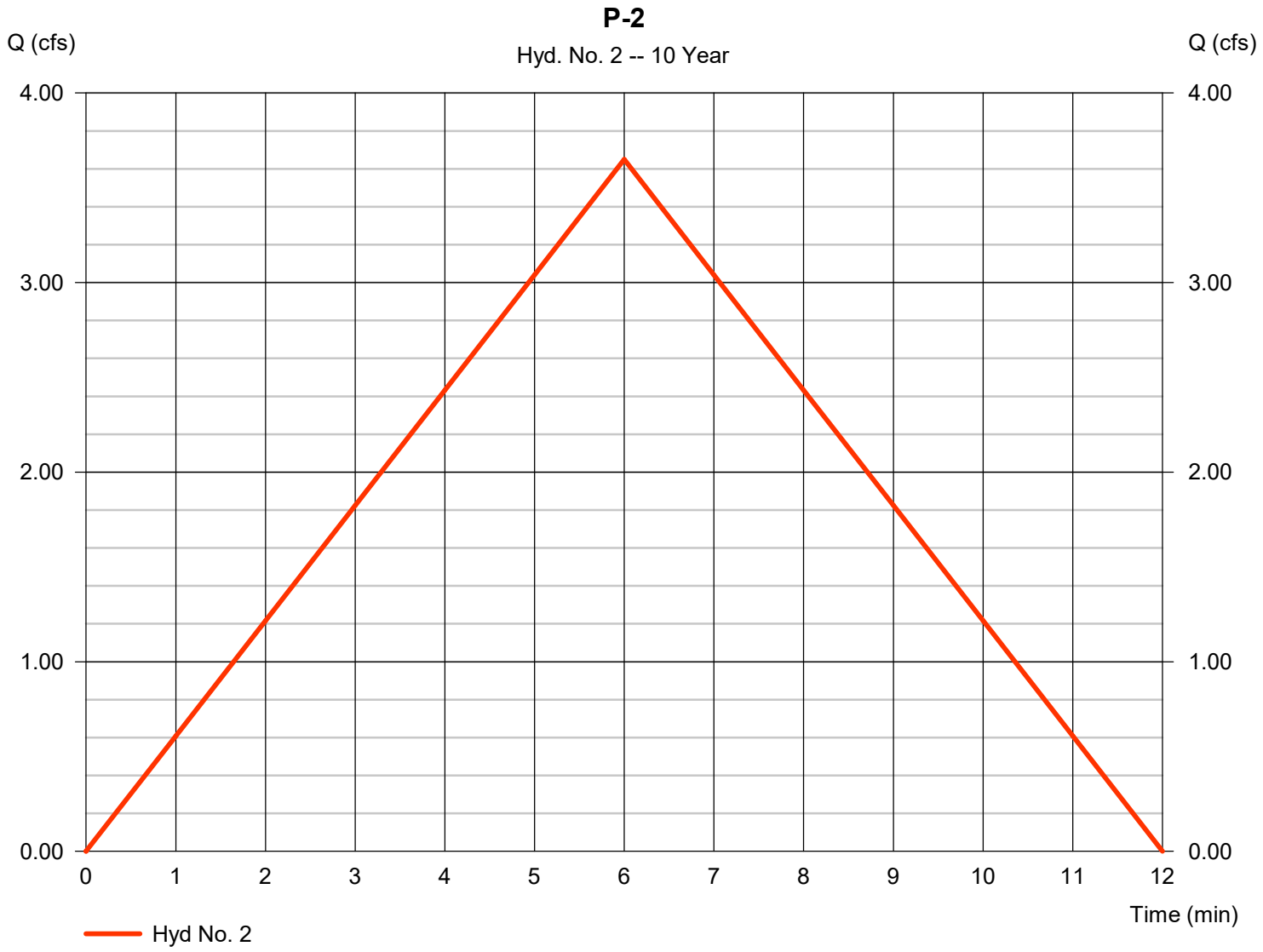
# Hydrograph Report



## Hyd. No. 2

P-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 3.649 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,314 cuft |
| Drainage area | = | 1.240 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 3.270 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# Hydrograph Report



## Hyd. No. 3

P-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 3.281 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 8 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,575 cuft |
| Drainage area | = | 1.430 ac | Runoff coeff. | = | 0.82 |
| Intensity | = | 2.798 in/hr | Tc by FAA | = | 8.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |

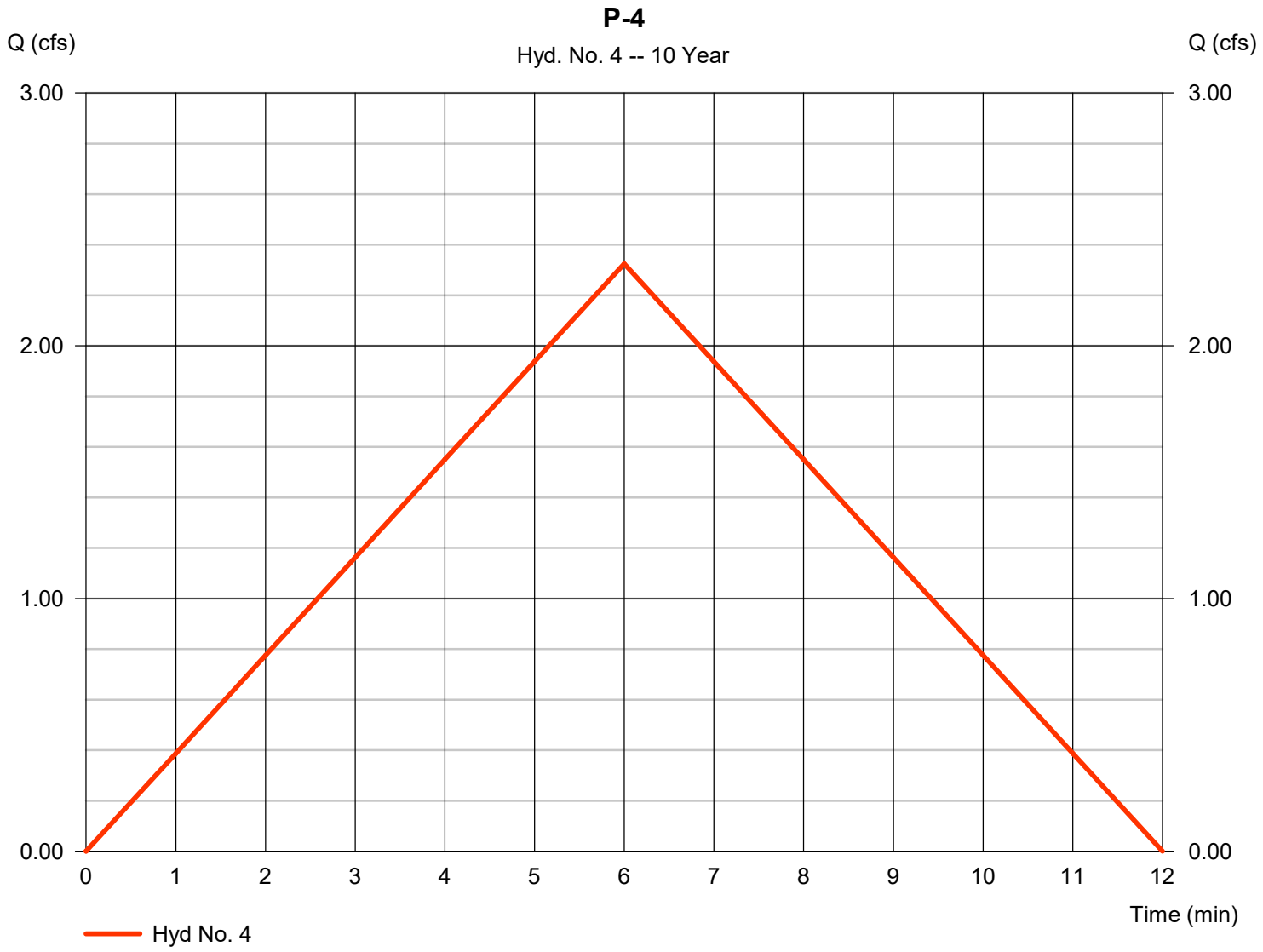
# Hydrograph Report



## Hyd. No. 4

P-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 2.325 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 837 cuft |
| Drainage area | = | 0.790 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 3.270 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



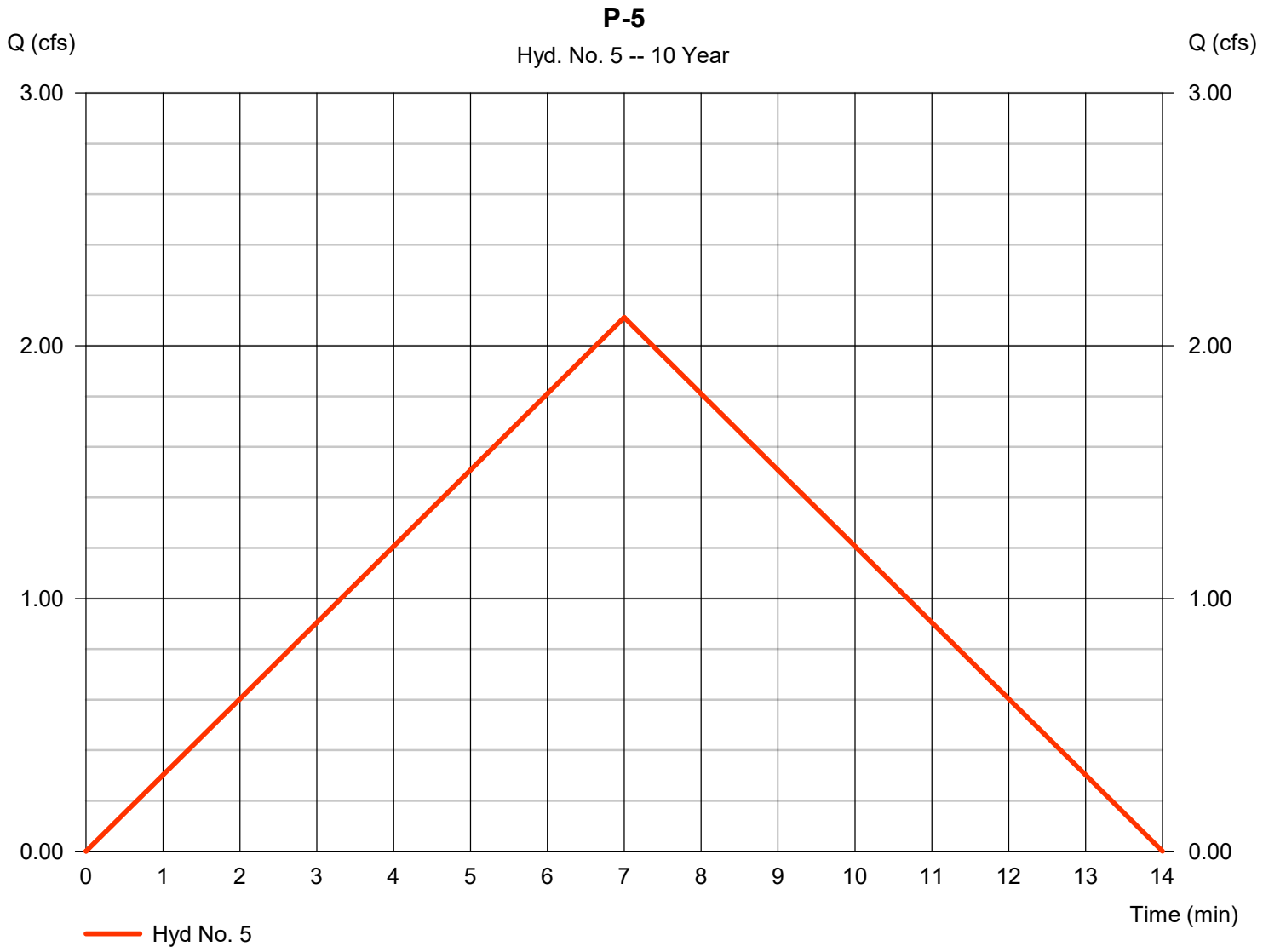
# Hydrograph Report



## Hyd. No. 5

P-5

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 2.112 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 887 cuft |
| Drainage area | = | 0.780 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 3.008 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



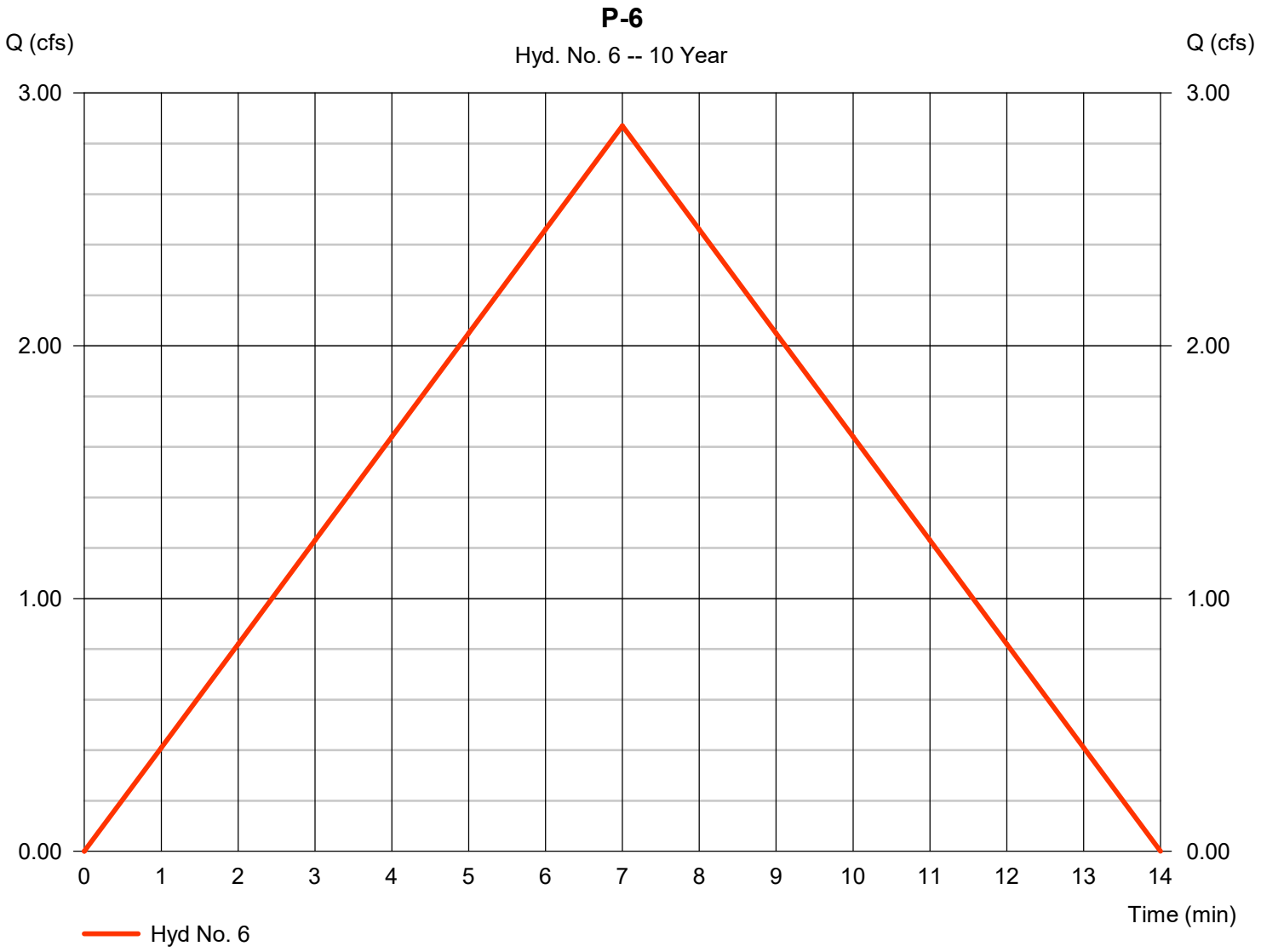
# Hydrograph Report



## Hyd. No. 6

P-6

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 2.870 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,205 cuft |
| Drainage area | = | 1.060 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 3.008 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



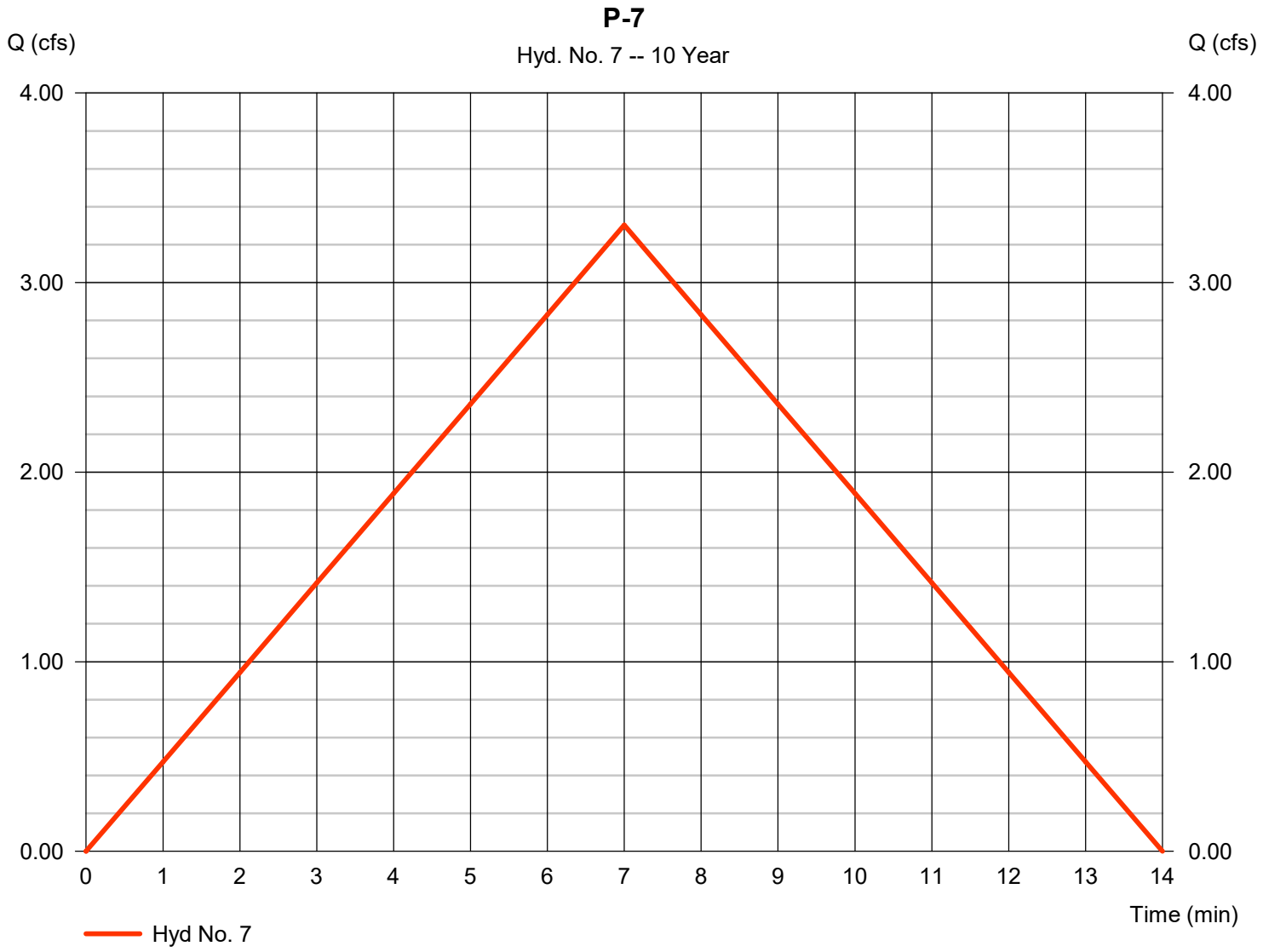
# Hydrograph Report



## Hyd. No. 7

P-7

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 3.303 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,387 cuft |
| Drainage area | = | 1.220 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 3.008 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# Hydrograph Report



## Hyd. No. 8

P-8

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.825 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 13 min |
| Time interval | = | 1 min | Hyd. volume | = | 643 cuft |
| Drainage area | = | 0.640 ac | Runoff coeff. | = | 0.6 |
| Intensity | = | 2.148 in/hr | Tc by FAA | = | 13.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |

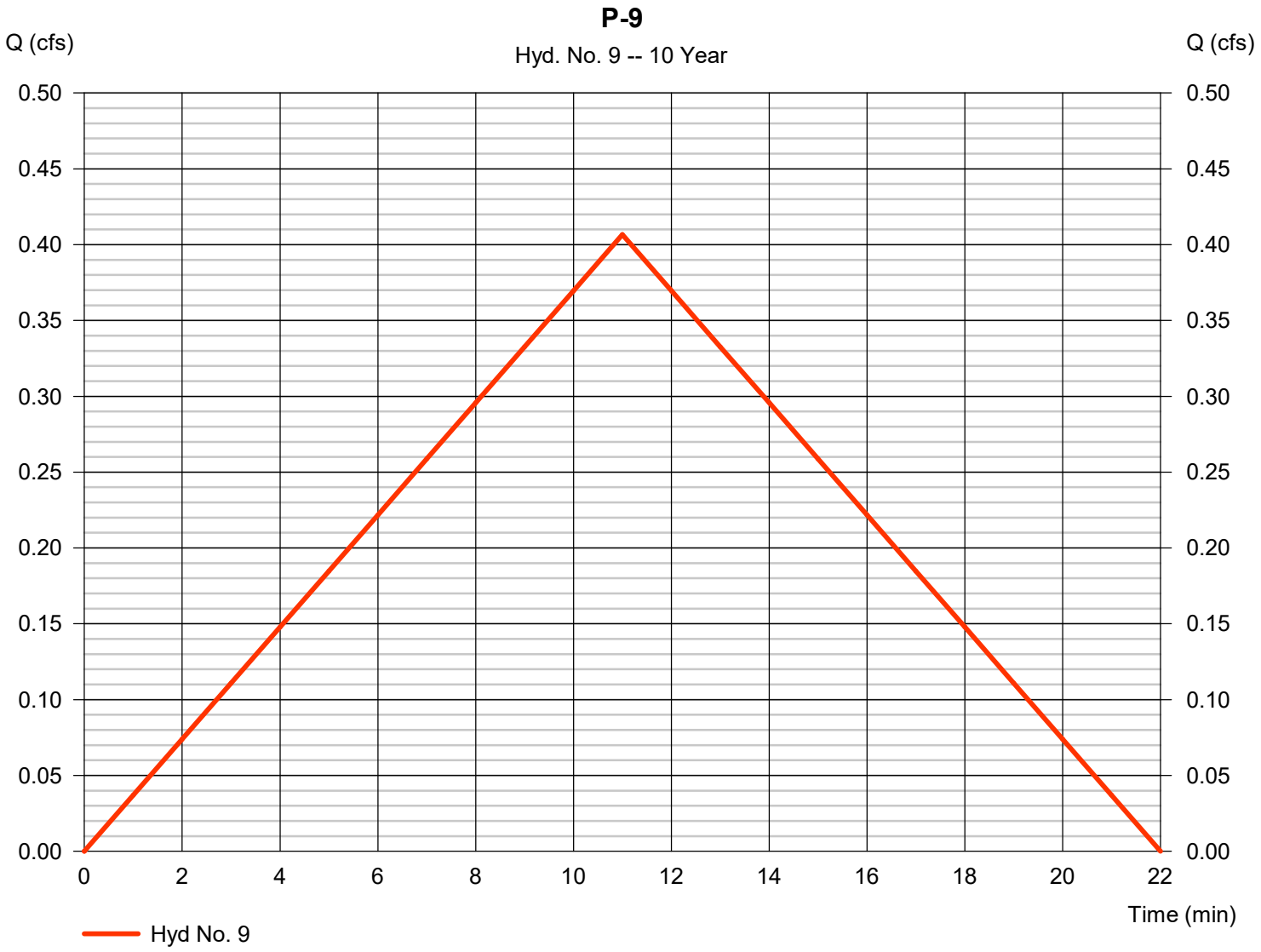
# Hydrograph Report



## Hyd. No. 9

P-9

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.407 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 11 min |
| Time interval | = | 1 min | Hyd. volume | = | 268 cuft |
| Drainage area | = | 0.360 ac | Runoff coeff. | = | 0.48 |
| Intensity | = | 2.353 in/hr | Tc by FAA | = | 11.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



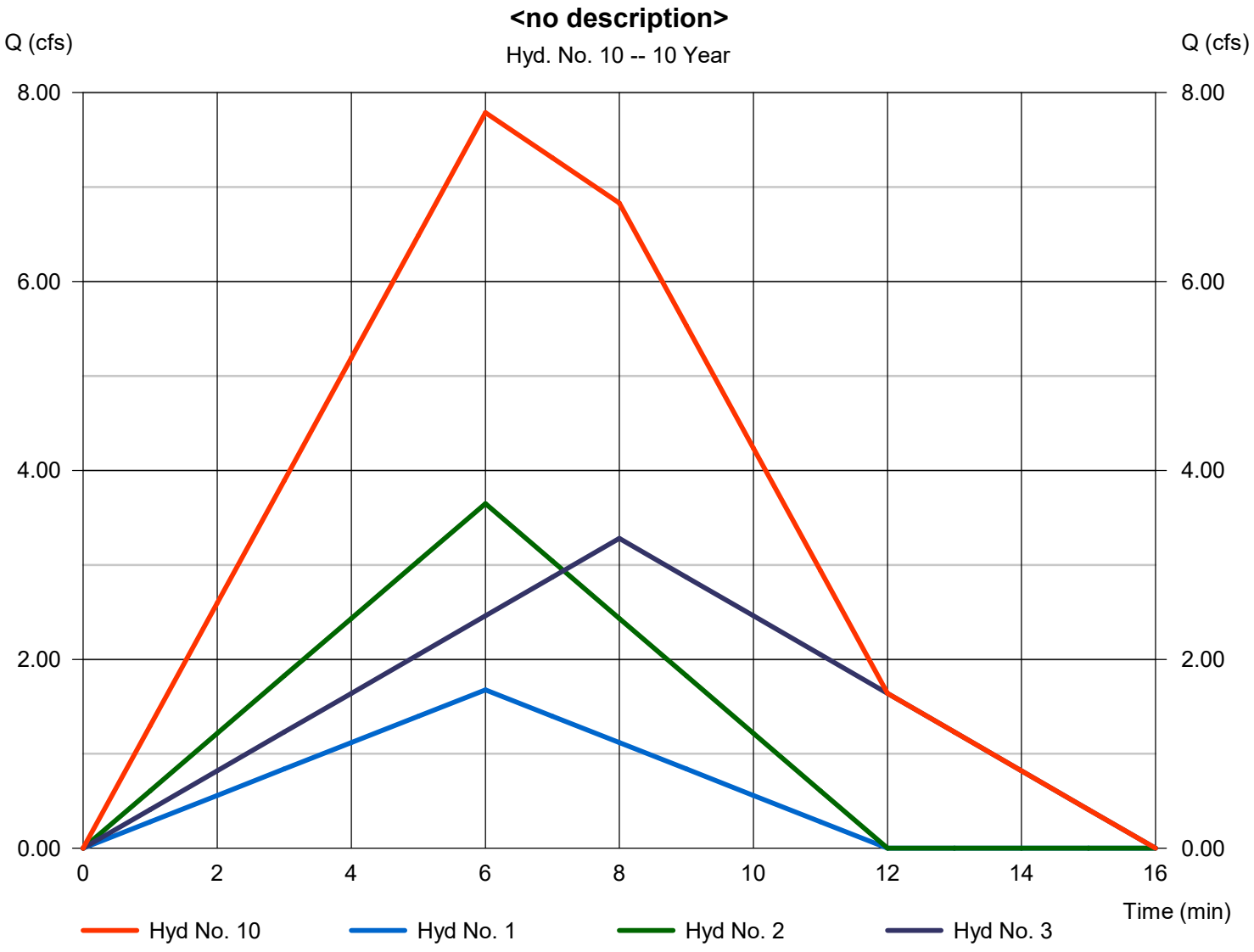
# Hydrograph Report



## Hyd. No. 10

<no description>

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 7.788 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 6 min |
| Time interval | = 1 min | Hyd. volume | = 3,493 cuft |
| Inflow hyds. | = 1, 2, 3 | Contrib. drain. area | = 3.240 ac |



# Hydrograph Report

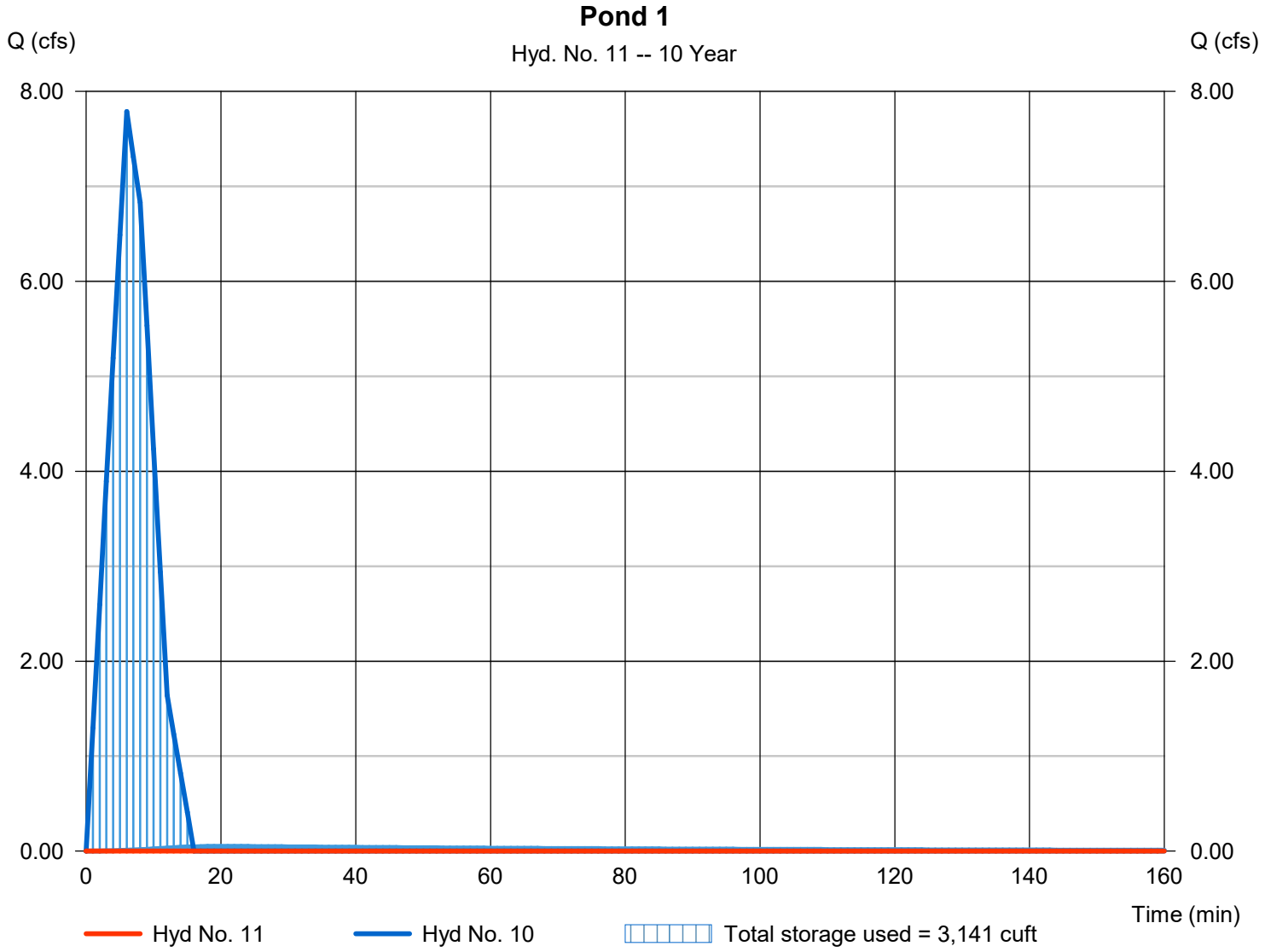


## Hyd. No. 11

Pond 1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 0.000 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 109 min |
| Time interval | = | 1 min | Hyd. volume | = | 0 cuft |
| Inflow hyd. No. | = | 10 - <no description> | Max. Elevation | = | 2674.83 ft |
| Reservoir name | = | POND 1 | Max. Storage | = | 3,141 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



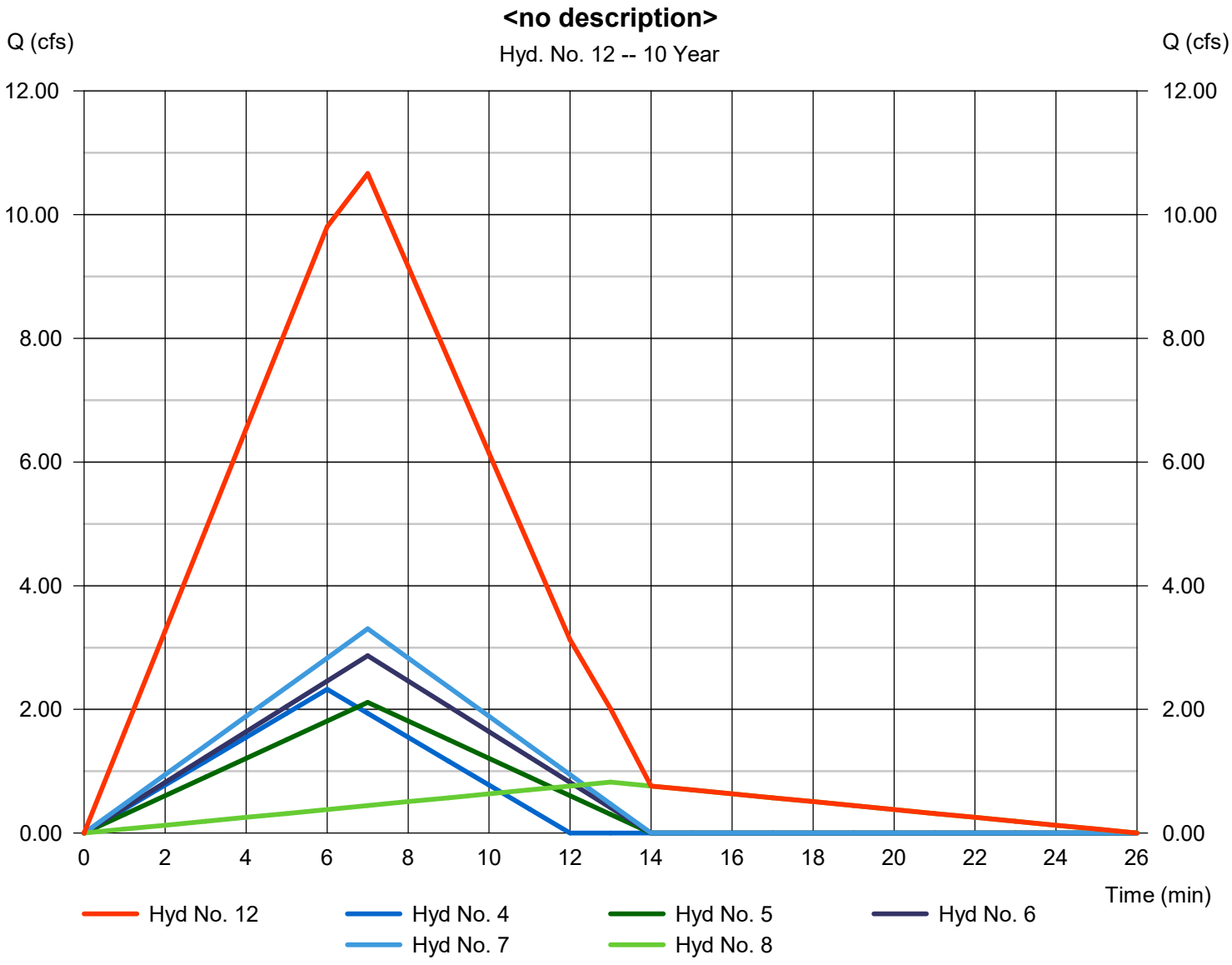
# Hydrograph Report



## Hyd. No. 12

<no description>

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 10.67 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 7 min |
| Time interval | = 1 min | Hyd. volume | = 4,960 cuft |
| Inflow hyds. | = 4, 5, 6, 7, 8 | Contrib. drain. area | = 4.490 ac |



# Hydrograph Report

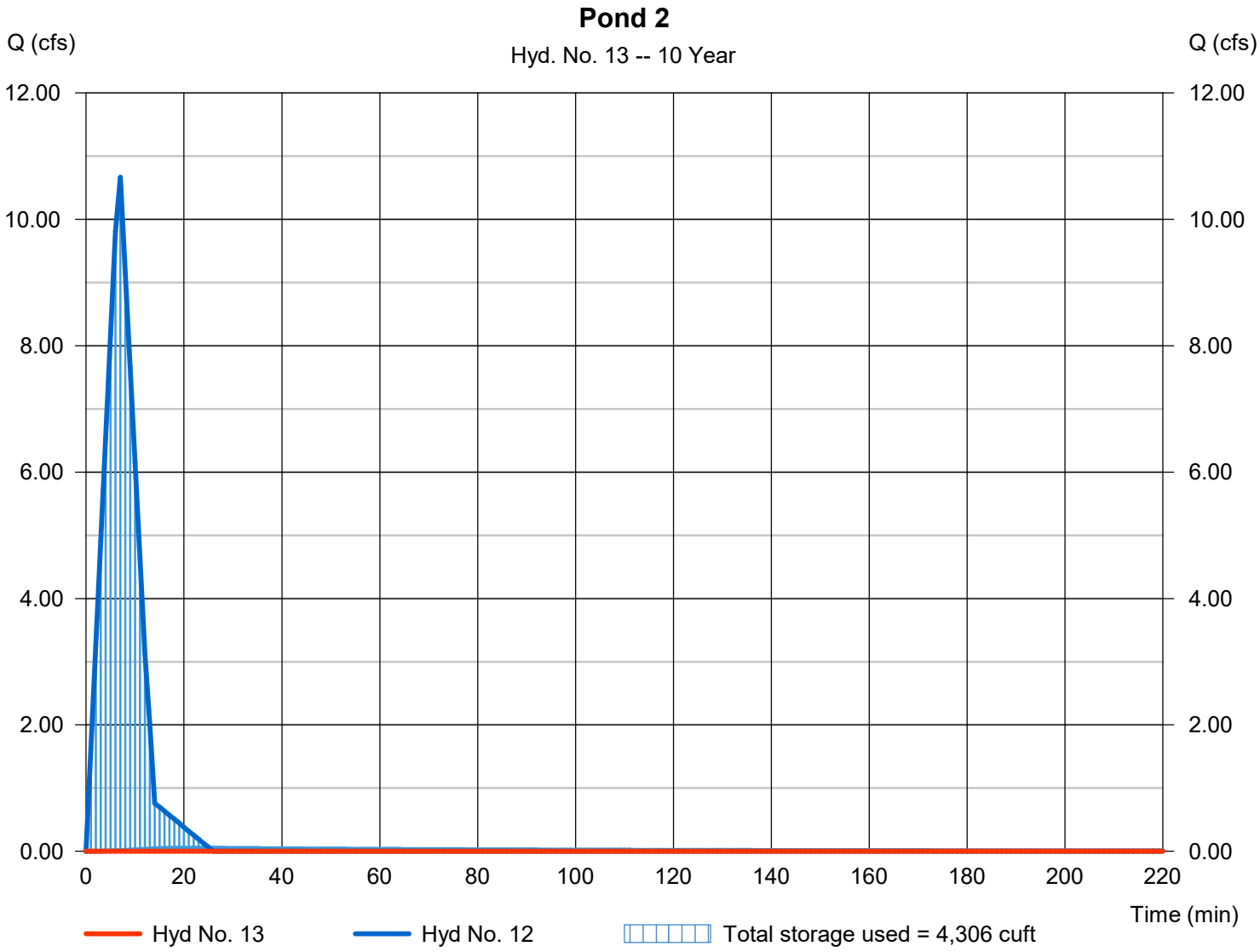


## Hyd. No. 13

Pond 2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 0.000 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 99 min |
| Time interval | = | 1 min | Hyd. volume | = | 0 cuft |
| Inflow hyd. No. | = | 12 - <no description> | Max. Elevation | = | 2663.80 ft |
| Reservoir name | = | POND 2 | Max. Storage | = | 4,306 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

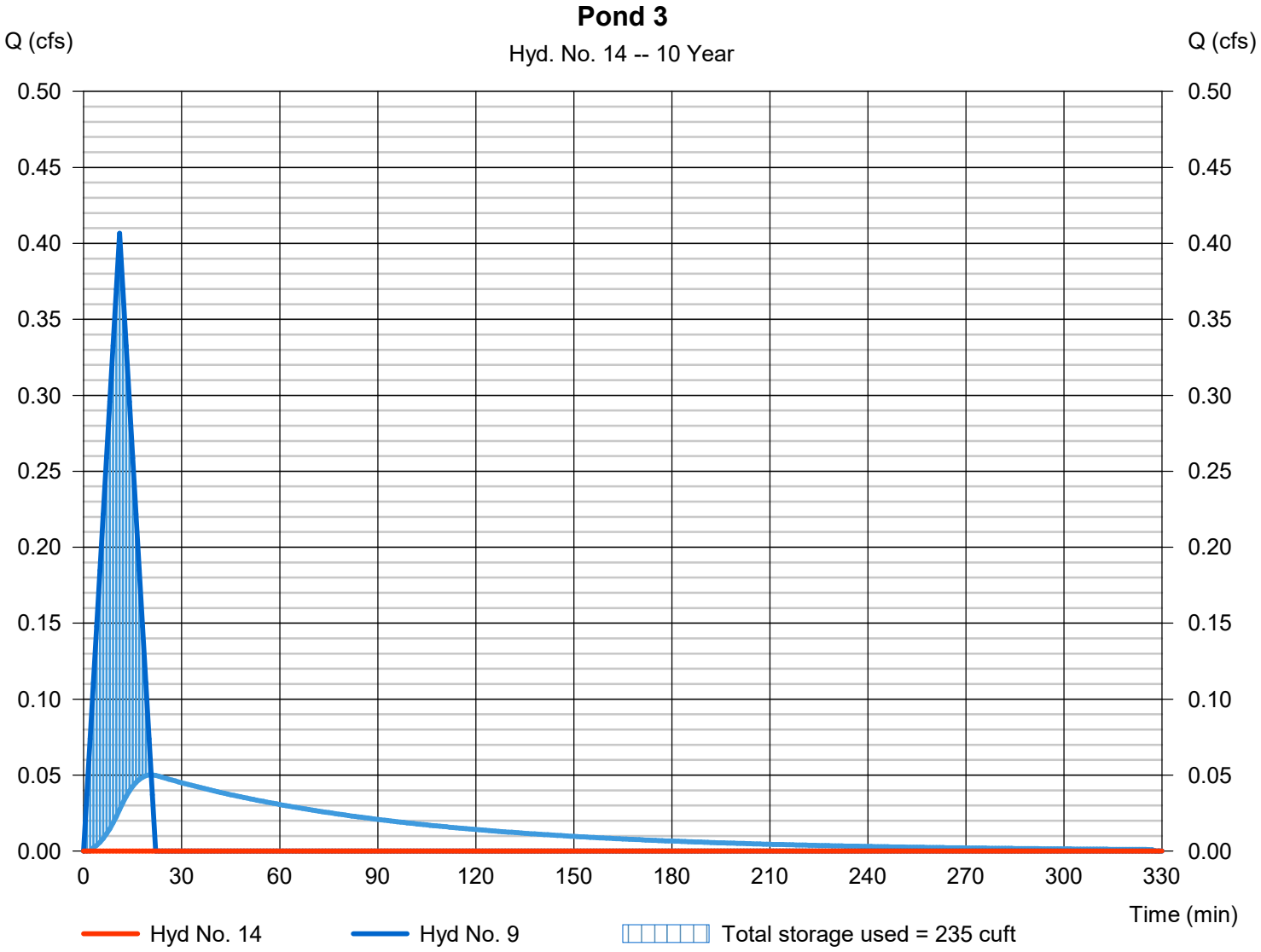


## Hyd. No. 14

Pond 3

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.000 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 20 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyd. No. | = 9 - P-9 | Max. Elevation | = 2659.52 ft |
| Reservoir name | = POND 3 | Max. Storage | = 235 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



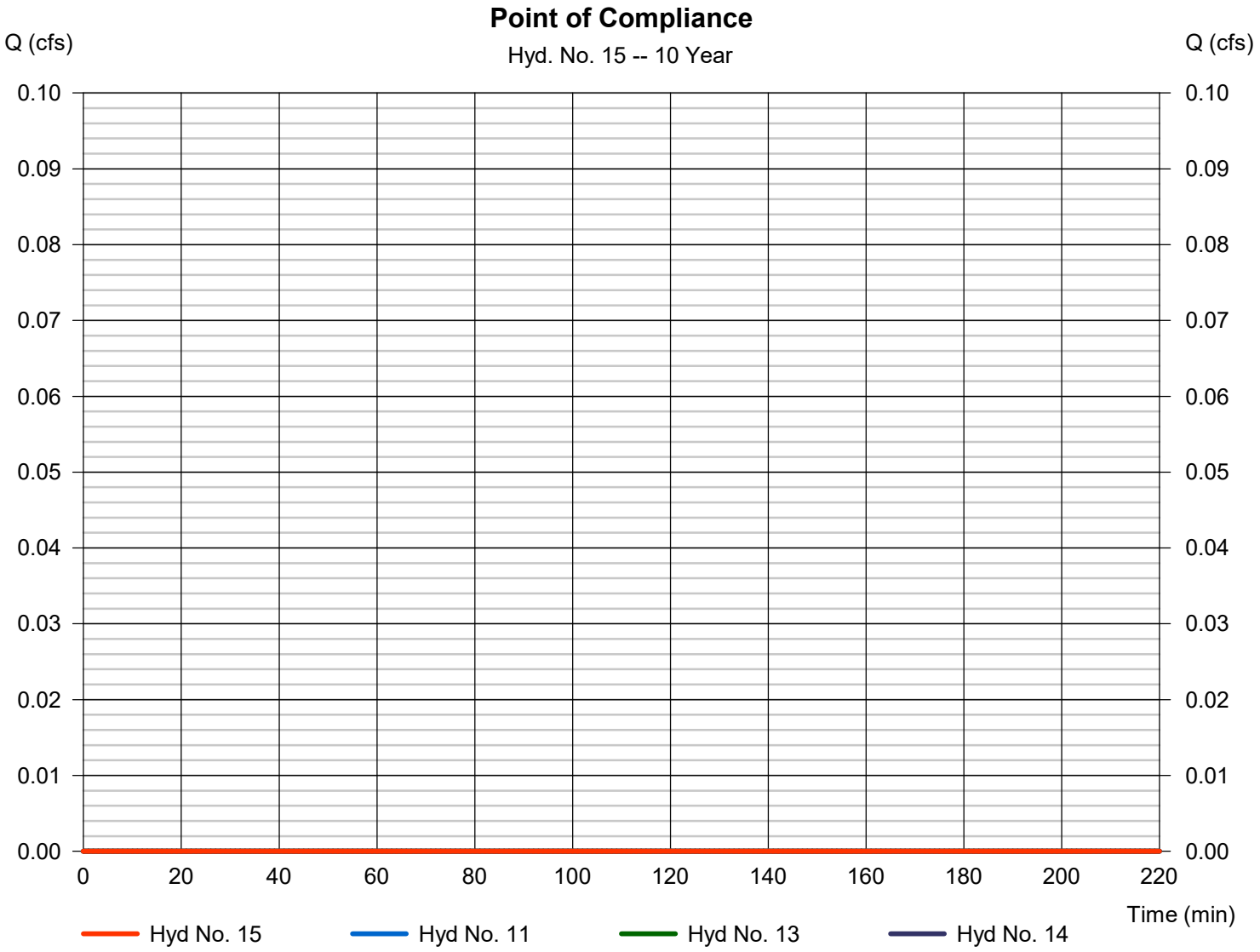
# Hydrograph Report



## Hyd. No. 15

Point of Compliance

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.000 cfs |
| Storm frequency | = 10 yrs | Time to peak | = 99 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyds. | = 11, 13, 14 | Contrib. drain. area | = 0.000 ac |



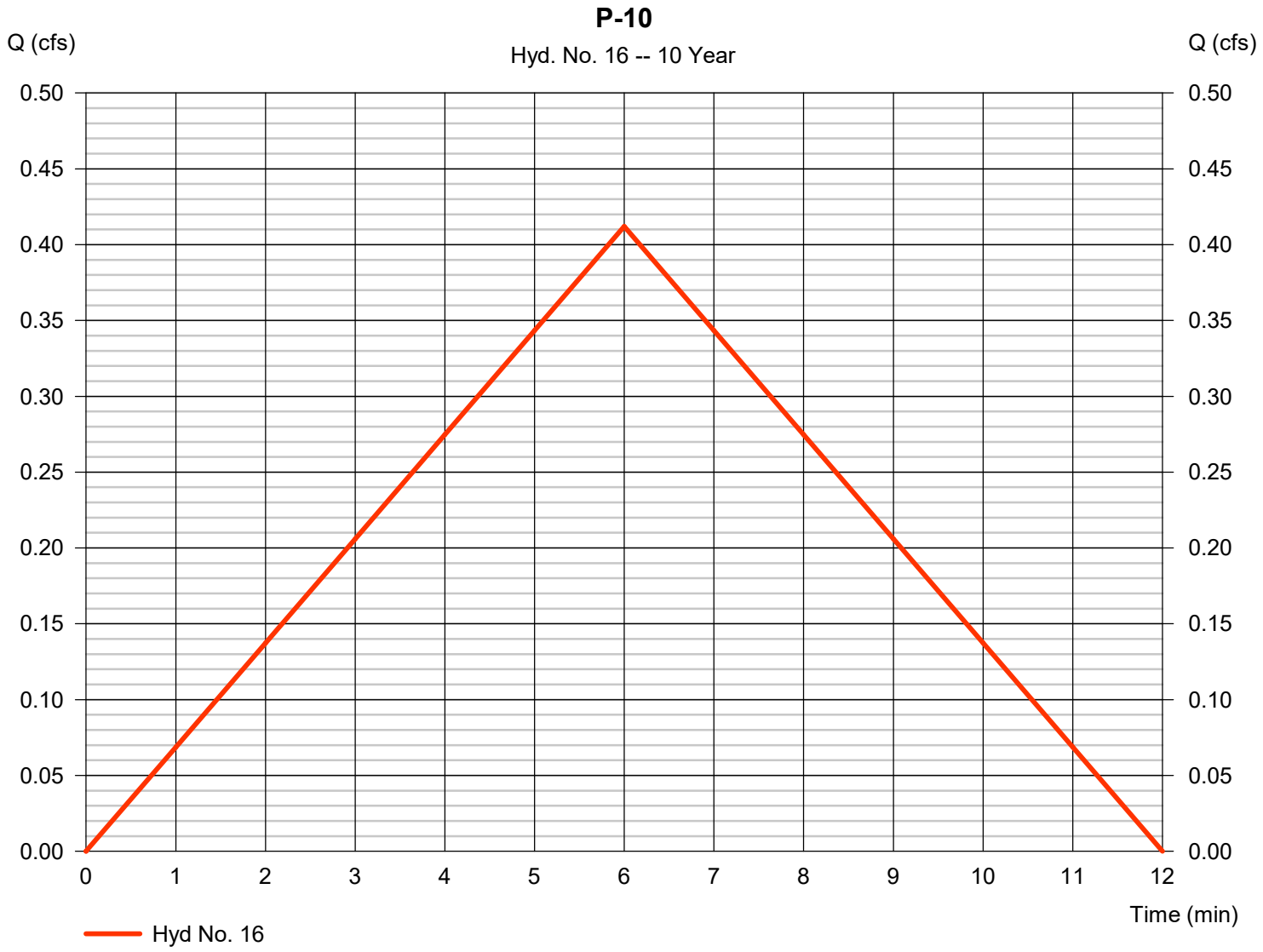
# Hydrograph Report



## Hyd. No. 16

P-10

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.412 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 148 cuft |
| Drainage area | = | 0.150 ac | Runoff coeff. | = | 0.84 |
| Intensity | = | 3.270 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Rational | 2.536 | 1 | 6 | 913 | ------ | ------ | ------ | P-1 |
| 2 | Rational | 5.518 | 1 | 6 | 1,986 | ------ | ------ | ------ | P-2 |
| 3 | Rational | 4.958 | 1 | 8 | 2,380 | ------ | ------ | ------ | P-3 |
| 4 | Rational | 3.515 | 1 | 6 | 1,265 | ------ | ------ | ------ | P-4 |
| 5 | Rational | 3.192 | 1 | 7 | 1,341 | ------ | ------ | ------ | P-5 |
| 6 | Rational | 4.338 | 1 | 7 | 1,822 | ------ | ------ | ------ | P-6 |
| 7 | Rational | 4.993 | 1 | 7 | 2,097 | ------ | ------ | ------ | P-7 |
| 8 | Rational | 1.246 | 1 | 13 | 971 | ------ | ------ | ------ | P-8 |
| 9 | Rational | 0.614 | 1 | 11 | 405 | ------ | ------ | ------ | P-9 |
| 10 | Combine | 11.77 | 1 | 6 | 5,279 | 1, 2, 3, | ------ | ------ | <no description> |
| 11 | Reservoir | 0.000 | 1 | 162 | 0 | 10 | 2675.42 | 4,864 | Pond 1 |
| 12 | Combine | 16.12 | 1 | 7 | 7,496 | 4, 5, 6, 7, 8, | ------ | ------ | <no description> |
| 13 | Reservoir | 0.000 | 1 | 153 | 0 | 12 | 2664.40 | 6,650 | Pond 2 |
| 14 | Reservoir | 0.000 | 1 | 55 | 0 | 9 | 2659.79 | 356 | Pond 3 |
| 15 | Combine | 0.000 | 1 | 153 | 0 | 11, 13, 14 | ------ | ------ | Point of Compliance |
| 16 | Rational | 0.623 | 1 | 6 | 224 | ------ | ------ | ------ | P-10 |

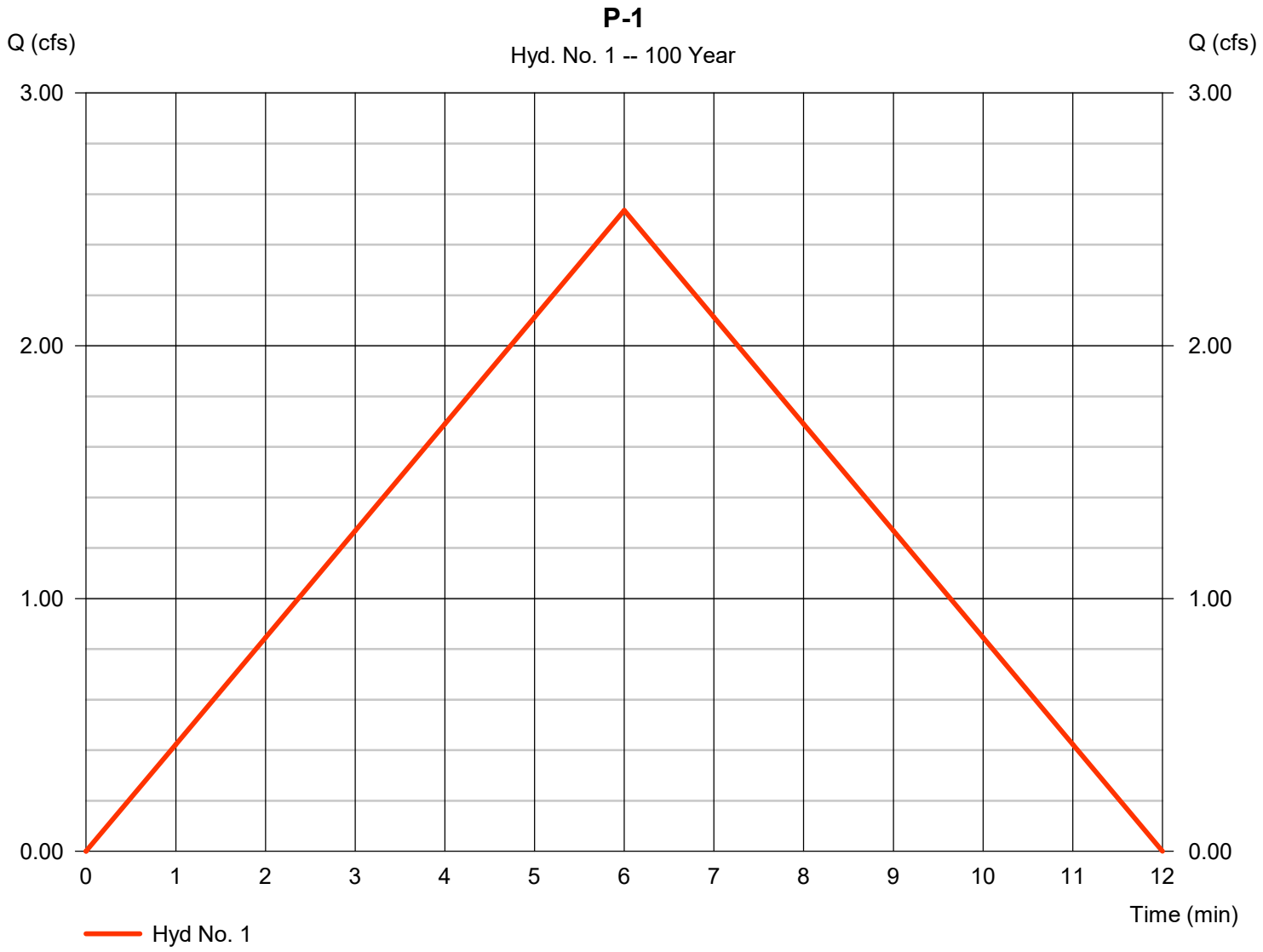
# Hydrograph Report



## Hyd. No. 1

P-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 2.536 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 913 cuft |
| Drainage area | = | 0.570 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 4.944 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



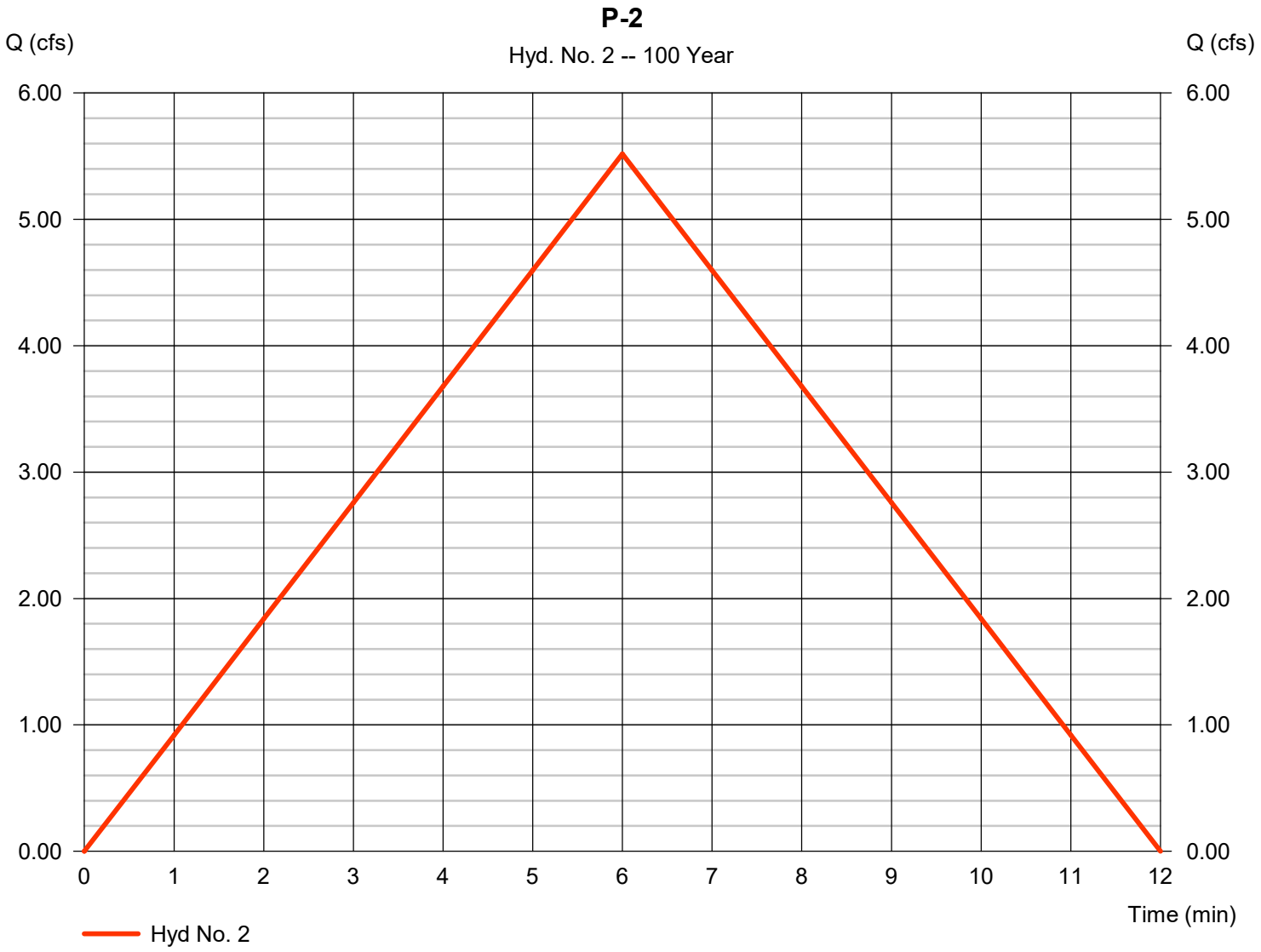
# Hydrograph Report



## Hyd. No. 2

P-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 5.518 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,986 cuft |
| Drainage area | = | 1.240 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 4.944 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



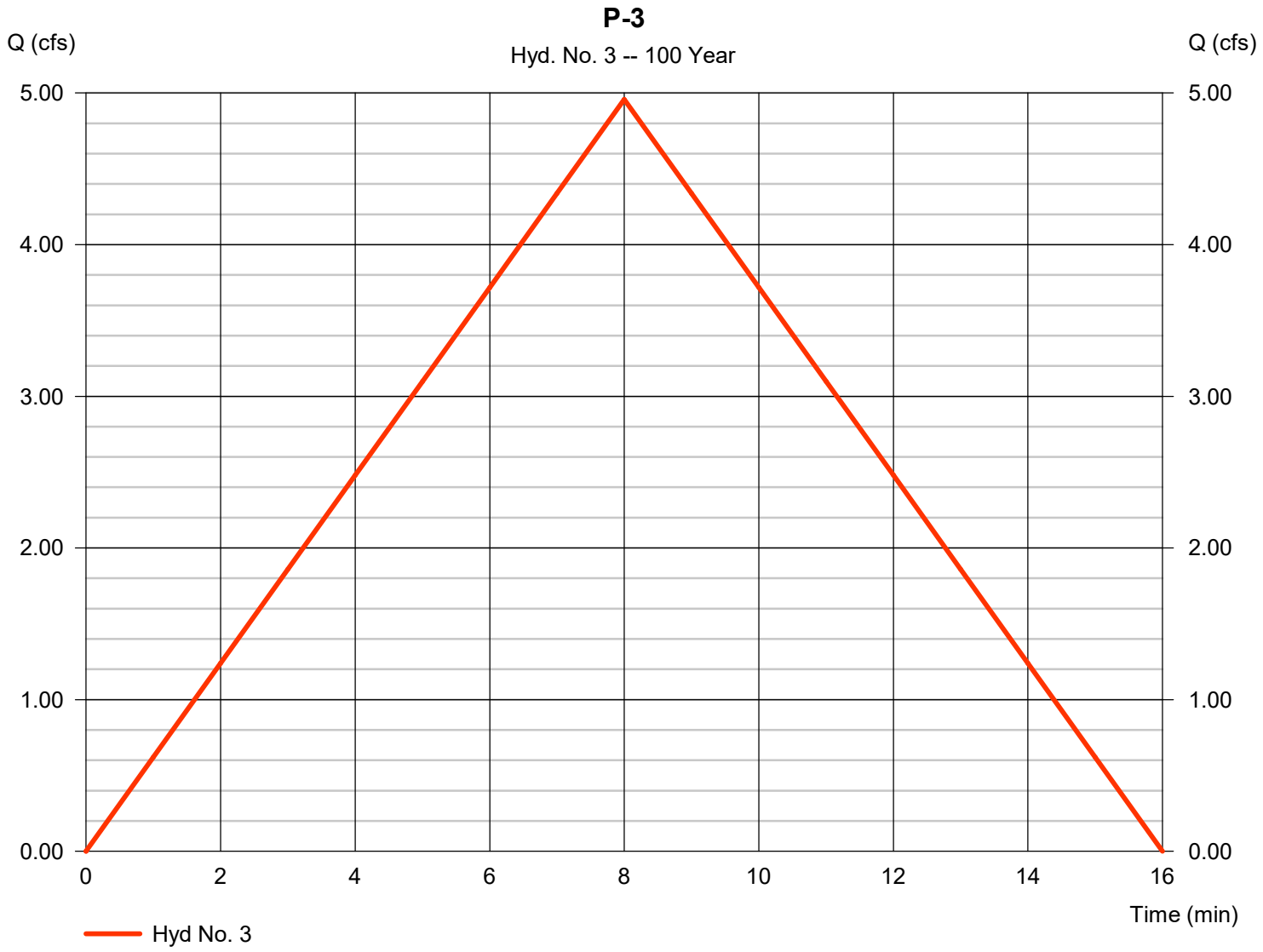
# Hydrograph Report



## Hyd. No. 3

P-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 4.958 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 8 min |
| Time interval | = | 1 min | Hyd. volume | = | 2,380 cuft |
| Drainage area | = | 1.430 ac | Runoff coeff. | = | 0.82 |
| Intensity | = | 4.228 in/hr | Tc by FAA | = | 8.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



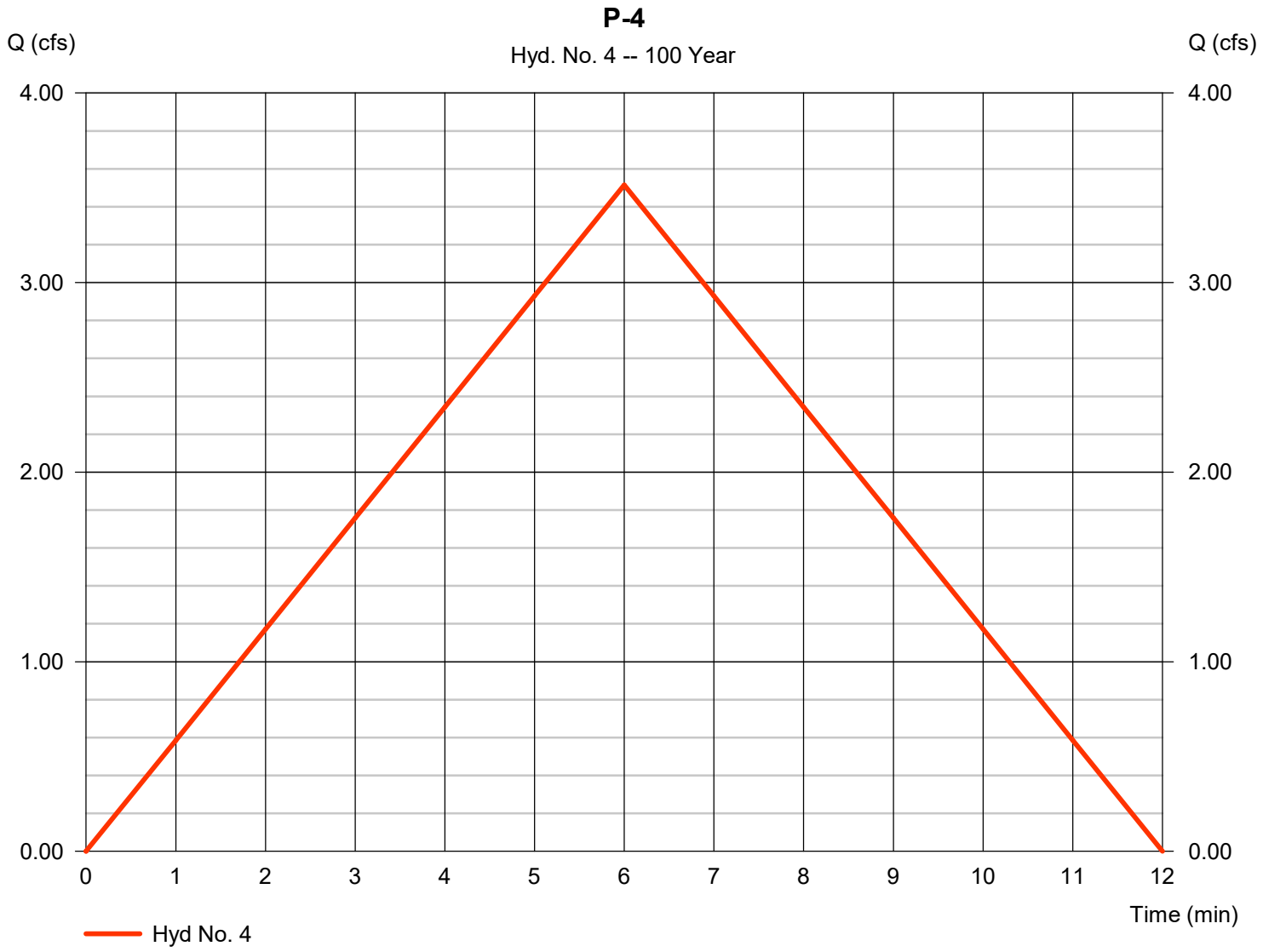
# Hydrograph Report



## Hyd. No. 4

P-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 3.515 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,265 cuft |
| Drainage area | = | 0.790 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 4.944 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



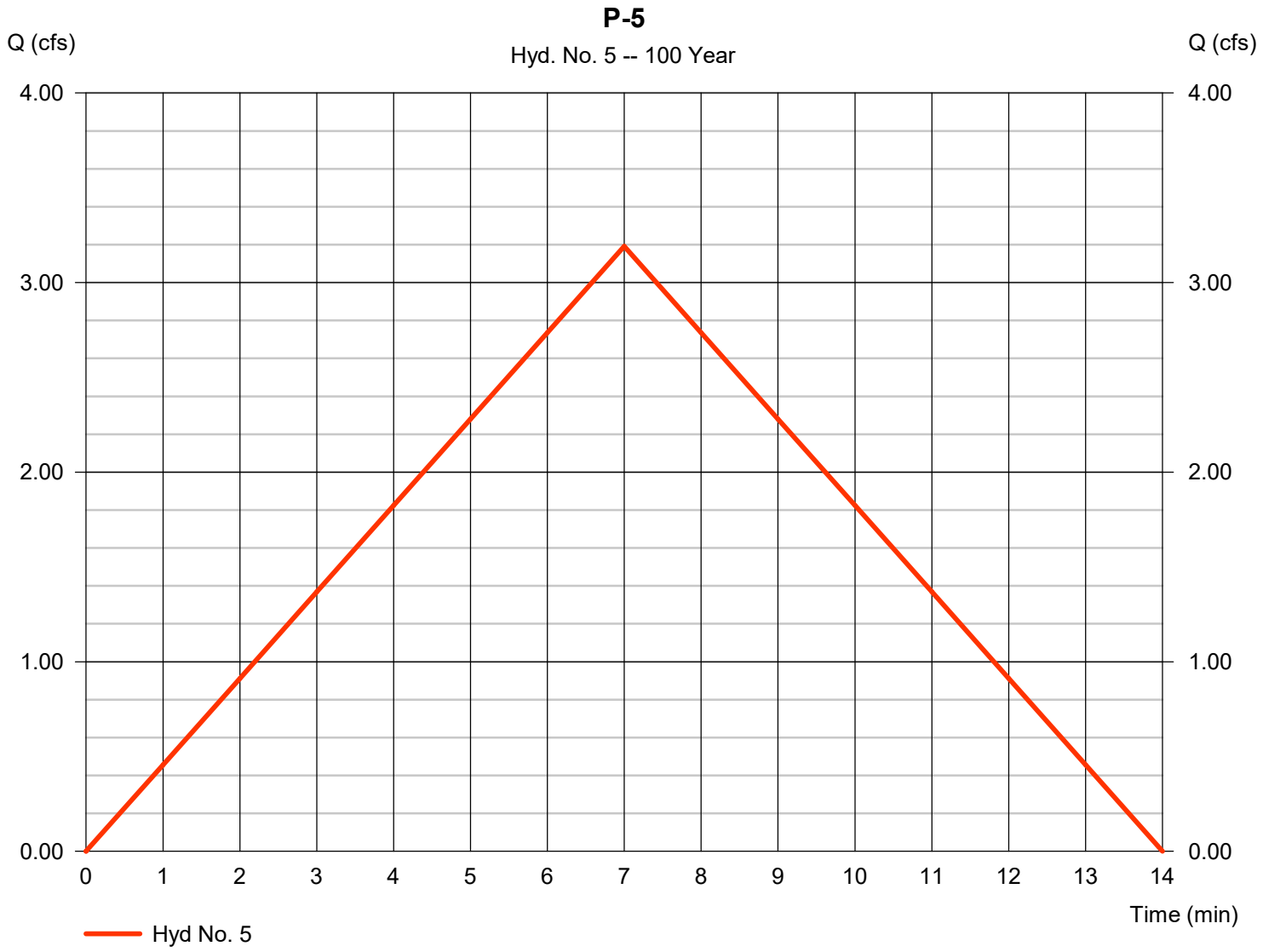
# Hydrograph Report



## Hyd. No. 5

P-5

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 3.192 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,341 cuft |
| Drainage area | = | 0.780 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 4.547 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



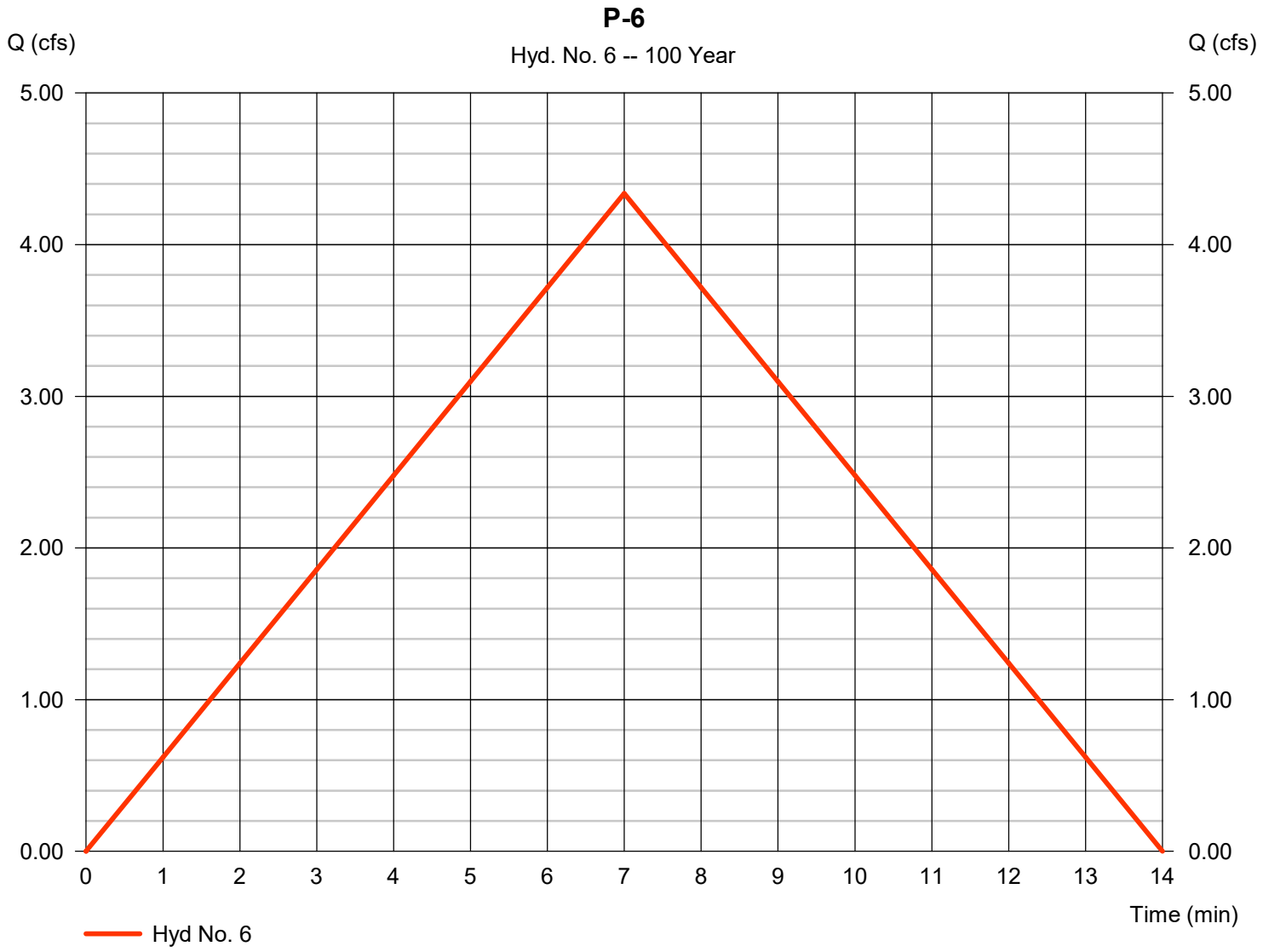
# Hydrograph Report



## Hyd. No. 6

P-6

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 4.338 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,822 cuft |
| Drainage area | = | 1.060 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 4.547 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



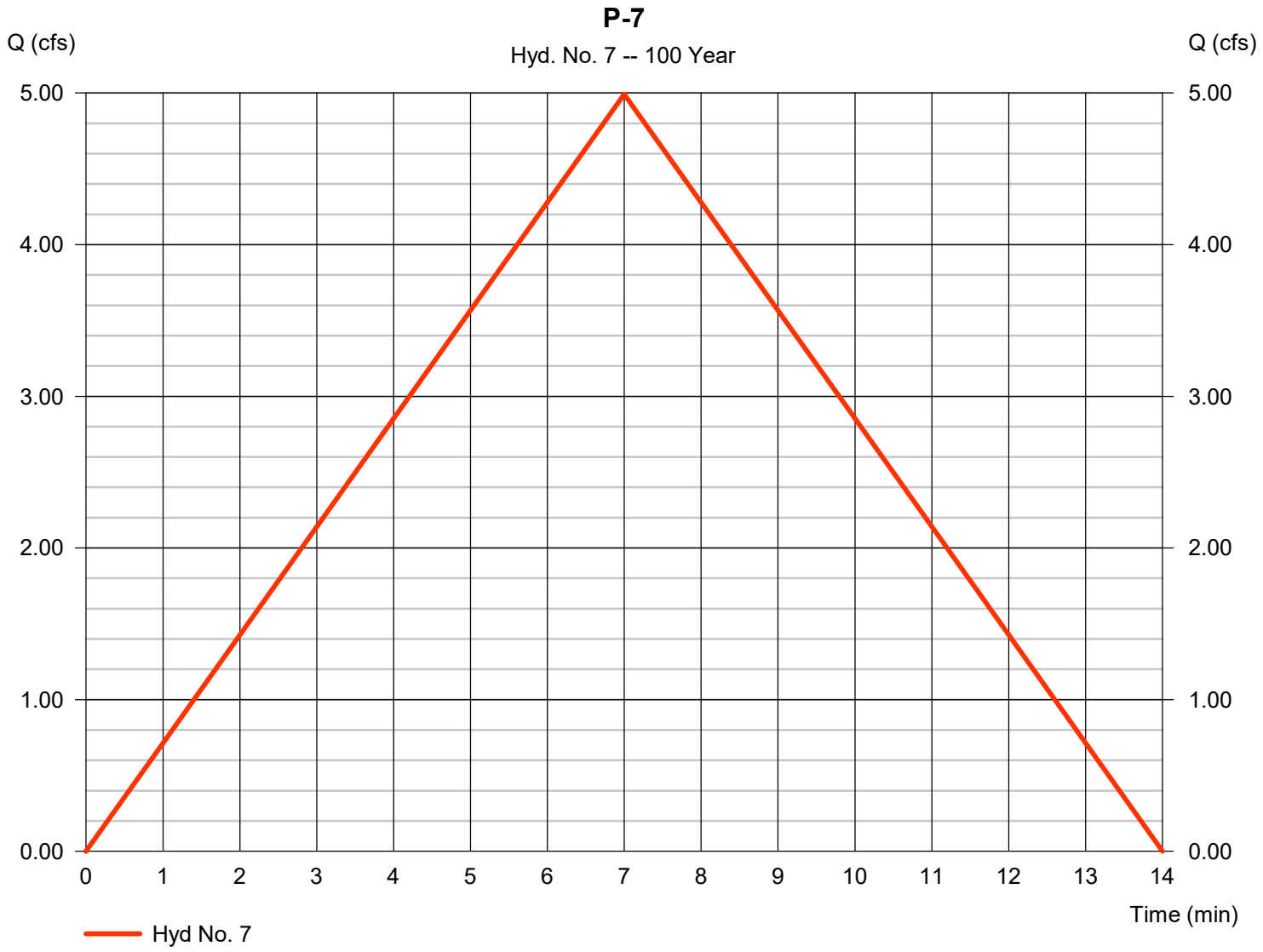
# Hydrograph Report



## Hyd. No. 7

P-7

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 4.993 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 7 min |
| Time interval | = | 1 min | Hyd. volume | = | 2,097 cuft |
| Drainage area | = | 1.220 ac | Runoff coeff. | = | 0.9 |
| Intensity | = | 4.547 in/hr | Tc by FAA | = | 7.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# Hydrograph Report



## Hyd. No. 8

P-8

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 1.246 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 13 min |
| Time interval | = | 1 min | Hyd. volume | = | 971 cuft |
| Drainage area | = | 0.640 ac | Runoff coeff. | = | 0.6 |
| Intensity | = | 3.244 in/hr | Tc by FAA | = | 13.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |

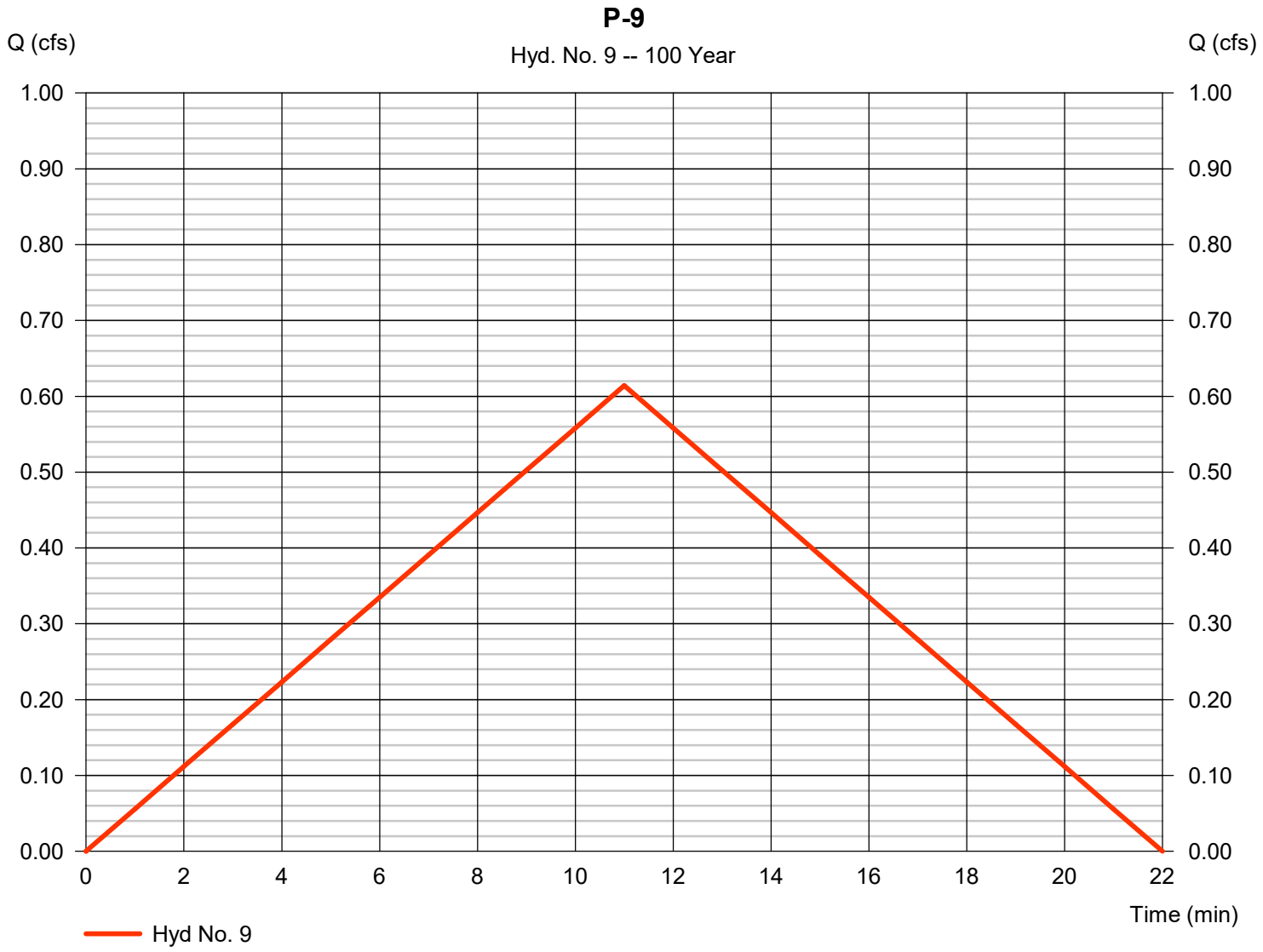
# Hydrograph Report



## Hyd. No. 9

P-9

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.614 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 11 min |
| Time interval | = | 1 min | Hyd. volume | = | 405 cuft |
| Drainage area | = | 0.360 ac | Runoff coeff. | = | 0.48 |
| Intensity | = | 3.554 in/hr | Tc by FAA | = | 11.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



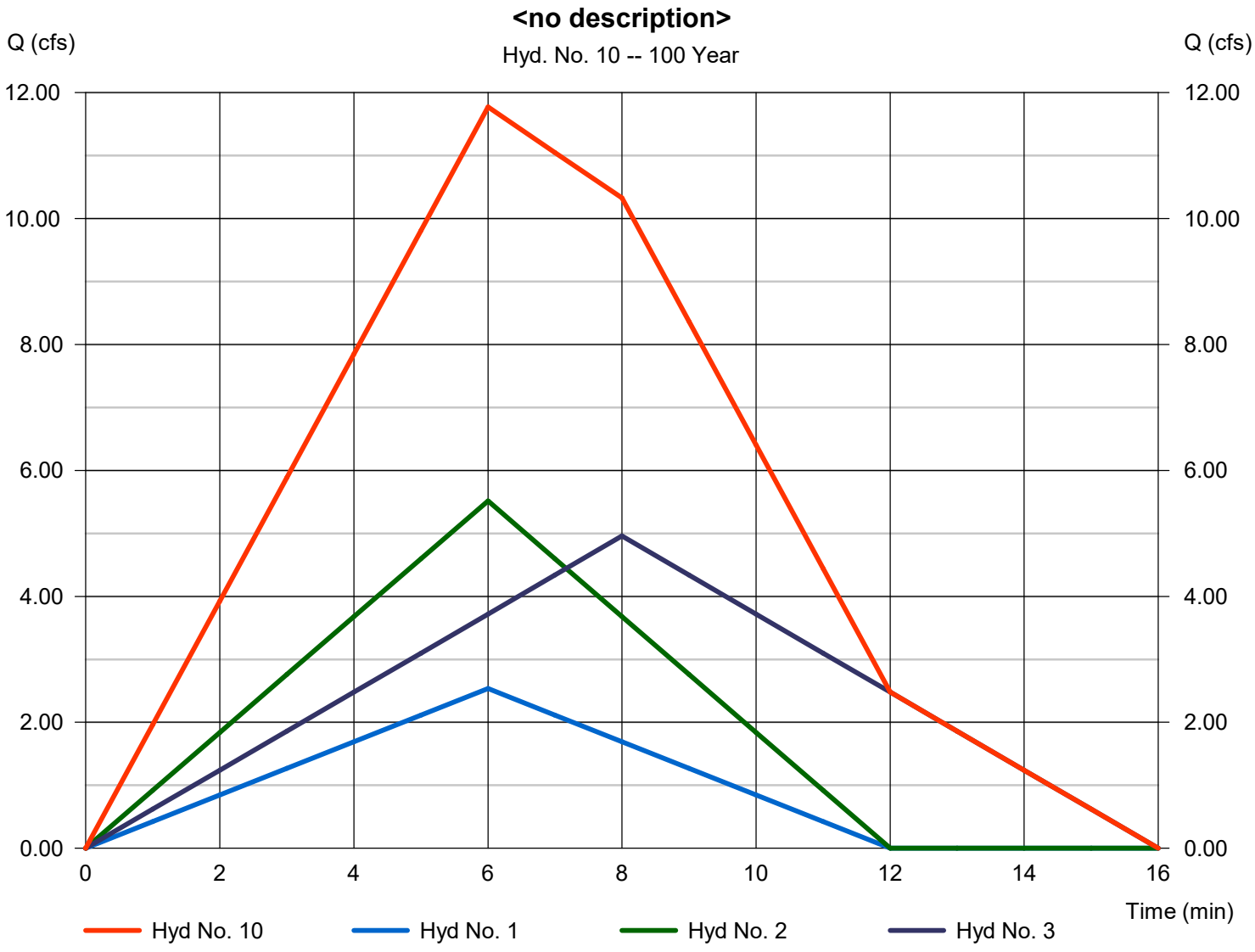
# Hydrograph Report



## Hyd. No. 10

<no description>

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 11.77 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 5,279 cuft |
| Inflow hyds. | = | 1, 2, 3 | Contrib. drain. area | = | 3.240 ac |



# Hydrograph Report

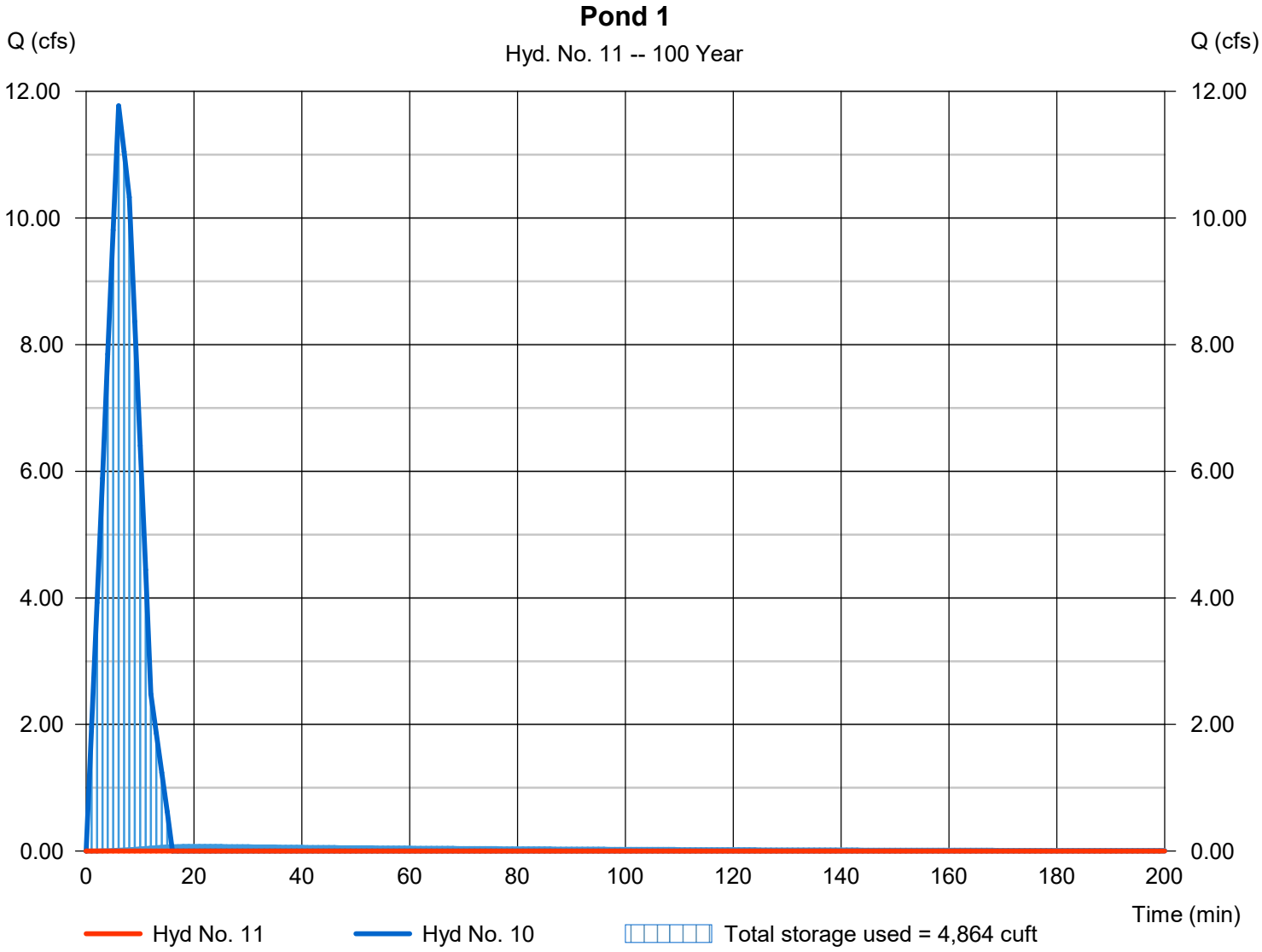


## Hyd. No. 11

Pond 1

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.000 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 162 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyd. No. | = 10 - <no description> | Max. Elevation | = 2675.42 ft |
| Reservoir name | = POND 1 | Max. Storage | = 4,864 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



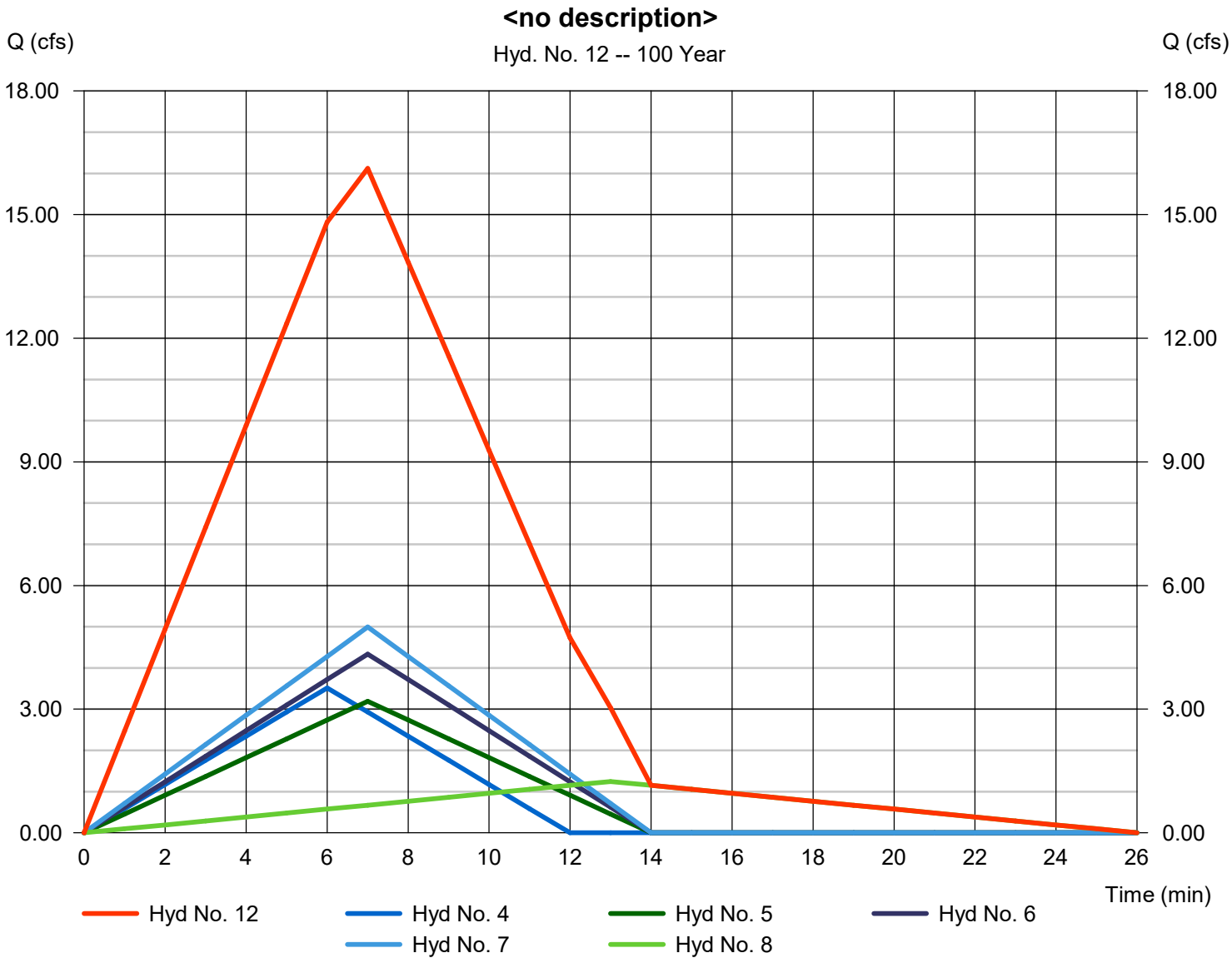
# Hydrograph Report



## Hyd. No. 12

<no description>

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 16.12 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 7 min |
| Time interval | = 1 min | Hyd. volume | = 7,496 cuft |
| Inflow hyds. | = 4, 5, 6, 7, 8 | Contrib. drain. area | = 4.490 ac |



# Hydrograph Report

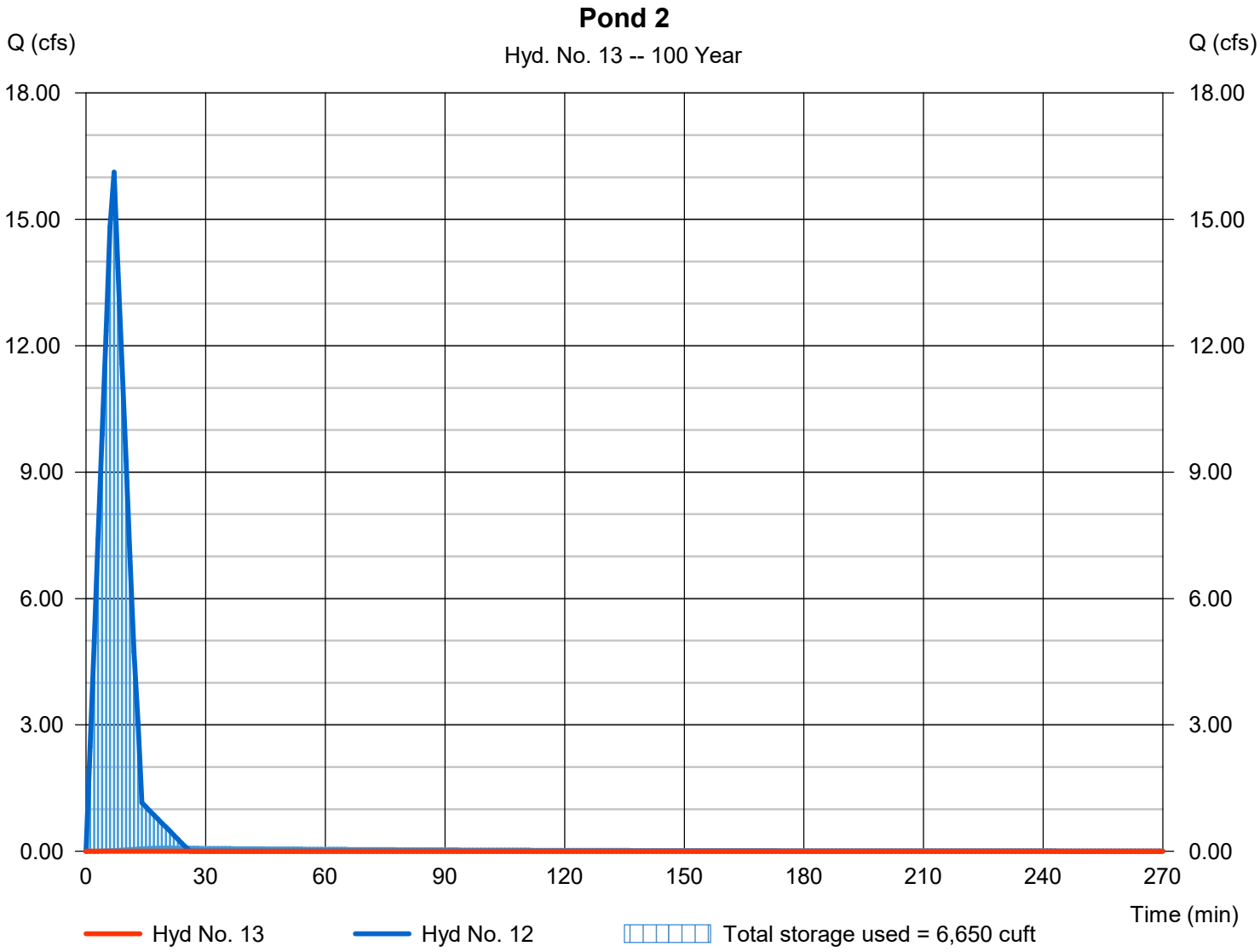


## Hyd. No. 13

Pond 2

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.000 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 153 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyd. No. | = 12 - <no description> | Max. Elevation | = 2664.40 ft |
| Reservoir name | = POND 2 | Max. Storage | = 6,650 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

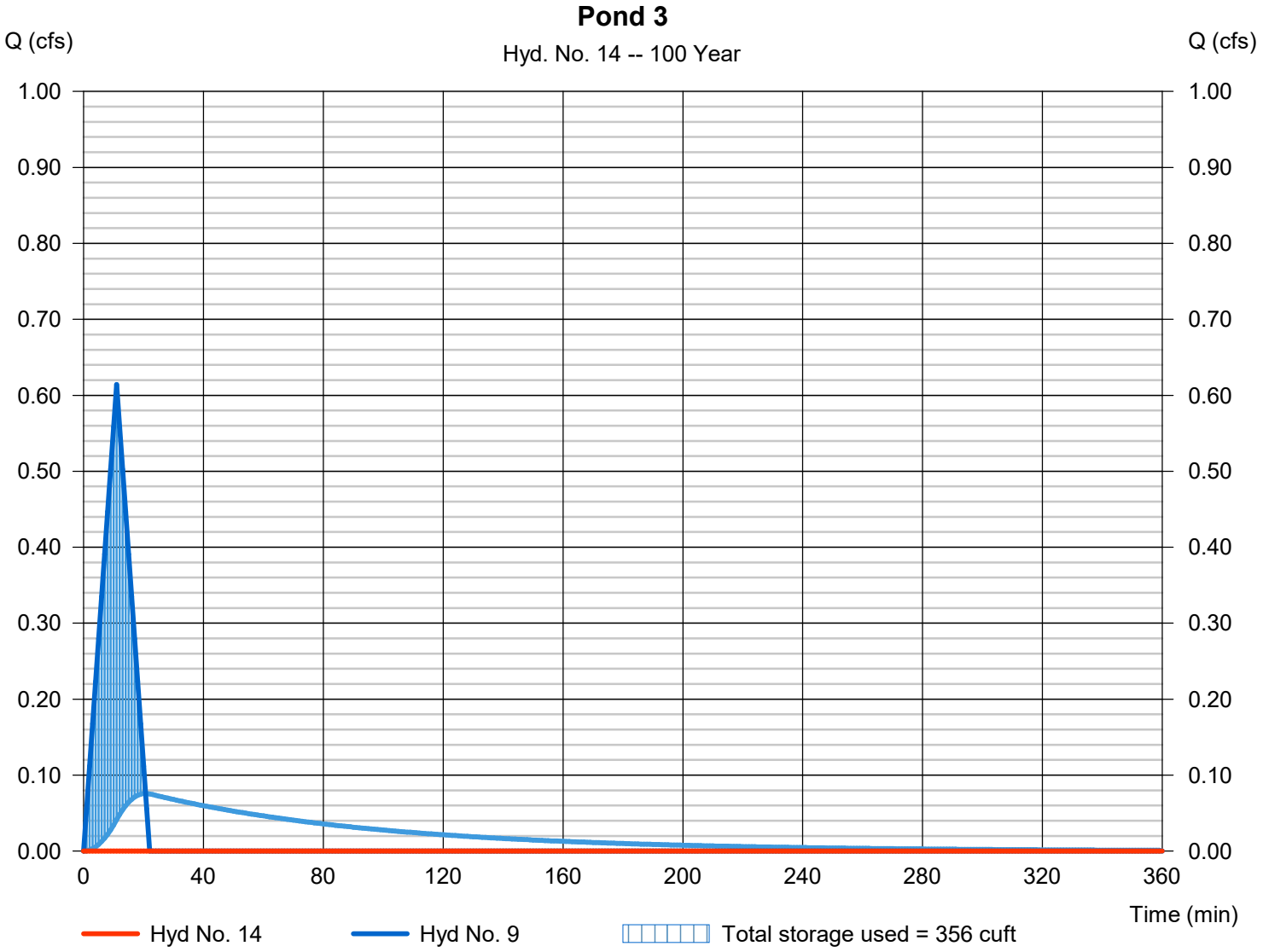


## Hyd. No. 14

Pond 3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 0.000 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 55 min |
| Time interval | = | 1 min | Hyd. volume | = | 0 cuft |
| Inflow hyd. No. | = | 9 - P-9 | Max. Elevation | = | 2659.79 ft |
| Reservoir name | = | POND 3 | Max. Storage | = | 356 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



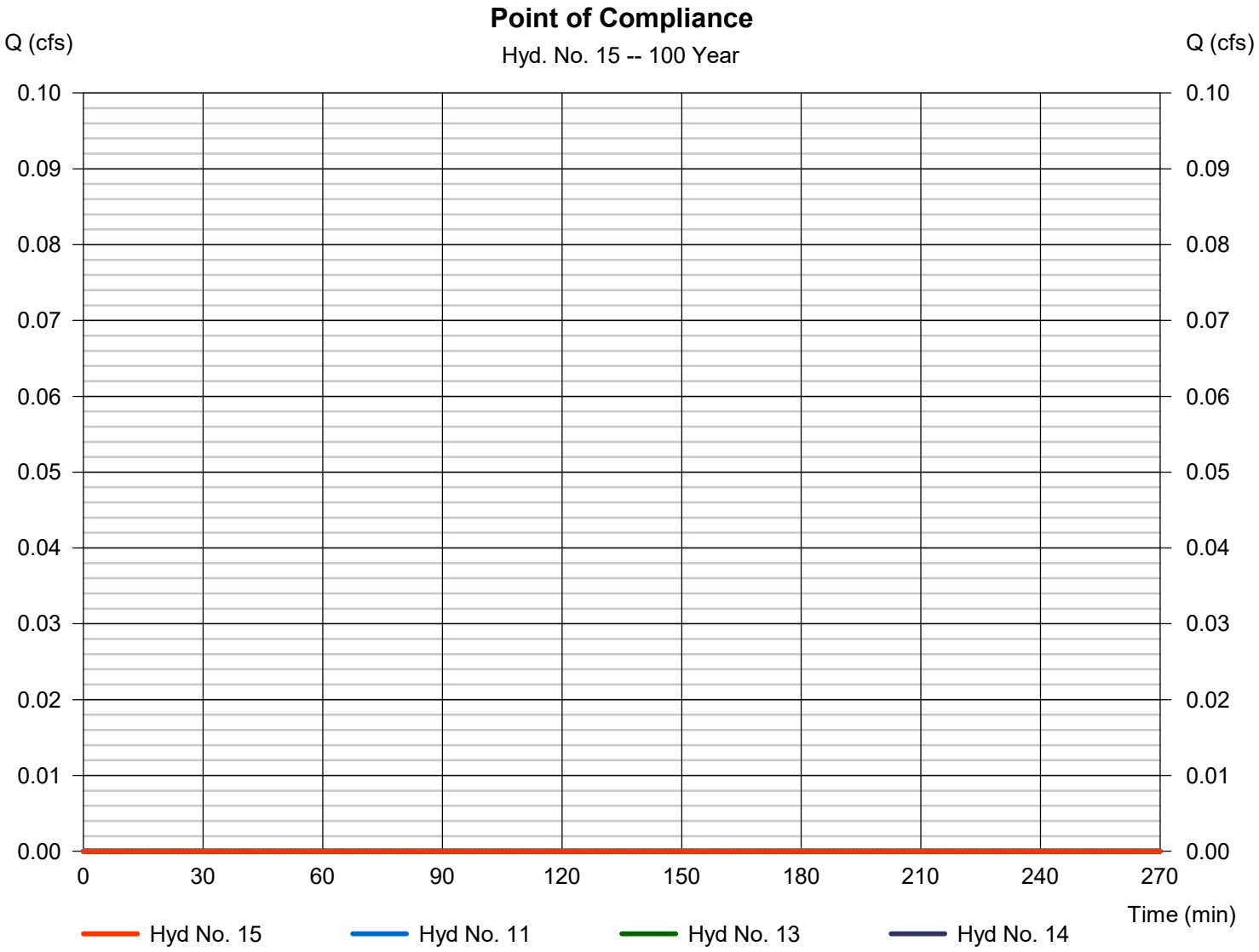
# Hydrograph Report



## Hyd. No. 15

Point of Compliance

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.000 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 153 min |
| Time interval | = 1 min | Hyd. volume | = 0 cuft |
| Inflow hyds. | = 11, 13, 14 | Contrib. drain. area | = 0.000 ac |



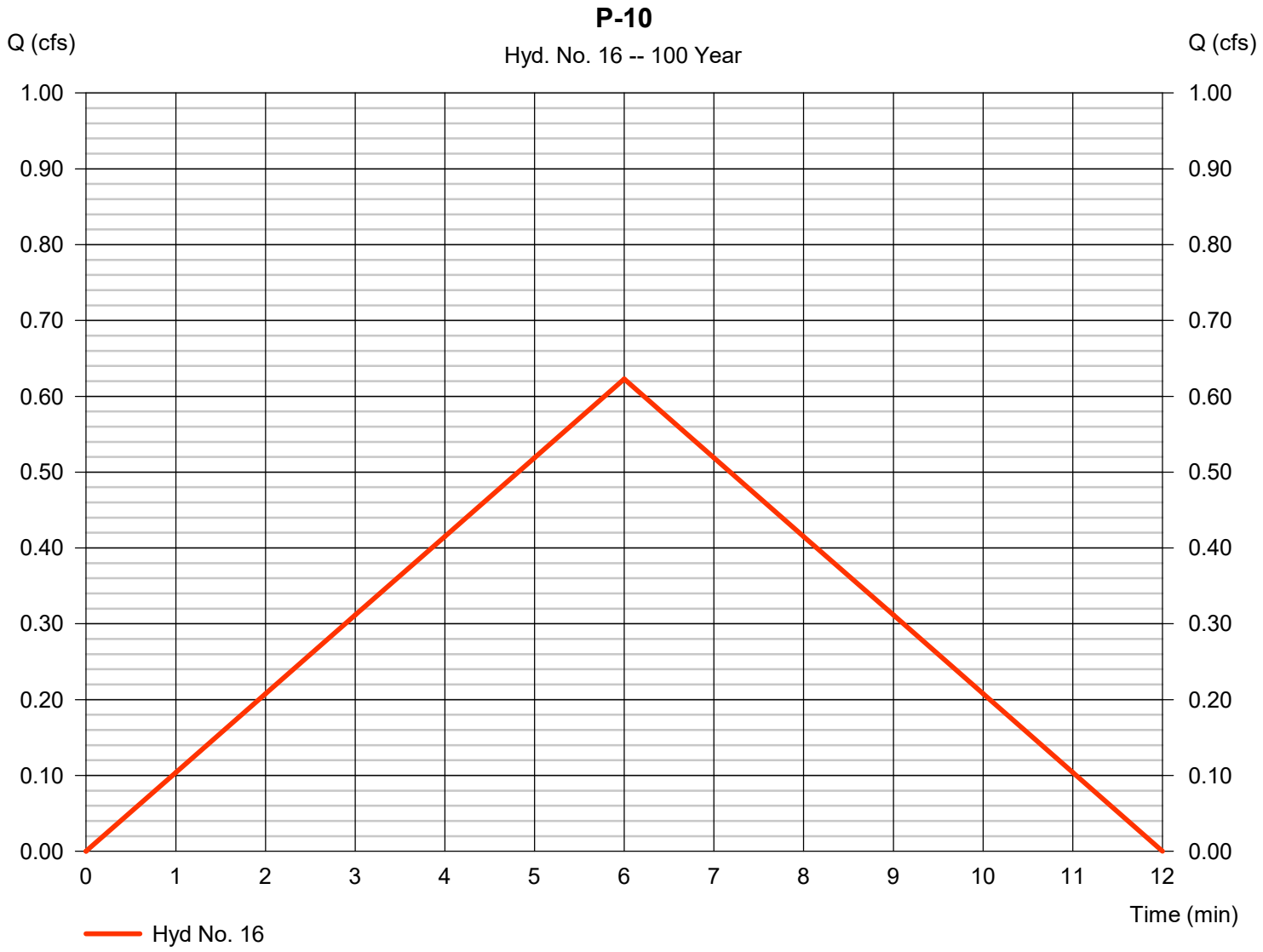
# Hydrograph Report



## Hyd. No. 16

P-10

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Rational | Peak discharge | = | 0.623 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 6 min |
| Time interval | = | 1 min | Hyd. volume | = | 224 cuft |
| Drainage area | = | 0.150 ac | Runoff coeff. | = | 0.84 |
| Intensity | = | 4.944 in/hr | Tc by FAA | = | 6.00 min |
| IDF Curve | = | Cherry Valley.IDF | Asc/Rec limb fact | = | 1/1 |



# Hydraflow Rainfall Report



| Return Period (Yrs) | Intensity-Duration-Frequency Equation Coefficients (FHA) | | | |
|---|---|---|---|---|
| | B | D | E | (N/A) |
| 1 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 2 | 3.5440 | 1.1000 | 0.6004 | -------- |
| 3 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 5 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 10 | 8.8347 | 0.1000 | 0.5496 | -------- |
| 25 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 50 | 0.0000 | 0.0000 | 0.0000 | -------- |
| 100 | 13.4033 | 0.1000 | 0.5515 | -------- |

File name: Cherry Valley.IDF

### Intensity = B / (Tc + D)^E

| Return Period (Yrs) | Intensity Values (in/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.20 | 0.84 | 0.67 | 0.57 | 0.50 | 0.45 | 0.41 | 0.38 | 0.36 | 0.33 | 0.32 | 0.30 |
| 3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 3.61 | 2.48 | 1.99 | 1.70 | 1.50 | 1.36 | 1.25 | 1.16 | 1.09 | 1.03 | 0.98 | 0.93 |
| 25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 5.46 | 3.74 | 3.00 | 2.56 | 2.27 | 2.05 | 1.88 | 1.75 | 1.64 | 1.55 | 1.47 | 1.40 |

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

| Storm Distribution | Rainfall Precipitation Table (in) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| SCS 24-hour | 0.00 | 2.20 | 0.00 | 3.30 | 4.25 | 5.77 | 6.80 | 7.95 |
| SCS 6-Hr | 0.00 | 1.80 | 0.00 | 0.00 | 2.60 | 0.00 | 0.00 | 4.00 |
| Huff-1st | 0.00 | 1.55 | 0.00 | 2.75 | 4.00 | 5.38 | 6.50 | 8.00 |
| Huff-2nd | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-3rd | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-4th | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Huff-Indy | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Custom | 0.00 | 1.75 | 0.00 | 2.80 | 3.90 | 5.25 | 6.00 | 7.10 |

January 20, 2023
Project No. C537-001

**Corion Enterprises**
100 Wilshire Blvd., Suite 700
Santa Monica, California 90401

Attention: Ms. JoAnn Horeni
Director, Client Relations

Subject: Geotechnical Report Update
Proposed Mini Storage Facility
Brookside Avenue, North Side, East of Nancy Avenue
Cherry Valley Area, Riverside County, California

Dear Ms. Horeni:

We are pleased to submit this geotechnical investigation report update for the subject project. The proposed development is to be located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County.

The proposed development is feasible from a geotechnical engineering standpoint. The primary issues that will require mitigation are related to variable near-surface soil conditions.

We appreciate the opportunity of being of service to you on this project. If there are any questions, please contact our office.

Respectfully,
**INLAND FOUNDATION ENGINEERING, INC.**


**Daniel R. Lind, C.E.G.**
Vice President

**Allen D. Evans, P.E., G.E.**
Principal

DRL:ADE:es
Distribution: Addressee

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## *INTRODUCTION*

The proposed mini-storage development is located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County.

Inland Foundation Engineering, Inc. (IFE) previously conducted a geotechnical investigation at this site in 2009. This report is based on testing and exploration conducted at that time, and our review of existing site conditions. This report provides updated geotechnical design parameters and recommendations for site grading. The following references were used in the preparation of this report:

- Preliminary Geotechnical Report, Proposed Mini Storage Facility, Brookside Avenue, Cherry Valley Area, Riverside County, California, prepared by Inland Foundation Engineering, Inc., dated December 17, 2009, Project No. B464-002

- Response to County Review Comments – County Geologic Report No. 2202, Preliminary Geotechnical Report, Proposed Mini Storage Facility, Brookside Avenue, Cherry Valley Area, Riverside County, California, prepared by Inland Foundation Engineering, Inc., dated June 25, 2010, Project No. B464-002

- Phase I Environmental Site Assessment, Proposed Commercial Development, 38632, 38692 and 38718 Brookside Avenue, Cherry Valley, California, prepared by Inland Foundation Engineering, Inc., dated August 11, 2009, Project No. B464-001

Additional references are appended.

## *SCOPE OF SERVICE*

The purpose of this report is to provide updated geotechnical parameters for design and construction of the proposed improvements on the site. The scope of the geotechnical services included:

- *Review of 2022 California Building Code (CBC) requirements, the general geologic site conditions, and the specific subsurface conditions of the project site.*

- *Evaluation of the engineering and geologic data previously collected for the project site.*

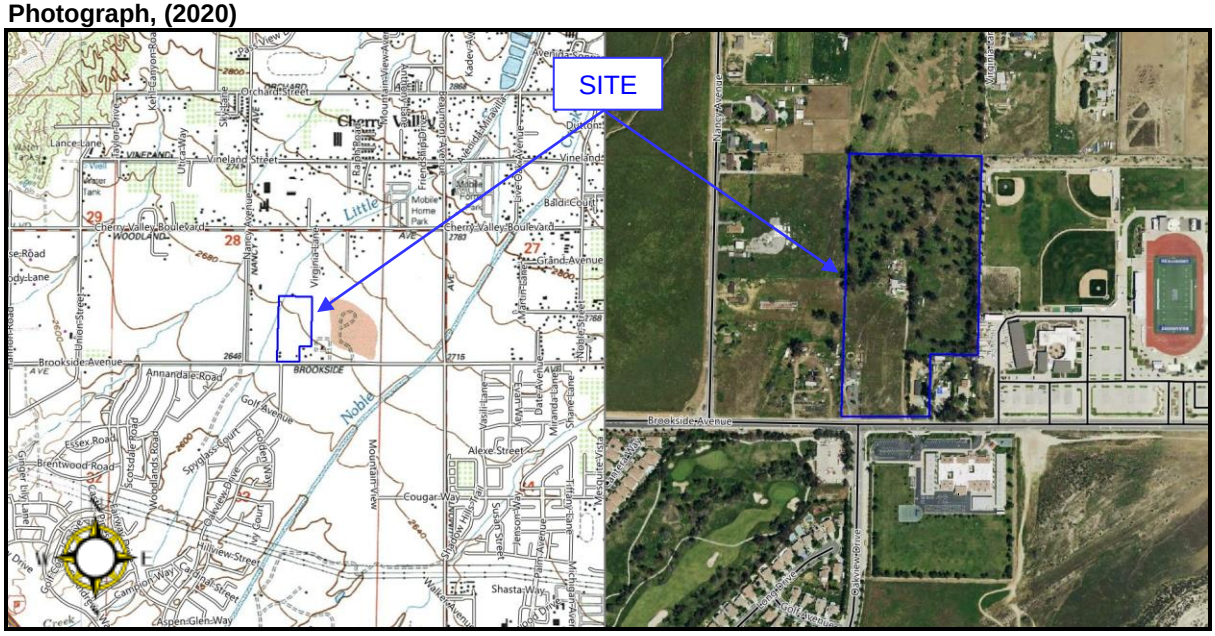
- *Preparation of this report with updated geotechnical conclusions and recommendations for design and construction.*

Evaluation of hazardous waste was not within the scope of service provided by this report. The evaluation of seismic hazards was based on literature review and subsurface exploration previously conducted at the site.

## *PROJECT AND SITE DESCRIPTION*

The project site rests in the southeasterly portion of Section 28, Township 2 South, Range 1 West, SBB&M. The site is located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County. The location of the project site is shown on Figure 1 below.

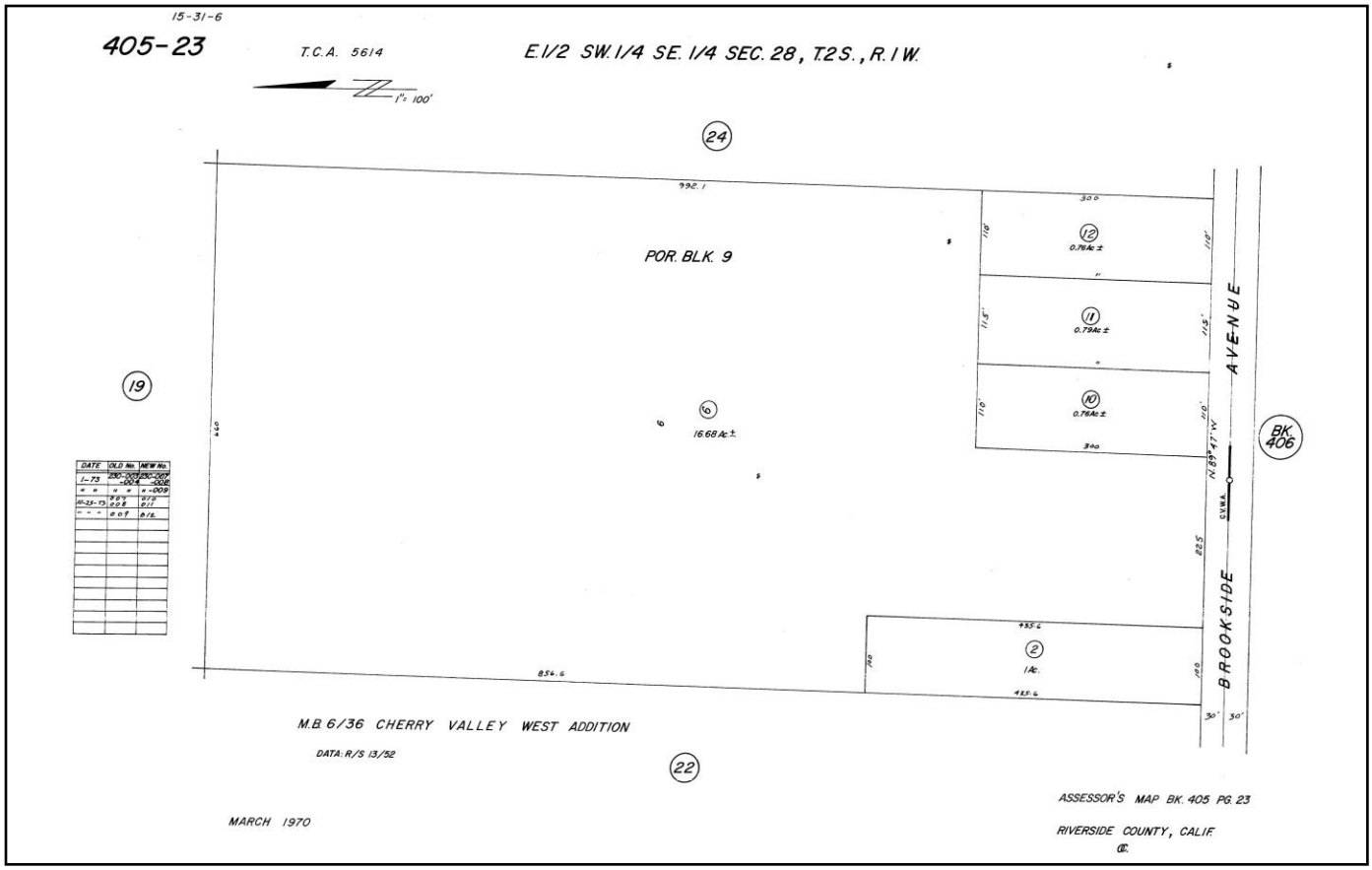
**Figure 1: Topographic Map, USGS Topographic Map, Beaumont 7.5' Quadrangle, and Aerial Photograph, (2020)**




The project site includes Assessor Parcel Nos. (APN) 405-230-006, 405-230-002, and 405-230-010. All three parcels front along Brookside Avenue. APN 405-230-006 (16.68-acre parcel) is situated between the two smaller parcels and extends along their northern perimeters. APN 405-230-002 (1-acre parcel) is located in the southwest region of the site while APN 405-230-010 (0.76-acre parcel) is located in the south-southeastern region of the site.

Figure 2 below is a portion of the Riverside County assessor parcel map showing the subject parcels.

**Figure 2: Riverside County Assessor Parcel Map**




APN 405-230-002 (1-acre) is fenced with an occupied residence near the center of the parcel. A detached garage is present on the north side of the residence and an enclosed room is attached on the north side of the garage. A gravel lined driveway extends from Brookside Avenue along the west perimeter of the parcel. A concrete parking area is located between the residence and the garage. The northern portion of the parcel is fenced and contains an empty concrete lined pond, shed and a small barn. The vegetation generally consists of several scattered trees on the parcel.

APN 405-230-006 (16.68-acres) contains a vacant residence near the center of the parcel. A detached carport is present on the north side of the residence. An empty concrete lined swimming pool is present on the west side of the residence. There is a raised terrace from the garage to the north and west of the pond. The flat terrace dips gently to the north and is approximately 3 to 6 feet higher than the adjacent grades. The parcel is vegetated with seasonal weeds, grasses and eucalyptus trees.

APN 405-230-010 (0.76 acre) contains an existing residence with an attached garage near the center of the parcel. A small area behind the residence is a fenced yard. The northern portion of the parcel is undeveloped. Existing dirt bike ramps (up to ±7 feet high) are present in the northwest portion of this parcel.

Two residential properties are located south of APN 405-230-006 (16.68-acre parcel) and east of APN 405-230-010 (0.76-acre parcel). The Beaumont Unified School District office facilities are present on the contiguous property east of the site, east of APN 405-230-006 (16.68-acre parcel). Slopes (2:1 h/v) ranging in height from about 4 to 12 feet extend downward to landscaped areas/infiltration basin at the school district site. A plant nursery is present on the contiguous property to the west of APN 405-230-002 (1-acre parcel) along Brookside Avenue. The other properties surrounding the site are residences and vacant land and/or corrals. Brookside Elementary School is present to the south of the site, across Brookside Avenue. A soil borrow pit is located several hundred feet east of the site and Beaumont High School is located approximately one-quarter mile east of the site. Residences and several small commercial businesses are located north of the site along Cherry Valley Boulevard.

The topography may be described as relatively level (±2,650' to ±2,690' msl) with two drainages running through the project site. One drainage extends across the northwest region of the site and another drainage extends from the northeast region to the center of the site. The site was historically vegetated with a dense growth of eucalyptus trees that has been partially removed.

The proposed construction will consist of a mini-storage facility. The storage facility will be developed on the eastern portion of the site. The remaining northern region and western region of the site will be held for future commercial/industrial use. The current plan indicates twenty-two self-storage structures, car parking, driveways, and carports on the site. The plan indicates that the existing house located on APN 405-230-010 (0.76 acre) will remain.

Our geotechnical exploration of the site was performed for the eastern region of the site that will contain the proposed mini storage facility. It is our understanding that the proposed facility will be supported by a combination of isolated square and continuous wall type foundations. We have not been provided with specific foundation loads. We anticipate however, that continuous wall loads will not exceed 3,000 pounds per linear foot. Isolated column loads of up to 60 kips have been considered in the generation of our geotechnical design parameters.

## *GEOLOGIC SETTING*

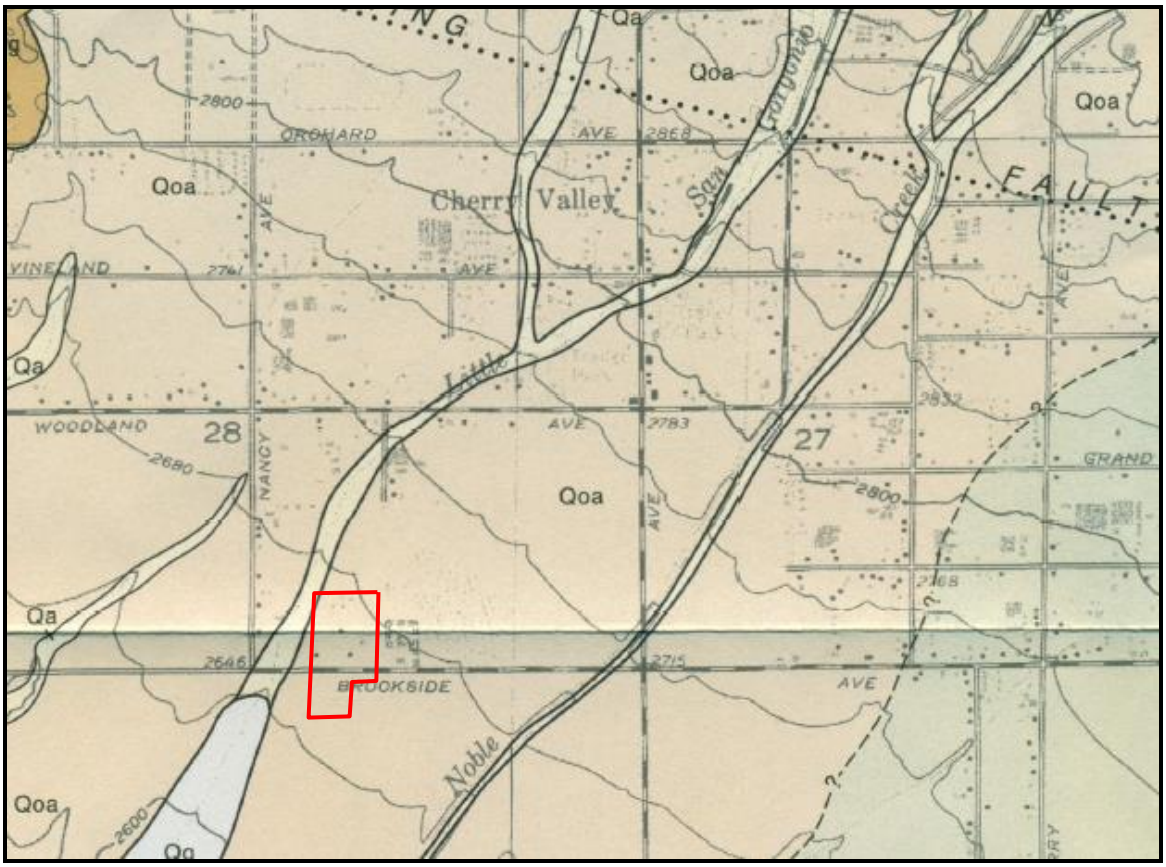
**Regional Geology:** The site is regionally situated within a natural geomorphic province in southern California known as the Transverse Ranges. The Transverse Ranges consist of a set of easterly-trending mountains and geologic structures that are distinct from the general northwest-southeast trend of the other provinces of California. More specifically, the site is located within the San Bernardino Mountains, an easterly trending structural block that is roughly 55 miles long and 20 miles wide. This mountain range was formed by intense folding and faulting in very late geologic time (predominantly Tertiary time). The geomorphology of this region of the San Bernardino Mountains indicates that the range is

very young, from a geologic standpoint, whereas it was uplifted tectonically predominately during Quaternary time.

**Local Geology:** Based on local geologic mapping (Dibblee, 2003), the site is shown to be underlain by Quaternary age (late Pleistocene) weakly indurated older alluvial deposits, generally described as being light reddish, dissected alluvial fan sand and gravel, that is crudely bedded (Qoa). A stream channel referred to as the Little San Gorgonio Creek is depicted on the northwesterly portion of the site. Mapping by Dibblee (2003) indicates that these deposits include Holocene-age alluvial sand, gravel and clay (Qa).

Figure 3 below is a portion of the Geologic Map of the Beaumont Quadrangle (Dibblee, 2003) indicating the mapped geologic units in the vicinity of the project site:

**Figure 3: Geologic Map of the Beaumont Quadrangle (Dibblee, 2003)**



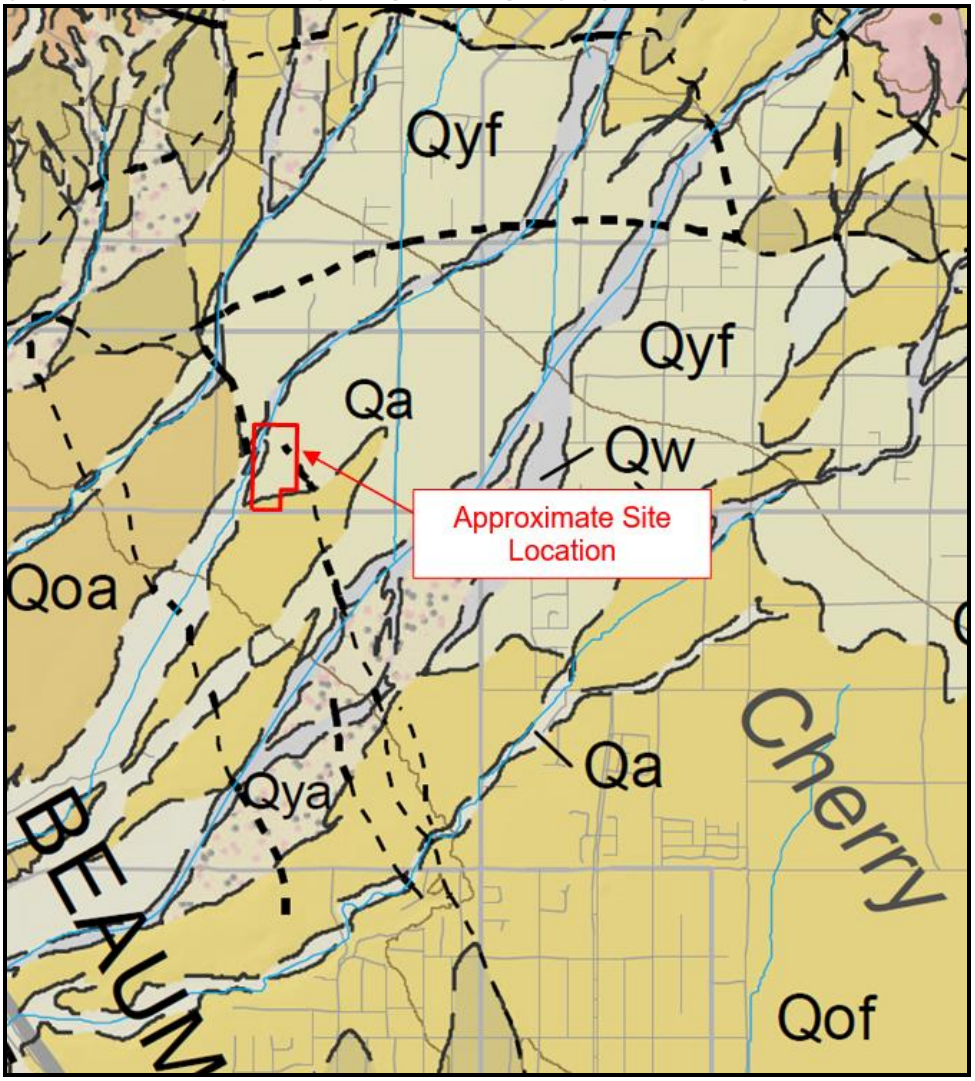

**Qoa** - Dissected alluvial fan sand and gravel, light reddish, crudely bedded, weakly indurated (late Pleistocene - early Holocene)

**Qa** - Alluvial sand, gravel and clay of flat flood plains and stream channels, unindurated, undissected (Holocene)

A review of the CGS Preliminary Geologic Map of Quaternary Deposits, Palm Springs 30' x 60' Quadrangle (Lancaster, et al., 2012) indicates the northerly portion of the project site is underlain by young alluvial fan deposits (map symbol Qyf). The southerly portion of the site

is mapped as being underlain by old alluvial fan deposits (Qoa). Alluvial wash materials are mapped on the northwesterly portion of the site. Figure 4 below is a portion of the referenced geologic map showing the mapped geologic units in the vicinity of the project.

**Figure 4: Preliminary Geologic Map, Palm Springs Quadrangle (Lancaster, et al., 2012)**




Qyf — **Young Alluvial Fan Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

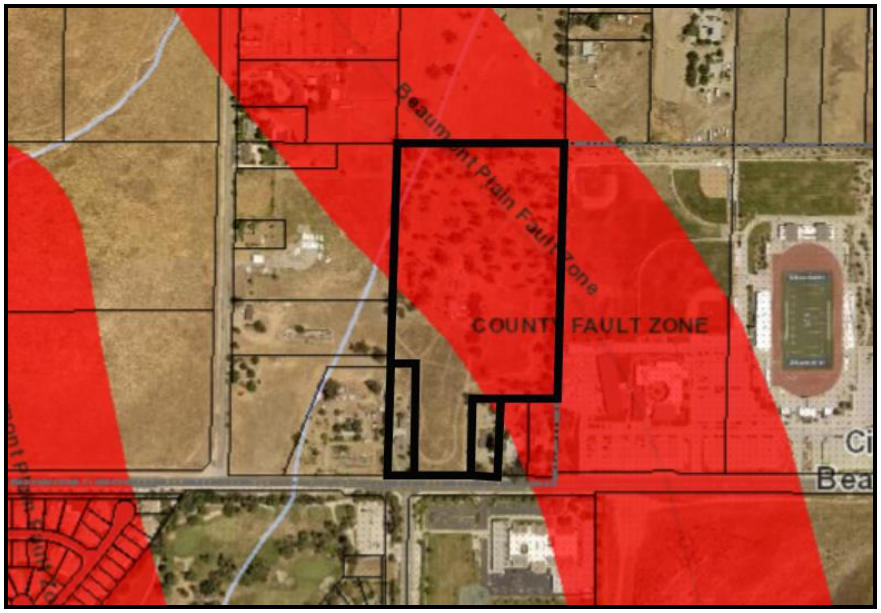
Qof — **Old Alluvial Fan Deposits** - slightly to moderately consolidated, moderately dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Fault -- Includes strike-slip, normal, reverse, oblique, and unspecified slip

**Faulting**: The site is not located within a State of California "Alquist-Priolo Earthquake Fault Zone" for fault rupture hazard (CGS, 2022). A large portion of the project site lies within a Riverside County fault zone associated with the Beaumont Plain Fault. (Riverside County, 2022). This fault is associated with a zone of northwest-trending parallel faults collectively referred to as the Beaumont Plain Fault Zone (Riverside County, 2022 and Matti, Morton, & Cox, 1992). This fault zone consists of en-echelon fault scarps that

traverse through and disrupt late Quaternary alluvial deposits. Figure 5 below is a portion of the County of Riverside TLMA GIS map (2022) indicating the project site in relation to mapped County fault zones in the vicinity of the property.

**Figure 5: County of Riverside TLMA GIS Map (2022)**




No distinct geomorphic features were observed or mapped on the site (defined scarps, etc.) which suggest the presence of faulting. However, the lack of geomorphic evidence at the site does not alter our conclusion that the presence of faulting at the site is very likely, based on mapping by the County of Riverside and work performed by others.

Our review of the potential for surface fault rupture at this site has included an examination of one non-stereo and five stereo pairs of vertical black and white aerial photographs dating between the years of 1949 and 2020 (see References for a listing) to aid in assessing the geologic and geomorphic characteristics with respect to the site and vicinity. No distinct photolineations or consistent tonal variations were observed on the southerly portion of the property, where the existing residence/proposed office building is located. The northerly portion of the site is largely obscured by trees in the photographs. Very faint tonal variations oriented northwest to southeast of the site were observed in the approximate location of the mapped fault zone northwest of the site near the intersection of Cherry Valley Boulevard and Nancy Avenue, however, these were not consistent in the historical aerial photographs and may not be associated with faulting. Disturbance of adjacent properties, particularly the adjacent property to the east, has obscured viewing evidence of faulting at this location. Based on mapping by others, including, but not limited to Riverside County, Rewis, et al. (2006), Gandhok, et al. (1999), it is our opinion that the faulting within the mapped Riverside County Fault Zone may be present as mapped. Our evaluation did not reveal evidence of the potential for faulting outside of the County of Riverside Fault Zone, where the existing residence/proposed office are located. Although the proposed storage facilities are not “habitable structures”, defined as having human occupancy of 2000 man-

hours or greater per year, based on the information reviewed for this project, it is our opinion there is a potential for surface rupture within the mapped Riverside County fault zone. Damage to the proposed storage structures could occur as a result of surface fault rupture and should be considered by the developer.

A detailed review of surface fault rupture potential at the site was not within the scope of service for this investigation. If habitable structures are planned within the fault zone in the future, a subsurface fault study will be required.

The site and surrounding area have been subjected to strong ground shaking related to active faults that traverse the region. The major faults influencing the site include the San Andreas (Southern Branch and San Bernardino Mountains sections) and the San Jacinto fault (San Jacinto Valley section). The approximate distances to these faults and published maximum earthquake magnitudes are shown in Table 1:

**Table 1: Major Fault Parameters**

| Fault Zone | Approximate Distance (km) | Earthquake Magnitude ($M_w$) |
|---|---|---|
| San Andreas - San Bernardino Mountains Section (Banning Fault) | 4.3 | 7.0* |
| San Jacinto - San Jacinto Valley (Claremont Fault) | 10.3 | 7.0 |
| San Andreas - Southern Branch | 10.4 | 7.0* |
| San Jacinto - San Bernardino | 23.7 | 7.0 |

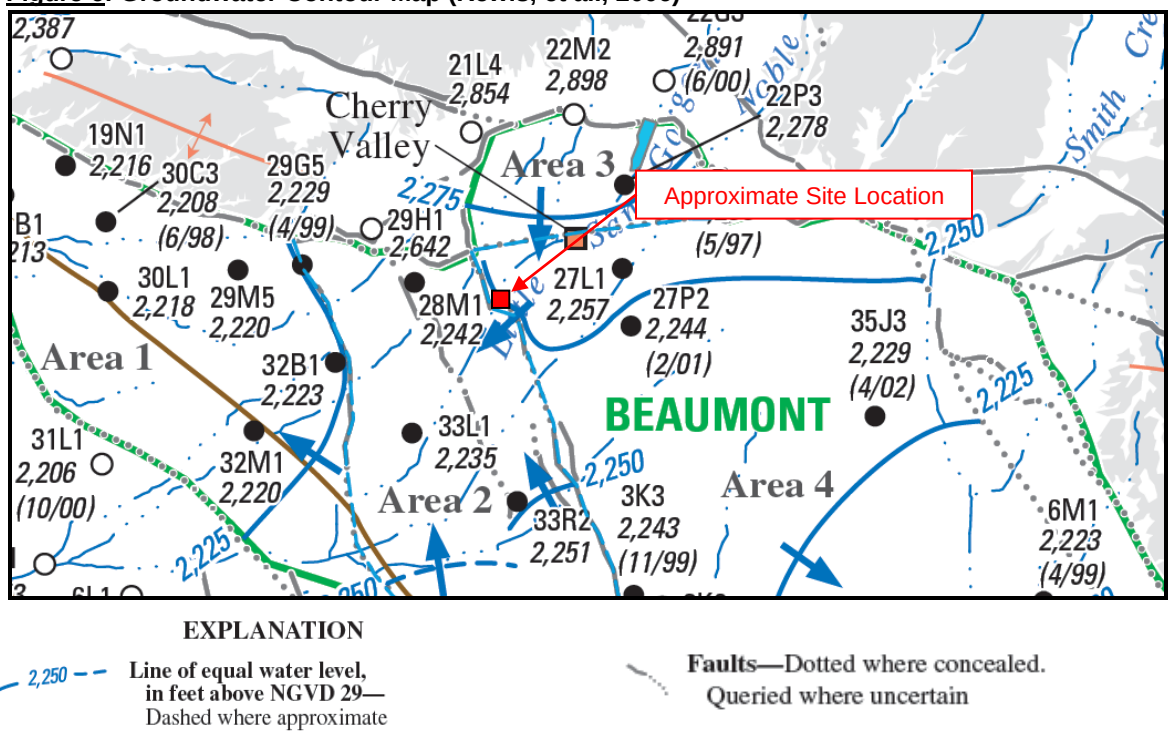
*Published fault parameters indicate an estimated maximum moment magnitude ($M_w$) earthquake of 7.0 for the San Bernardino Mts. section of the San Andreas fault zone. However, for seismic design purposes, based on published parameters for faults in California from the *Working Group on Earthquake Probabilities* (Field and others, 2008; Willis and others, 2008), we are considering that a cascading effect of rupture will occur along all segments of the San Andreas Fault Zone collectively, rather than just the singular San Bernardino Mts. section. Based on the recently published rupture-model data (Petersen et al., 2008), the total rupture area of these combined faults is 6,847 square kilometers with an associated Maximum Moment Magnitude ($M_W$) of 8.0.

**Groundwater:** The site lies within the Cherry Valley Hydrologic Subarea of the Santa Ana River Hydrologic Unit. Groundwater records published by USGS (National Water Information System: Web Interface, 2022) indicate that the depth to groundwater in the vicinity of the project site is greater than 300 feet beneath the existing ground surface. State Well No. 02S/01W-27P003S, located approximately 3,500 feet to the east of the site, was monitored on April 26, 2022. At that time, depth to groundwater was 480.95 feet beneath the existing ground surface. State Well No. 02S/01W-32B003S, located approximately 4,800 feet west of the site, was monitored on April 27, 2022. Depth to groundwater at that time was 437.5 feet beneath the existing ground surface.

Based on a report entitled “Geology, Ground-Water Hydrology, Geochemistry, and Ground-Water Simulation of the Beaumont and Banning Storage Units, San Gorgonio Pass Area, Riverside, California (Rewis, et al., 2006), the mapped elevation of the groundwater in the vicinity of the subject site is on the order of 2,250’ above mean sea level (msl). Based on a low point surface elevation on the site of approximately 2,660’ above msl, this corresponds to a groundwater depth of approximately 410’ below the ground surface.

Figure 6 is a portion of the referenced groundwater contour map.

**Figure 6: Groundwater Contour Map (Rewis, et al., 2006)**




The groundwater report indicates a continual decline in water levels in the vicinity of the project site between 1927 and the present. In “Area 3”, where the project site is located, water measurements from nearby wells indicate a water-level decline of about 80 feet from the 1960’s to 2004 (Rewis, et al., 2006).

Figure 7 below are maps from the referenced 2006 groundwater report that show ground-water level contours for (A) 1926-1927, (B) 1955, and (C) 1957, which illustrate the decline in groundwater levels. Based on extrapolation of the groundwater contours, historical high groundwater (1927) beneath the project site is on the order of 340 feet beneath the existing ground surface.

**Figure 7: Ground-water level contours for (A) 1926-1927, (B) 1955, and (C) 1957**

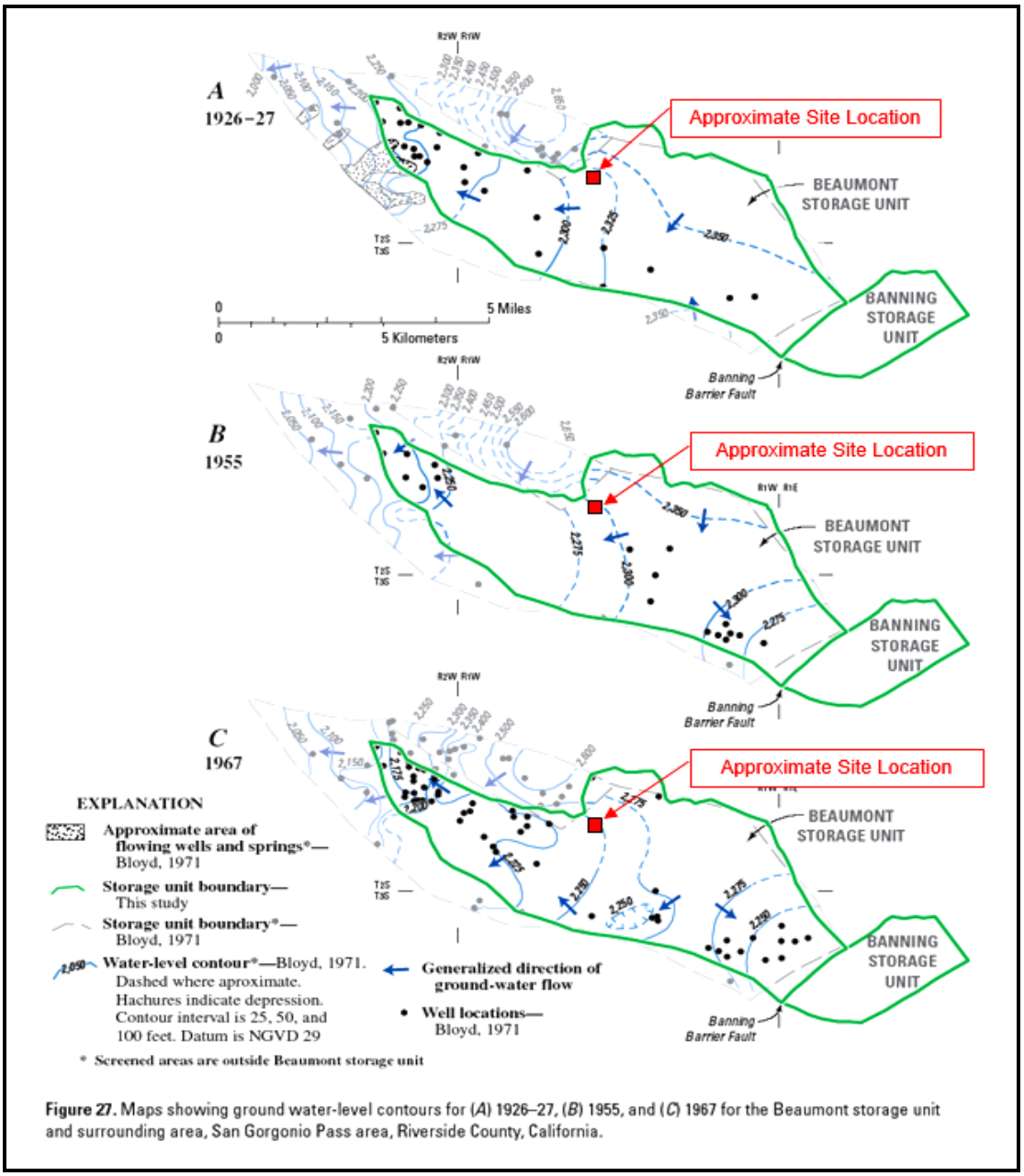



**Figure 27.** Maps showing ground water-level contours for (*A*) 1926–27, (*B*) 1955, and (*C*) 1967 for the Beaumont storage unit and surrounding area, San Gorgonio Pass area, Riverside County, California.

**Seismic Design Parameters:** The approximate site coordinates (WGS 84) are 33.9630°N / -116.9869°W. The U.S. Seismic Design Maps website (OSHPD, 2022) was used to evaluate the seismic parameters for this project. Table 3 summarizes design criteria obtained from the 2022 California Building Code (CBC), which is based on ASCE 7-16. The values presented in Table 2 are for the risk-targeted maximum considered earthquake ($MCE_R$).

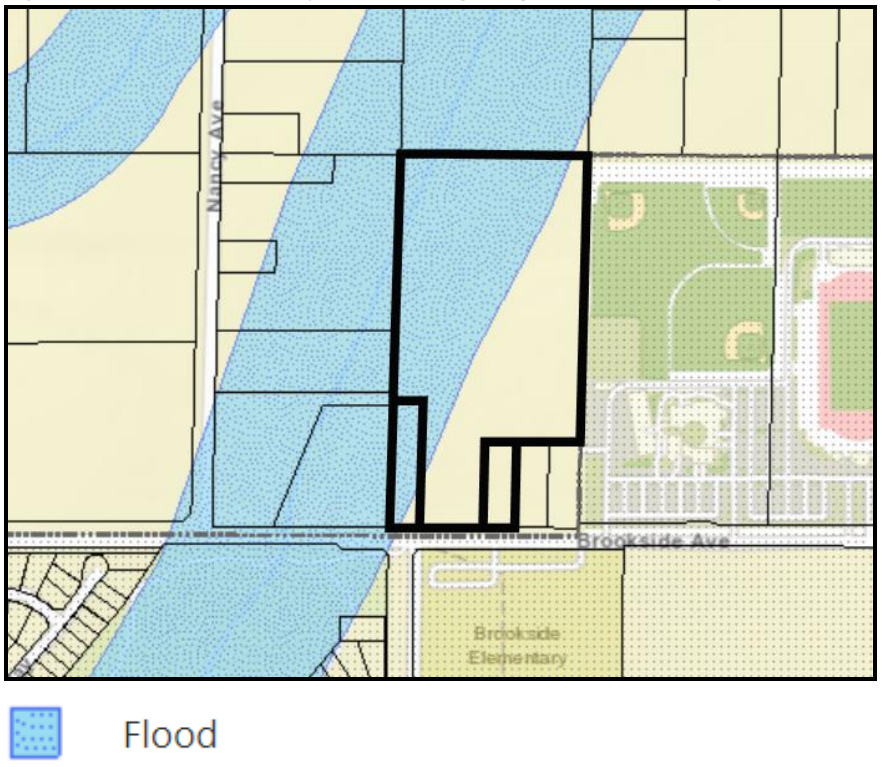
**Table 2: 2022 CBC Seismic Design Parameters**

| Seismic Parameter | Value |
|---|---|
| **$S_S$** - $MCE_R$ Ground Motion for 0.2-sec Period | 2.107 |
| **$S_1$** - $MCE_R$ Ground Motion for 1-sec Period | 0.724 |
| **$SD_S$** - Numeric Seismic Design Value at 0.2-sec period | 1.685 |
| **PGA** - $MCE_g$ Peak Ground Acceleration | 0.86 |
| **$F_{PGA}$** - Site Amplification Factor at PGA | 1.2 |
| **$PGA_M$ -** Site Modified Peak Ground Acceleration | 1.032 |
| **SITE CLASS** | D (Default) |

The seismic design parameters recommended above should be discussed with the project structural engineer, as they may significantly impact the structural design of the project. A site-specific ground motion analysis may result in less conservative seismic design parameters.

**Flooding:** A review of flood hazards at the site was not in within our scope of service. For informative purposes, a large portion of the project site is located in a mapped Riverside County Flood Control District Flood Zone. Figure 8 below is a portion of the Riverside County TLMA GIS (2022) map depicting the mapped flood zone.

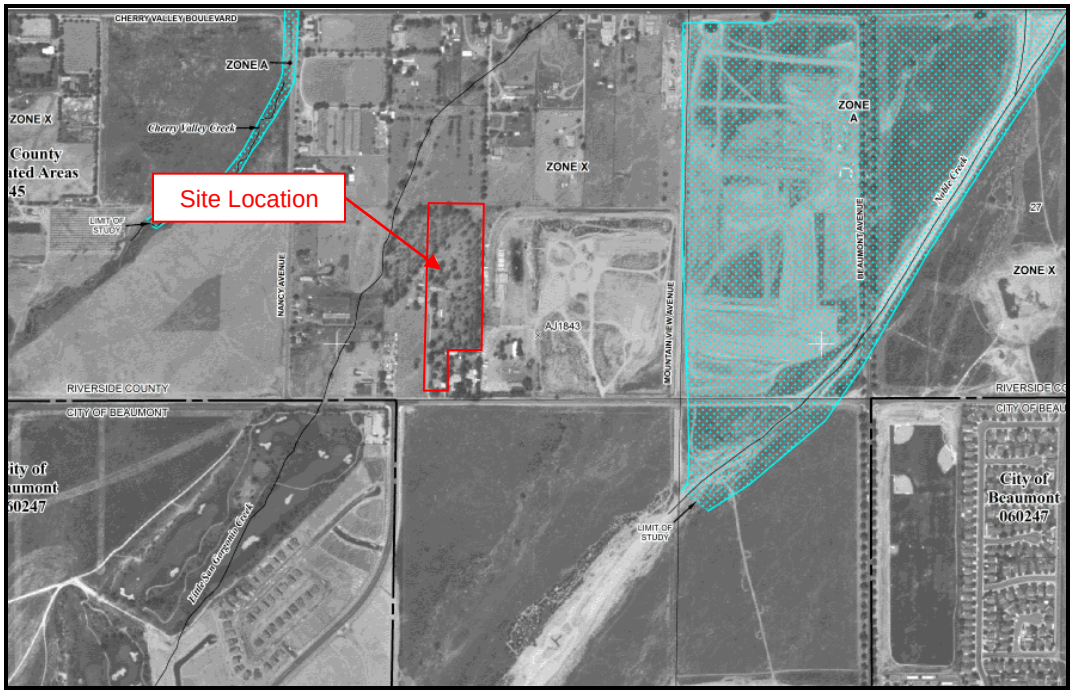
**Figure 8: Riverside County TLMA GIS (2022) Flood Zone Map**




A review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Map No. 06065C0803G, dated August 28, 2008, indicates that the site

is located in an area designated as “Zone X” (unshaded), described as “Areas determined to be outside the 0.2 percent annual chance flood plain.” Figure 9 below is a portion of the referenced FIRM Map indicating the site and mapped flood hazard zone.

**Figure 9: FIRM Map No. 06065C0803G, dated August 28, 2008**




**OTHER AREAS**

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

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

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

**ZONE A** No Base Flood Elevations Determined.

**Secondary Seismic Hazards:** The primary geologic hazard affecting the project is ground shaking. Secondary permanent or transient seismic hazards generally associated with severe ground shaking during an earthquake include, but are not limited to; ground rupture, liquefaction, seismically-induced settlement, seiches or tsunamis, landsliding, debris flow, and rockfalls. These are discussed below:

Ground Rupture: Ground rupture is generally considered most likely to occur along pre-existing faults. A large portion of the project site lies within a Riverside County fault zone associated with the Beaumont Plain Fault Zone, (Riverside County, 2022). On this basis, the potential for fault rupture at the site is high.

Slope Failure: Based on the relatively planar topography, no slopes will exist to represent a hazard to this project.

Liquefaction: In general, liquefaction is a phenomenon that occurs where there is a loss of strength or stiffness in the soils that can result in the settlement of buildings, ground failure, or other hazards. The main factors contributing to this phenomenon are: 1) cohesionless, granular soil with relatively low density (usually of Holocene age); 2) shallow ground water (generally less than 50 feet); and 3) moderate to high seismic ground shaking.

Groundwater was not encountered within the exploratory borings, which extended up to a maximum depth of approximately 50 feet below the existing ground surface. The regional groundwater table beneath the site is expected to be at a depth greater than 300 feet. On this basis, the potential for liquefaction at the site is very low.

Lurching: Ground lurching is the horizontal movement of soil, sediments, or fill located on relatively steep embankments or scarps as a result of seismic activity, forming irregular ground surface cracks. The potential for lateral spreading or lurching is highest in areas underlain by soft, saturated materials, especially where bordered by steep banks or adjacent hard ground. Due to the flat-lying nature of the site, distance from embankments, the potential for ground lurching and/or lateral spreading is considered very low.

Seismically-Induced Settlement: The site is underlain to a depth of 35 to 40 feet by medium dense to dense alluvial deposits consisting of silty sand and silty sand with gravel (SM), and sandy gravel (GS). Sampler blow count and laboratory unit weight test data indicate these deposits are medium dense to dense, with estimated in-situ relative compaction of 89 to 100. Refer to the Subsurface Conditions section of this report. The potential for seismically-induced settlement is not significant.

Seiches/Tsunamis: A seiche is a standing wave in an enclosed or partially enclosed body of water. In order for a seiche to form, the body of water needs to be at least partially bounded, allowing the formation of the standing wave. Tsunamis are very large ocean waves that are caused by an underwater earth-quake or volcanic eruption, often causing extreme destruction when they strike land.

There are no bodies of water on or adjacent to the project site. Based on the distance to large, open bodies of water and the elevation of the site with respect to sea level, the potential for seiches/tsunamis does not present a hazard to this project.

Landsliding: Due to the relatively low-lying relief of the site and adjacent areas, the potential for landsliding due to seismic shaking is considered very low.

Debris Flow: We understand that historical FEMA maps show a “blue-line” stream traversing the uppermost northwest corner of the site, and that flood control projects northeast of the site have diverted this flow into Noble Creek.

A review of the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Map No. 06065C0803G, dated August 28, 2008, indicates that the site is located in an area designated as “Zone X” (unshaded), described as “Areas determined to be outside the 0.2 percent annual chance flood plain.”

Based on the information reviewed, it is our opinion that the potential for debris flow is low for this project.

Rockfalls: Since no large rock outcrops are present at or adjacent to the site, the possibility of rockfalls during seismic shaking is nil.

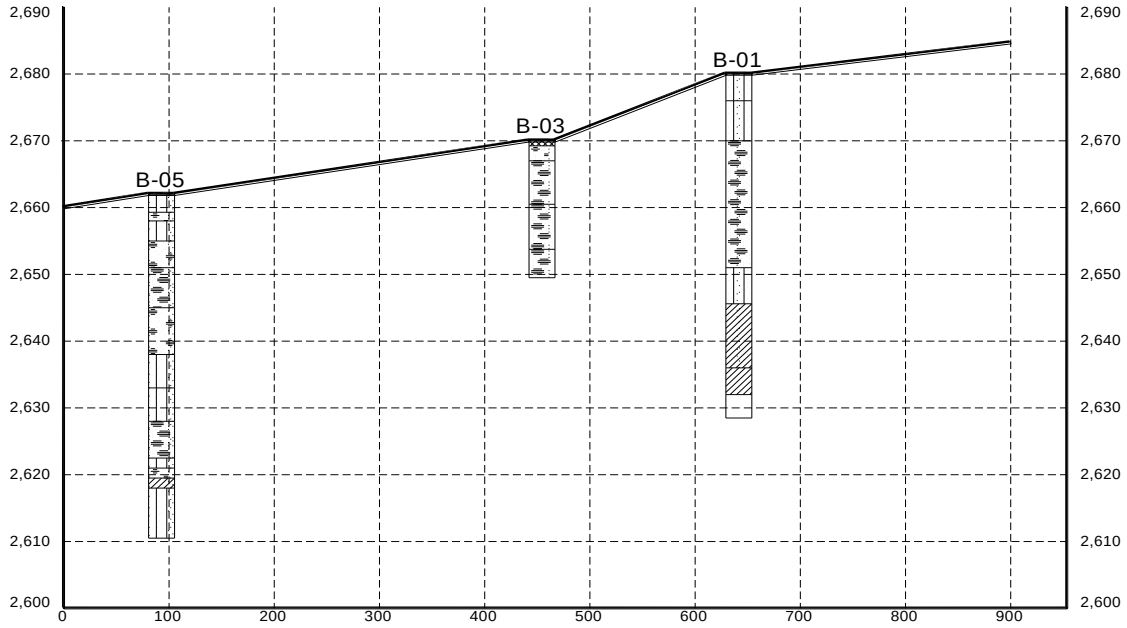
**Other Geologic Hazards:** There are other geologic hazards not necessarily associated with seismic activity that occur statewide. These hazards include, but are not limited to, methane gas, hydrogen-sulfide gas, tar seeps, Radon-222 gas, and naturally occurring asbestos. Of these hazards, there are none that appear to impact the site.

## *SUBSURFACE CONDITIONS*

Our 2009 field and laboratory exploration and testing indicate that the site is underlain by alluvial deposits. The soil encountered in the upper 35 to 40 feet generally consisted of silty sand and silty sand with gravel (SM), and sandy gravel (GS). Sampler blow count and laboratory unit weight test data indicate these deposits are medium dense to dense, with estimated in-situ relative compaction of 89 to 100 percent. The soil encountered below 35 to 40 feet generally consisted of medium dense silty sand (SM), clayey sand (SC), sandy clay (CL), and sandy silty clay (ML-CL). The soil encountered was slightly moist to moist.

Groundwater was not encountered during the investigation. A typical profile is indicated on Figure 10 below.

**Figure 10: Generalized Subsurface Profile**




Laboratory testing indicates native soils within the zone of influence to the proposed development are non-plastic (PI=0) and can be assumed to be non-expansive.

Consolidation testing indicates that the soil is slightly compressible and over-consolidated. This testing indicated that the soil is not subject to saturation collapse.

Analytical testing indicates the concentration of sulfates in the soil may be approximately 0.001 percent which is considered to be negligible with respect to sulfate attack on concrete. Chloride concentrations are less than 500 parts per million. The soil is neutral to slightly acidic with pH values of 6.0 to 6.9. Saturated resistivity values ranged from 10,000 to 15,000 ohm-cm.

The site is occupied by numerous existing structures and other improvements to be demolished. A review of aerial photographs and historical topographic maps indicates that other structures previously occupied portions of the site. Based on past site use, there are likely buried / abandoned septic tanks, utility lines, undocumented fill, buried debris and other unsuitable conditions within the near-surface soil that should be removed during project grading.

## *CONCLUSIONS AND RECOMMENDATIONS*

Based on our review of current site conditions and current building code requirements, the conclusions and recommendations in the referenced 2009 geotechnical report remain applicable, unless otherwise noted. It is our opinion that the proposed construction will be

feasible from a geotechnical engineering standpoint. The site soil is suitable for providing foundation and pavement support with recompaction as recommended herein.

A large portion of the site was historically vegetated by a dense growth of eucalyptus trees. The removal of the root zone and disturbed soils associated with the eucalyptus trees may be a primary concern during the grading. There are also likely buried / abandoned septic tanks, utility lines, undocumented fill, buried debris and other unsuitable conditions within the near-surface soil that should be removed during project grading.

Testing indicates that on-site soils are non-plastic and may be assumed to be non-expansive.

Groundwater was not encountered within the exploratory borings. Historical data suggests that groundwater is on the order of 340± feet below the existing ground surface. It is our opinion that groundwater will not influence the proposed construction.

The following paragraphs present more detailed design criteria which have been developed on the basis of our field and laboratory exploration and testing.

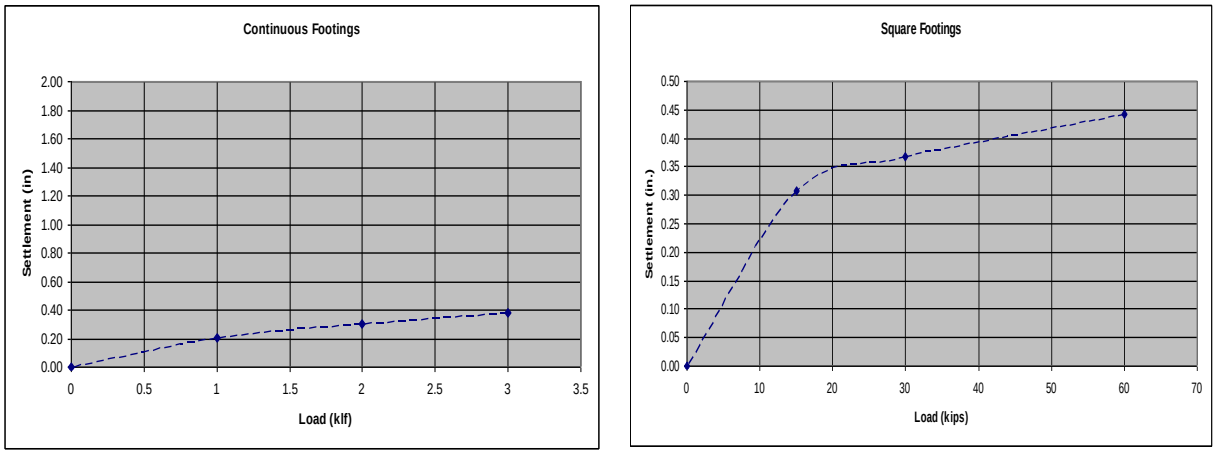
**Foundation Design:** The results of our exploration and testing indicate that either continuous wall or isolated square footings, which are supported upon dense, undisturbed soils or properly recompacted native material, may be expected to provide satisfactory support for the proposed structures. Footings should not span from cut to fill. Where such a transition occurs, all footings should be underlain by the minimum compacted fill thickness indicated under Item 4 in the General Site Grading section of this report.

Footings should have a minimum width of twelve inches and should be founded a minimum of twelve inches beneath the lowest adjacent final grade. Foundations supporting two floors should have a minimum width of fifteen inches and should be supported a minimum of eighteen inches beneath the lowest adjacent final grade. For design, we recommend an allowable soil bearing capacity of 1,600 pounds per square foot.

The recommendations made in the preceding paragraph are based on the assumption that all footings will be supported upon dense, undisturbed or properly compacted soil. All grading shall be performed under the testing and inspection of a representative of this firm. Prior to the placement of concrete, we recommend that the footing excavations be inspected in order to verify that they extend into satisfactory soil and are free of loose and disturbed materials. If concrete is to be placed on dry absorptive soil in hot and dry weather, the soil should be dampened but not to a point that there is free-standing water prior to placement. The formwork and reinforcement should also be dampened.

Settlements of properly designed and constructed footings are expected to be within tolerable limits for the proposed structure. Both continuous wall and isolated square footings carrying the design loads within the limits of the allowable bearing capacity are expected to experience a maximum settlement of one inch. Differential settlements due to uniform loads are expected to be less than one-half inch vertical over 20 feet horizontal. Differential settlements between loads of different magnitudes may be estimated on the bases of our settlement analyses which are presented graphically on Figure 11 below:

**Figure 11: Differential Settlement**




**Lateral Design:** The allowable bearing capacity provided in the preceding section is for the total of dead and frequently applied live loads. These may be increased by 33 percent to provide for lateral loads of short duration such as those caused by wind or seismic forces.

Resistance to lateral loads will be provided by a combination of friction acting at the base of the slab or foundation and passive earth pressure. A coefficient of friction of 0.4 between soil and concrete may be used with dead load forces only. A passive earth pressure of 260 pounds per square foot, per foot of depth, may be used for the sides of footings poured against recompacted or dense native material. Passive earth pressure should be ignored within the upper one foot except where confined as beneath a floor slab, for example.

**Trench Wall Stability:** Significant caving did not occur within our 2009 exploratory borings. All excavations should be configured in accordance with the requirements of CalOSHA. We would classify the soils as Type C. The classification of the soil and the shoring and/or slope configuration should be the responsibility of the contractor on the basis of the trench depth and the soil encountered. The contractor should have a “competent person” on-site for the purpose of assuring safety within and about all construction excavations.

**Retaining Walls:** Retaining walls may be necessary during construction and/or landscaping. The retaining walls may be designed for an active earth pressure equivalent to that exerted by a fluid weighing not less than that shown in the following Table 3:

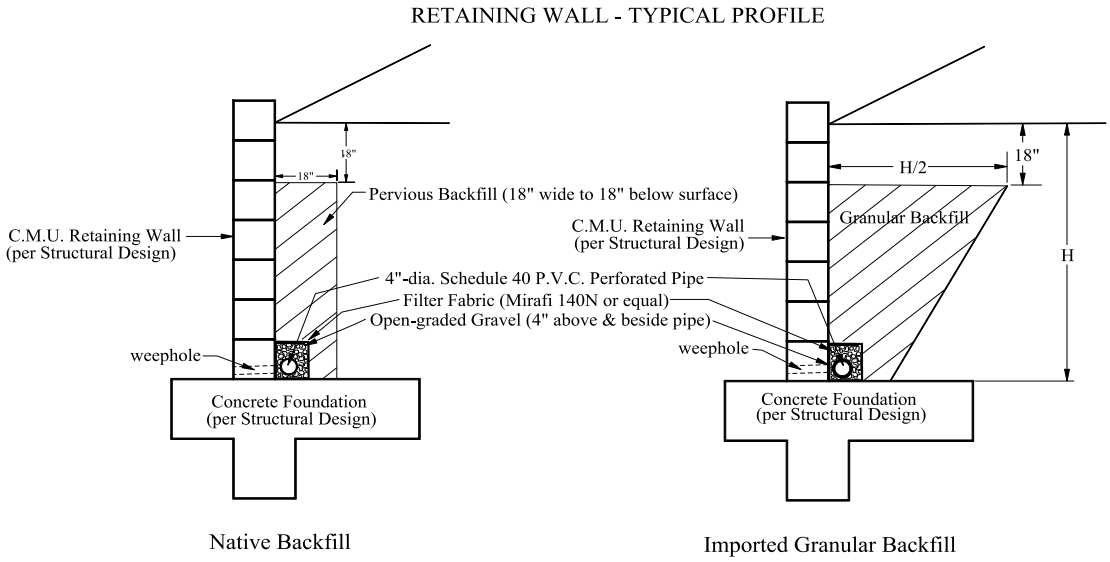
**Table 3: Retaining Wall Design Parameters**

| Surface Slope of Retained Material Horizontal:Vertical | If clean sand and/or gravel with $\phi = 38°$ is used to backfill | If native soils are used to backfill |
|---|---|---|
| Level | 30 | 40 |
| 2 to 1 | 43 | 60 |

For walls that are restrained, an "At-Rest" lateral earth pressure should be used. This may be taken as an Equivalent Fluid Pressure of 62 pounds per cubic foot with the resultant applied at mid-height.

Any applicable construction and seismic surcharges should be added to the above pressures. The effects of seismic forces may be characterized as an Equivalent Fluid Pressure of 30 pounds per cubic foot. The resultant of seismic forces should be applied above the base of the wall a distance of 0.6H where H is the total height.

**Figure 12: Retaining Wall Typical Profile**




At least 12 inches of granular material should be used in the backfill behind the walls and water pressure should not be permitted to build up behind retaining walls. The upper 12 to 18 inches of the backfill should consist of soil having a low permeability (less than $10^{-6}$ cm/sec). All backfill shall be non-expansive. A subdrain should be constructed along the base of the backfill.

**Concrete Slabs-on-Grade:** Concrete slabs-on-grade shall have a minimum thickness of four inches. During final grading and prior to the placement of concrete, all surfaces to receive concrete slabs-on-grade shall be compacted in order to maintain a minimum compacted fill thickness of 12 inches. Regardless of the extent of compaction, all concrete will crack due to shrinkage. The soils are not significantly expansive and there are no geotechnical engineering factors that would be used to develop recommendations for the design (ie. thickness, reinforcement, joint spacing, etc.) of non-structural slabs. However, these are important elements of the design of concrete slabs-on-grade that should not be overlooked. Non-reinforced slabs with no control joints, poorly placed control joints and/or poorly constructed control joints will crack at random locations and could result in unsightly appearance regardless of the soil condition.

Load bearing slabs may be designed using a Modulus of Subgrade Reaction not exceeding 125 pounds per square inch per inch.

Slabs that are designed and constructed in accordance with the provisions of the American Concrete Institute (ACI) as a minimum will perform much better and will be more pleasing in appearance. Shrinkage of concrete should be anticipated. This will result in cracks in all concrete slabs-on-grade. Shrinkage cracks may be directed to saw-cut "control joints" spaced on the basis of slab thickness and reinforcement. ACI typically recommend control joint spacings in unreinforced concrete at maximum intervals equal to the slab thickness times 24. A level subgrade is also an important element in achieving some “control” in the locations of shrinkage cracks. Control joints should be cut immediately following the finishing process and prior to the placement of the curing cover or membrane. Control joints that are cut on the day following the concrete placement are generally ineffective. The placement of reinforcing steel will help in reducing crack width and propagation as-well-as providing for an increase in the control joint spacing. The use of welded wire mesh has typically been observed to be of limited value due to difficulties and lack of care in maintaining the level of the steel in the concrete during placement. The addition of water to the mix to enhance placement and workability frequently results in an excessive water-cement ratio that weakens the concrete, increases drying times and results more cracking due to concrete shrinkage during the initial cure.

It should be assumed that the soils under the slab will likely become saturated during the life of the structure. Moisture will also be emitted from the concrete mixture as it cures. Flooring manufacturers may have specific requirements related to emission rates from concrete that should be achieved prior to the placement of flooring. Typically, these range from 3 to 5 pounds of water per 1000 square feet per 24-hour period. The emission rates are measured using an approximate 72-hour test procedure that we are able to conduct upon request. The drying time of the concrete may be reduced using a lower water-cement ratio such as 0.5 or 0.45. The use of fly

ash may enhance workability of the mix and reduce the alkali content within the slab. The use of a chemical membrane or curing compound may increase the drying time. Other suitable curing methods are available. The curing method is important in reducing plastic shrinkage cracking and should not be eliminated to reduce dry times.

Where slabs are to receive moisture sensitive floor coverings, we recommend the use of a vapor retarder. There are various products manufactured for this purpose. ASTM currently provides a standard water vapor permeance of 0.3 perms. Such materials would allow up to 18 gallons of water per week in a 50,000 square foot area. Therefore, it should be understood that these materials are not vapor "barriers". Some flooring applications may require more effective retarders. Therefore, the selection of the vapor retarder should be based upon the type of flooring material and is not considered to be a Geotechnical Engineering design parameter.

Vapor retarders should have a minimum thickness of 10-mil unless otherwise specified. It is possible that the retarders will be exposed to equipment loads such as ready-mix trucks, buggies, laser screeds, etc. In such cases, the thickness shall be increased to at least 15-mil. Vapor retarders should be placed between two 2-inch thick layers of sand in order to reduce the potential of punctures and to aid in the curing process. In lieu of this, the concrete may be placed directly upon the vapor retarder but should be designed with reinforcement to offset additional curling stresses. Seams and holes made for underground utilities should be properly sealed per the recommendations of the manufacturer.

The vapor retarder recommended in the preceding paragraphs is a common method of reducing the migration of moisture through the slab. It will not prevent all moisture migration through the slab nor will it prohibit the formation of mold or other moisture related problems. For moisture sensitive floor coverings, an expert in that field should be consulted to properly design a vapor retarder suitable for the specific application.

If concrete is to be placed on a dry absorptive subgrade in hot and dry weather, the subgrade should be dampened but not to a point that there is freestanding water prior to placement. The formwork and reinforcement should also be dampened.

**Expansive Soils:** On-site soils are not considered to be significantly expansive. Laboratory testing indicates a Plasticity Index (PI) of 0. On this basis, special design criteria for expansive soils will not be necessary. Specifically, reinforcement and thickening of foundations and slabs-on-grade in order to resist expansive soil pressures will not be necessary. Reinforcement may be required for other purposes related to structural properties. Nominal reinforcement is recommended for all foundations and concrete slabs-on-grade.

**Tentative Pavement Design:** All surfaces to receive asphalt concrete paving should be underlain by a minimum compacted fill thickness of 12 inches (excluding aggregate base). This may be performed as described in the Site Grading Section of this report. Due to changes expected within the soils due to the effects of blending during site grading, actual R-Value testing was not performed during this study. On the basis of an estimated R-Value of 40, we make the following tentative recommendations for structural pavement section design:

**Table 4: Tentative Pavement Design**

| Service | Asphalt Concrete Thickness (ft.) | Base Course Thickness (ft.) |
|---|---|---|
| Brookside Avenue (Assumed TI=7.0) | 0.33 | 0.58 |
| Interior Parking and Driveways (Assumed TI=4.5) | 0.25 | 0.50 |

These recommendations are provided for estimating purposes only. At the completion of rough grading, when the actual soils are more accurately defined, samples may be obtained for actual R-Value testing which will serve as a basis for the actual structural street section design. The final testing and design will be completed by the geotechnical engineer. All work within the roadway area should be done in accordance with the applicable codes, ordinances and requirements of Riverside County and will be performed under the inspection of that agency.

**General Site Grading:** All grading should be performed in accordance with the applicable provisions of the 2022 California Building Code. The following specifications have been developed on the basis of our field and laboratory testing:

1. **Clearing and Grubbing:** All building, slab and pavement areas and all surfaces to receive compacted fill should be cleared of existing loose soil, artificial fill, vegetation, debris, septic systems, and other unsuitable materials. All below-grade structures, including abandoned swimming pools and building foundations, should be removed. We recommend a minimum overexcavation of at least 24 inches to provide assurance of removing unsuitable materials and processing of roots and loose and disturbed soils. Abandoned underground utility lines should be traced out and completely removed from the site. Each end of the abandoned utility line should be securely capped at the entrance and exit to the site to prevent any water from entering the site. Soils loosened due to the removal of trees should be removed and replaced as controlled compacted fill under the direction of the geotechnical engineer.

2. **Preparation of Surfaces to Receive Compacted Fill:** All surfaces to receive compacted fill should be subjected to compaction testing prior to

processing. Testing should indicate a relative compaction of at least 85 percent within the unprocessed native soils. If roots or other deleterious materials are encountered or if the relative compaction fails to meet the acceptance criterion, additional overexcavation will be required until satisfactory conditions are encountered. Upon approval, surfaces to receive fill shall be scarified, brought to near optimum moisture content, and compacted to a minimum of 90 percent relative compaction.

3. **Placement of Compacted Fill:** Fill materials consisting of on-site soils or approved imported granular soils, should be spread in shallow lifts, and compacted at near optimum moisture content to a minimum of 90 percent relative compaction. Our observations of the material encountered during our exploration and testing indicate that compaction will be most readily obtained by means of heavy rubber-wheeled or vibratory compactors. This should be determined by the grading contractor prior to the commencement of site grading.

4. **Preparation of Building Areas:** Support for buildings should not transition from cut to fill. All building areas should be underlain entirely by dense, undisturbed soil or a uniform compacted fill thickness based upon the footing type and configuration. This assumes that the footing width is directly proportional to the applied load on the basis of the allowable soil bearing capacity provided in this report. Table 5 presents the recommended depth and extent of recompaction for continuous and isolated square footings:

**Table 5: Recommended Building Area Preparation**

| Foundation Type | Depth of Recompaction below Footing | Extent of Recompaction beyond Footing Edges |
|---|---|---|
| Isolated Square | 12 Inches | 5 Feet |
| Continuous | 12 Inches | 5 Feet |

Footing areas should be overexcavated to the depths and extents indicated in the preceding table. This zone of recompaction should also extend a minimum of 24 inches below the existing ground surface. The surface of the overexcavation should then be reviewed for compliance with the criteria of Item 2 under this section. Upon approval the surface should be scarified, brought to near optimum moisture content and compacted to a minimum of 90 percent relative compaction. An inspection should then be made by a representative of this firm, in order to verify the depth of the overexcavation and the relative compaction obtained. The excavated material may then be replaced as controlled compacted fill.

5. **Preparation of Slab and Paving Areas:** During final grading and immediately prior to the placement of concrete or a base course, all surfaces to receive asphalt concrete paving or concrete slabs-on-grade should be processed and tested to assure compaction for a depth of at least of 12 inches. This may be accomplished by a combination of overexcavation, scarification and recompaction of the surface, and replacement of the excavated material as controlled compacted fill. Compaction of the slab areas should be to a minimum of 90 percent relative compaction. Compaction within the proposed pavement areas should be to a minimum of 95 percent relative compaction for both the subgrade and base course.

6. **Utility Trench Backfill:** It is our opinion that utility trench backfill consisting of the on-site soil types should be placed by mechanical compaction to a minimum of 90 percent relative compaction. This is with the exception of the upper 12 inches under pavement areas where the minimum relative compaction should be 95 percent. Jetting of the native soils is not recommended.

7. **Testing and Inspection:** During grading tests and observations should be performed by a representative of this firm to verify that the grading is performed per the project specifications. Field density testing should be performed per the current ASTM D1556 or ASTM D6938 test methods. The minimum acceptable degree of compaction should be 90 percent of the maximum dry density, based on ASTM D1557, except where superseded by more stringent requirements, such as beneath pavement. Where testing indicates insufficient density, additional compactive effort should be applied until retesting indicates satisfactory compaction.

## *LIMITATIONS*

The findings and recommendations of this report are based upon a review of previous exploration and testing on the site. Should conditions be encountered during construction that are different than indicated herein, our office should be notified in order to determine if revisions or retesting are warranted. This report was prepared prior to the preparation of a grading plan for the project. We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

Evaluation of hazardous waste was not within the scope of services provided. The evaluation of seismic hazards was based upon a literature review.
This update report was prepared for Corion Enterprises for use in the design and construction of the proposed mini storage facility. This report may only be used by Corion Enterprises for this purpose. The use of this report by parties or for other purposes is not

authorized without written permission by Inland Foundation Engineering, Inc. Inland Foundation Engineering, Inc. will not be liable for any projects connected with the unauthorized use of this report.

The recommendations of this report are considered to be preliminary. The final design parameters may only be determined or confirmed at the completion of site grading on the basis of observations made during the site grading operation. To this extent, this report is not considered to be complete until the completion of both the design process and the site preparation.

The information in this report represents professional opinions that have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, either expressed or implied, is made as to the professional advice included in this report.

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# *APPENDIX A – Site Exploration*

# APPENDIX A

## SITE EXPLORATION

For the 2009 site investigation for this project, five exploratory borings were drilled with a truck-mounted hollow-stem auger drill rig at the approximate locations shown on Figure No. A-8. The materials encountered during drilling were logged by a staff geologist. Boring logs are included with this report as Figures Nos. A-3 through A-7.

Representative soil samples were obtained within the borings by driving a thin-walled steel penetration sampler with successive 30-inch drops of a 140-pound hammer. The numbers of blows required to achieve each six inches of penetration were recorded on the boring logs. Two different samplers were used; a Standard Penetration Test (SPT) sampler and a modified California sampler with brass sample rings. Representative bulk soil samples were also obtained from the auger cuttings. Samples were placed in moisture sealed containers and transported to our laboratory for further testing and evaluation. Laboratory tests results are discussed and included in Appendix B.

## UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487-06)

| PRIMARY DIVISIONS | | | GROUP SYMBOLS | | SECONDARY DIVISIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS – MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE | GRAVELS – MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE | CLEAN GRAVELS (LESS THAN) 5% FINES | GW |  | WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES |
| | | | GP |  | POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES |
| | | GRAVEL WITH FINES | GM |  | SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES |
| | | | GC |  | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES |
| | SANDS – MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE | CLEAN SANDS (LESS THAN) 5% FINES | SW |  | WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES |
| | | | SP |  | POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES |
| | | SANDS WITH FINES | SM |  | SILTY SANDS, SAND-SILT MIXTURES |
| | | | SC |  | CLAYEY SANDS, SAND-CLAY MIXTURES |
| FINE GRAINED SOILS – MORE THAN HALF OF MATERIALS IS SMALLER THAN #200 SIEVE SIZE | SILTS AND CLAYS – LIQUID LIMIT IS LESS THAN 50 | | ML |  | INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS |
| | | | CL |  | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS |
| | | | OL |  | ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY |
| | SILTS AND CLAYS – LIQUID LIMIT IS GREATER THAN 50 | | MH |  | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS |
| | | | CH |  | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS |
| | | | OH |  | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS |
| | HIGHLY ORGANIC SOILS | | PT |  | PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS |
| TYPICAL FORMATIONAL MATERIALS | SANDSTONES | | SS |  | |
| | SILTSTONES | | SH |  | |
| | CLAYSTONES | | CS |  | |
| | LIMESTONES | | LS |  | |
| | SHALE | | SL |  | |

## CONSISTENCY CRITERIA BASES ON FIELD TESTS

RELATIVE DENSITY – COARSE – GRAIN SOIL

| RELATIVE DENSITY | SPT * (# BLOWS/FT) | RELATIVE DENSITY (%) |
|---|---|---|
| VERY LOOSE | <4 | 0-15 |
| LOOSE | 4-10 | 15-35 |
| MEDIUM DENSE | 10-30 | 35-65 |
| DENSE | 30-50 | 65-85 |
| VERY DENSE | >50 | 85-100 |

CONSISTENCY – FINE-GRAIN SOIL

| CONSISTENCY | SPT* (# BLOWS/FT) | TORVANE UNDRAINED SHEAR STRENGTH (tsf) | POCKET ** PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf) |
|---|---|---|---|
| Very Soft | <2 | <0.13 | <0.25 |
| Soft | 2-4 | 0.13-0.25 | 0.25-0.5 |
| Medium Stiff | 4-8 | 0.25-0.5 | 0.5-1.0 |
| Stiff | 8-15 | 0.5-1.0 | 1.0-2.0 |
| Very Stiff | 15-30 | 1.0-2.0 | 2.0-4.0 |
| Hard | >30 | >2.0 | >4.0 |

* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1 3/8 INCH I.D.) SPLIT BARREL SAMPLER (ASTM -1586 STANDARD PENETRATION TEST)

** UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ.FT. READ FROM POCKET PENETROMETER

### MOISTURE CONTENT

| DESCRIPTION | FIELD TEST |
|---|---|
| DRY | Absence of moisture, dusty, dry to the touch |
| MOIST | Damp but no visible water |
| WET | Visible free water, usually soil is below water table |

### CEMENTATION

| DESCRIPTION | FIELD TEST |
|---|---|
| Weakly | Crumbled or breaks with handling or slight finger pressure |
| Moderately | Crumbles or breaks with considerable finger pressure |
| Strongly | Will not crumble or break with finger pressure |

# EXPLANATION OF LOGS

Figure A-2

# LOG OF BORING B-01

| | | | |
|---|---|---|---|
| Elevation: | 2680.0 Date(s) Drilled: 11/19/09 | Logged by: | FWC |
| Drilling Method: | Rotary Auger | Hammer Type: | Auto-Trip |
| Drilling Rig: | Mobile B-53 | Hammer Weight: | 140 lb. |
| Boring Diameter: | 8-inches | Hammer Drop: | 30-inches |

## SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

| DEPTH (ft) | USCS | SAMPLE TYPE | BLOWS/6" | MOISTURE (%) | DRY UNIT WT. (pcf) | RELATIVE COMPACTION (%) |
|---|---|---|---|---|---|---|
| | SM | BULK | | | | |
| | | SS | 13 | 2 | 122 | |
| 5 | SM | BULK | 10 | | | |
| | | SS | 8 | 2 | 119 | |
| | | | 12 | | | |
| | | SS | 12 | 2 | 119 | |
| 10 | GS | BULK | 15 | | | |
| | | SS | 13 | 1 | 126 | |
| | | | 17 | | | |
| 15 | | SS | 19 | 1 | 132 | |
| | | | 37 | | | |
| | | SS | 28 | 1 | 136 | |
| | | | 26 | | | |
| 20 | | SS | 15 | 2 | 124 | |
| | | | 23 | | | |
| 25 | | SPT | 17 | 3 | | |
| | | | 11 | | | |
| 30 | SM | SS | 20 | 4 | 122 | |
| | | SPT | 25 | 5 | | |
| | | | 14 | | | |
| 35 | SC | | 16 | | | |
| | | SPT | 17 | 3 | | |
| | | | 17 | | | |
| 40 | | SS | 14 | 9 | 113 | |
| | | SPT | 26 | 7 | | |
| | | | 13 | | | |
| 45 | CL | | 14 | | | |
| | | SPT | 15 | 8 | | |
| | | | 15 | | | |
| 50 | ML CL | SPT | 16 | 0 | | |
| | | | 22 | | | |

**SILTY SAND**, fine to coarse grained with gravel, gray brown, slightly moist, medium dense, interbedded with thin layers gravel throughout.

**SILTY SAND with GRAVEL**, fine to coarse grained, dark red brown, dry to slightly moist, medium dense, interbedded with thin layers sand throughout.

**SANDY GRAVEL**, fine to coarse grained, olive brown, dry to slightly moist, medium dense.

**SILTY SAND with GRAVEL**, fine to medium grained, red brown, moist, medium dense, weakly to moderately cemented.

**CLAYEY SAND**, very fine to fine grained, red brown, slightly moist, medium dense

**SANDY CLAY**, very fine to fine grained, dark red brown, slightly moist, stiff to hard.

**SANDY SILTY CLAY**, very fine to fine grained, dark red brown, moist, hard.

End of boring at 51.5 feet. No groundwater or mottling encountered.

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**Geotechnical Exploration**
**Brookside Avenue**
**Cherry Valley Area, CA**
**Project No. B464-002**

Figure No. **A-3**

# LOG OF BORING B-02

| | | | | | |
|---|---|---|---|---|---|
| Elevation: | 2676.0 | Date(s) Drilled: | 11/19/09 | Logged by: | FWC |
| Drilling Method: | Rotary Auger | | | Hammer Type: | Auto-Trip |
| Drilling Rig: | Mobile B-53 | | | Hammer Weight: | 140 lb. |
| Boring Diameter: | 8-inches | | | Hammer Drop: | 30-inches |

## SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

| DEPTH (ft) | USCS | SAMPLES: DRIVE SAMPLE | SAMPLES: BULK SAMPLE | SAMPLES: SAMPLE TYPE | BLOWS/6" | MOISTURE (%) | DRY UNIT WT. (pcf) | RELATIVE COMPACTION (%) |
|---|---|---|---|---|---|---|---|---|
| | SM | | | BULK | | | | |
| | | | | SS | 6<br>10 | 2 | 119 | |
| 5 | | | | SS | 5<br>8 | 2 | 120 | |
| | GS | | | SS | 19<br>28 | 1 | 137 | |
| 10 | | | | SS | 14<br>16 | 1 | 143 | |
| 15 | SM | | | SS | 17<br>30 | 1 | 131 | |

**SILTY SAND,** fine to coarse grained with gravel, gray brown, slightly moist, loose, interbedded with thin layers sand throughout.

**SANDY GRAVEL,** fine to coarse grained, light brown, dry, medium dense.

**SILTY SAND with GRAVEL,** fine to coarse grained, olive brown, slightly moist, dense, weakly cemented.

End of boring at 15.5 feet. No groundwater or mottling encountered.

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Figure No. **A-4**

# LOG OF BORING B-03

| | | | | | |
|---|---|---|---|---|---|
| Elevation: | 2670.0 | Date(s) Drilled: | 11/19/09 | Logged by: | FWC |
| Drilling Method: | Rotary Auger | | | Hammer Type: | Auto-Trip |
| Drilling Rig: | Mobile B-53 | | | Hammer Weight: | 140 lb. |
| Boring Diameter: | 8-inches | | | Hammer Drop: | 30-inches |

## SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

| DEPTH (ft) | USCS | SAMPLES: DRIVE SAMPLE | SAMPLES: BULK SAMPLE | SAMPLES: SAMPLE TYPE | BLOWS/6" | MOISTURE (%) | DRY UNIT WT. (pcf) | RELATIVE COMPACTION (%) |
|---|---|---|---|---|---|---|---|---|
| | SW | | | SS | 6 | 1 | 124 | |
| | GS | | | BULK | 9 | | | |
| 5 | | | | SS | 12 | 1 | 133 | |
| | | | | | 13 | | | |
| | | | | SS | 8 | | | |
| | | | | | 21 NR | | | |
| 10 | GS | | | BULK | | | | |
| | | | | SS | 18 | 2 | 126 | |
| | | | | | 20 | | | |
| | | | | SS | 20 | 1 | 135 | |
| 15 | | | | | 20 | | | |
| | GS | | | SS | 37 | 2 | 135 | |
| | | | | | 37 | | | |
| 20 | | | | SS | 23 | 1 | 123 | |
| | | | | | 27 | | | |

**ARTIFICIAL FILL,** SILTY SAND, fine to coarse grained with gravel, gray brown, slightly moist, loose to medium dense.

**SAND,** fine to coarse grained with trace gravel, olive brown, dry, medium dense.

**SANDY GRAVEL,** fine to coarse grained, olive brown, dry to slightly moist, medium dense.

**SANDY GRAVEL,** fine to coarse grained with silt, olive brown, dry to slightly moist, medium dense.

- cobble -

- rocky layers from 15.5 to 17.5 feet -

**SANDY GRAVEL,** fine to coarse grained, brown, dry to slightly moist, dense, weakly cemented.

End of boring at 20.5 feet. No groundwater or mottling encountered.

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**Cherry Valley Area, CA**
**Project No. B464-002**

Figure No. **A-5**

# LOG OF BORING B-04

| | | | | | |
|---|---|---|---|---|---|
| Elevation: | 2672.0 | Date(s) Drilled: | 11/19/09 | Logged by: | FWC |
| Drilling Method: | Rotary Auger | | | Hammer Type: | Auto-Trip |
| Drilling Rig: | Mobile B-53 | | | Hammer Weight: | 140 lb. |
| Boring Diameter: | 8-inches | | | Hammer Drop: | 30-inches |

## SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

| DEPTH (ft) | USCS | Description | SAMPLES: DRIVE SAMPLE | SAMPLES: BULK SAMPLE | SAMPLES: SAMPLE TYPE | BLOWS/6" | MOISTURE (%) | DRY UNIT WT. (pcf) | RELATIVE COMPACTION (%) |
|---|---|---|---|---|---|---|---|---|---|
| | SM | **SILTY SAND,** fine to medium grained, olive brown, slightly moist to moist, loose. | | ■ | BULK | | 18 | 114 | |
| | | | | | SS | 6 | 6 | 120 | |
| 5 | SW SM | **SAND,** fine to coarse grained with gravel, olive brown, slightly moist, medium dense. | | ■ | BULK | 10 | | | |
| | SP SM | **SILTY SAND,** fine to medium grained, olive brown, moist, medium dense. | | ■ | BULK | 13 | 3 | 128 | |
| | | | | | SS | 17 | | | |
| 10 | | **SAND with SILT and GRAVEL,** fine to coarse grained, olive brown, dry to slightly moist, medium dense. | | ■ | SS | 11 | 3 | 124 | |
| | | | | | | 16 | | | |
| | GS | **SANDY GRAVEL,** fine to medium grained, olive brown, dry to slightly moist, medium dense. | | ■ | SS | 22 | 3 | 130 | |
| 15 | | | | | | 28 | | | |
| | | | | | SS | 35 | 1 | 128 | |
| | | | | | | 24 | | | |
| 20 | | | | | SS | 26 | 2 | 132 | |
| | | End of boring at 20.5 feet. No groundwater or mottling encountered. | | | | 30 | | | |

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**Cherry Valley Area, CA**
**Project No. B464-002**

Figure No.
**A-6**

# LOG OF BORING B-05

| | | | | | |
|---|---|---|---|---|---|
| Elevation: | 2662.0 | Date(s) Drilled: | 11/19/09 | Logged by: | FWC |
| Drilling Method: | Rotary Auger | | | Hammer Type: | Auto-Trip |
| Drilling Rig: | Mobile B-53 | | | Hammer Weight: | 140 lb. |
| Boring Diameter: | 8-inches | | | Hammer Drop: | 30-inches |

## SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

| DEPTH (ft) | USCS | Description | SAMPLES: DRIVE SAMPLE | SAMPLES: BULK SAMPLE | SAMPLES: SAMPLE TYPE | BLOWS/6" | MOISTURE (%) | DRY UNIT WT. (pcf) | RELATIVE COMPACTION (%) |
|---|---|---|---|---|---|---|---|---|---|
| | SM | **SILTY SAND,** fine to coarse grained, olive brown, dry to slightly moist, loose. | | | | | | | |
| | | **SAND with GRAVEL,** fine to coarse grained, red brown, slightly moist, medium dense. | ✓ | | SS | 7<br>7 | 2 | 118 | |
| 5 | SM | **SILTY SAND,** fine to medium grained with gravel, olive brown, slightly moist, medium dense. | ✓ | | SS | 4<br>5<br>10 | 5 | 122 | |
| | SG | **GRAVELLY SAND,** fine to coarse grained, olive brown, slightly moist, medium dense. | ✓ | | SS | 10<br>13 | 5 | 121 | |
| 10 | GS | **SANDY GRAVEL,** fine to coarse grained, olive brown, dry to slightly moist, medium dense.<br>- rocky layer - | ✓ | ■ | BULK<br>SS | 16<br>23 | 4 | 124 | |
| 15 | | | ✓ | ■ | SS | 9<br>11 | 3 | 120 | |
| | SG | **GRAVELLY SAND,** fine to coarse grained with silt, olive brown, slightly moist, medium dense. | ✓ | | SS | 9<br>12 | 6 | 124 | |
| 20 | | | ✓ | | SS | 9<br>11 | 6 | 119 | |
| | SM | **SILTY SAND,** fine to medium grained with trace gravel, red brown, slightly moist, medium dense. | ☒ | ■ | BULK<br>SPT | 8<br>10 | 9 | | |
| 25 | | | | | | | | | |
| | SM | **SILTY SAND,** fine to medium grained with gravel and trace clay, red brown, moist, medium dense. | ✓ | | SS | 13 | 10 | 119 | |
| 30 | | | ☒ | | SPT | 18<br>12<br>24 | 8 | | |
| | GS | **SANDY GRAVEL,** fine to coarse grained with cobbles, olive brown, slightly moist, medium dense.<br>- rocky layer 35 to 37 feet - | ☒ | | SPT | 35<br>35 | 3 | | |
| 35 | | | | | | | | | |
| | SM | - rocky layer - | | | | | | | |
| 40 | SM<br>SW | **SILTY SAND,** fine to medium grained with trace gravel, orange brown, moist, medium dense. | ✓ | | SS | 23 | 9 | 120 | |
| | SC | **SAND,** fine to coarse grained, olive, slightly moist, medium dense. | ☒ | | SPT | 41<br>21<br>15 | 4 | | |
| | SM | **CLAYEY SAND,** very fine to fine grained, red brown, moist, medium dense. | ☒ | | SPT | 13<br>15 | 9 | | |
| 45 | | **SILTY SAND,** very fine to fine grained, red brown, moist, medium dense. | | | | | | | |
| 50 | | | ☒ | | SPT | 13 | 6 | | |
| | | End of boring at 51.5 feet. No groundwater or mottling encountered. | | | | 13 | | | |

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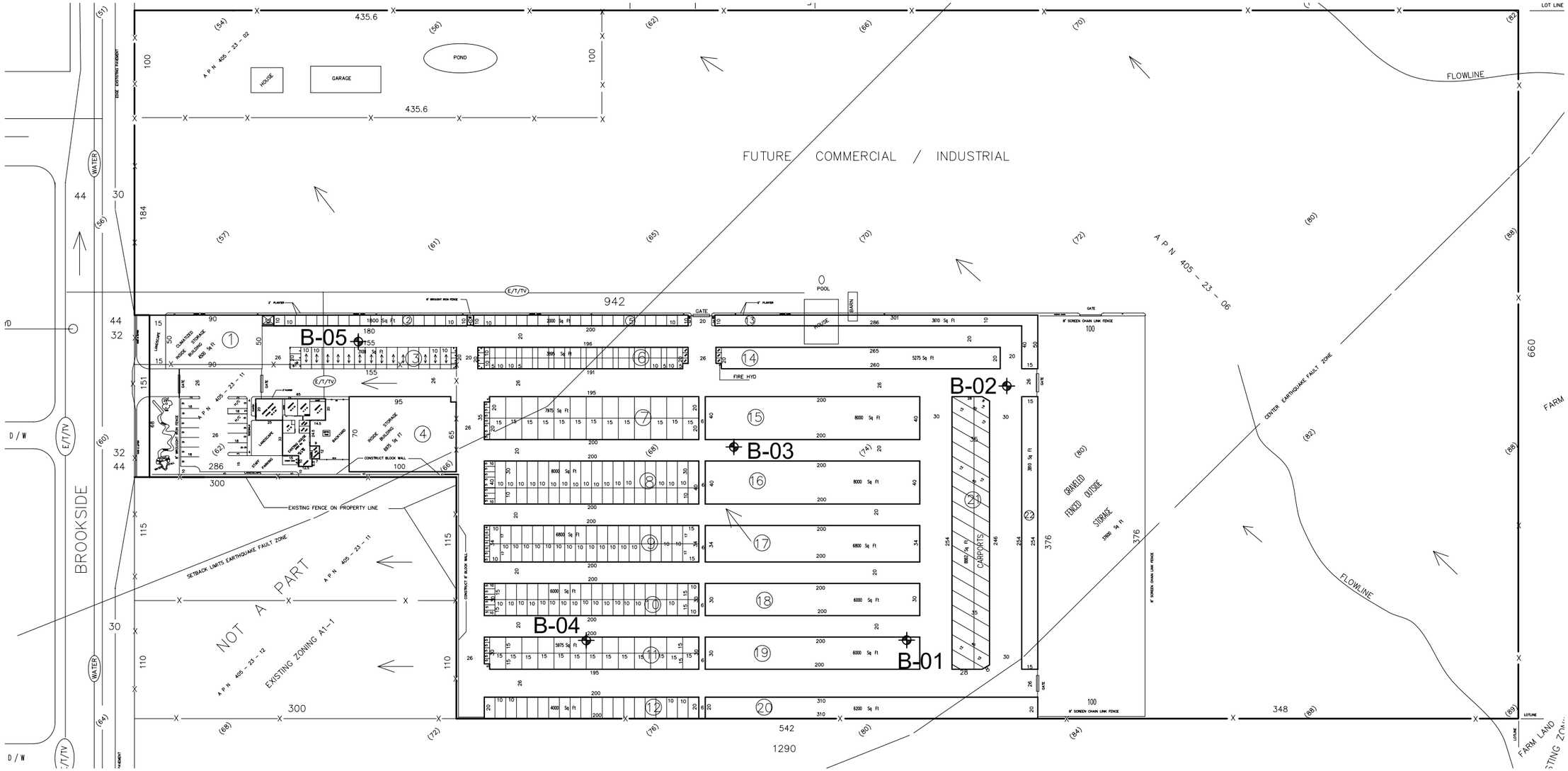
**Geotechnical Exploration**
**Brookside Avenue**
**Cherry Valley Area, CA**
**Project No. B464-002**

Figure No. **A-7**

# SITE PLAN

## Proposed Mini Storage Facility

## Brookside Avenue, Cherry Valley Area, Riverside County, California




GRAPHIC SCALE

100 0 50 100 200 400

1 INCH = 100 FT

## LEGEND

⌖ = Approximate Location of Exploratory Boring


INLAND FOUNDATION ENGINEERING, INC.
1310 South Santa Fe Avenue
San Jacinto, California
(951) 654-1555 FAX (951) 654-0551


JOB NO.: B464-002

DATE: December 2009

Fig. A-8

***APPENDIX B –***
***Laboratory Testing***

## APPENDIX B

## LABORATORY TESTING

Representative soil samples obtained from our borings were returned to our laboratory for additional observation and testing. Descriptions of the tests performed are provided below.

**Unit Weight and Moisture Content:** Ring samples were weighed and measured to evaluate their unit weight. A small portion of each sample was then tested for moisture content. The testing was performed per ASTM D2937 and D2216. The results of the testing are shown on the boring logs (Figure Nos. A-3 through A-7).

**Maximum Density-Optimum Moisture Content:** Three samples were selected for maximum density testing in accordance with ASTM D1557. The test results are presented graphically on Figure B-3.

**Sieve Analysis:** Three soil samples were selected for sieve analysis testing in accordance with ASTM D422. These tests provide information for classifying the soil in accordance with the Unified Classification System. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing are shown on Figure B-4.

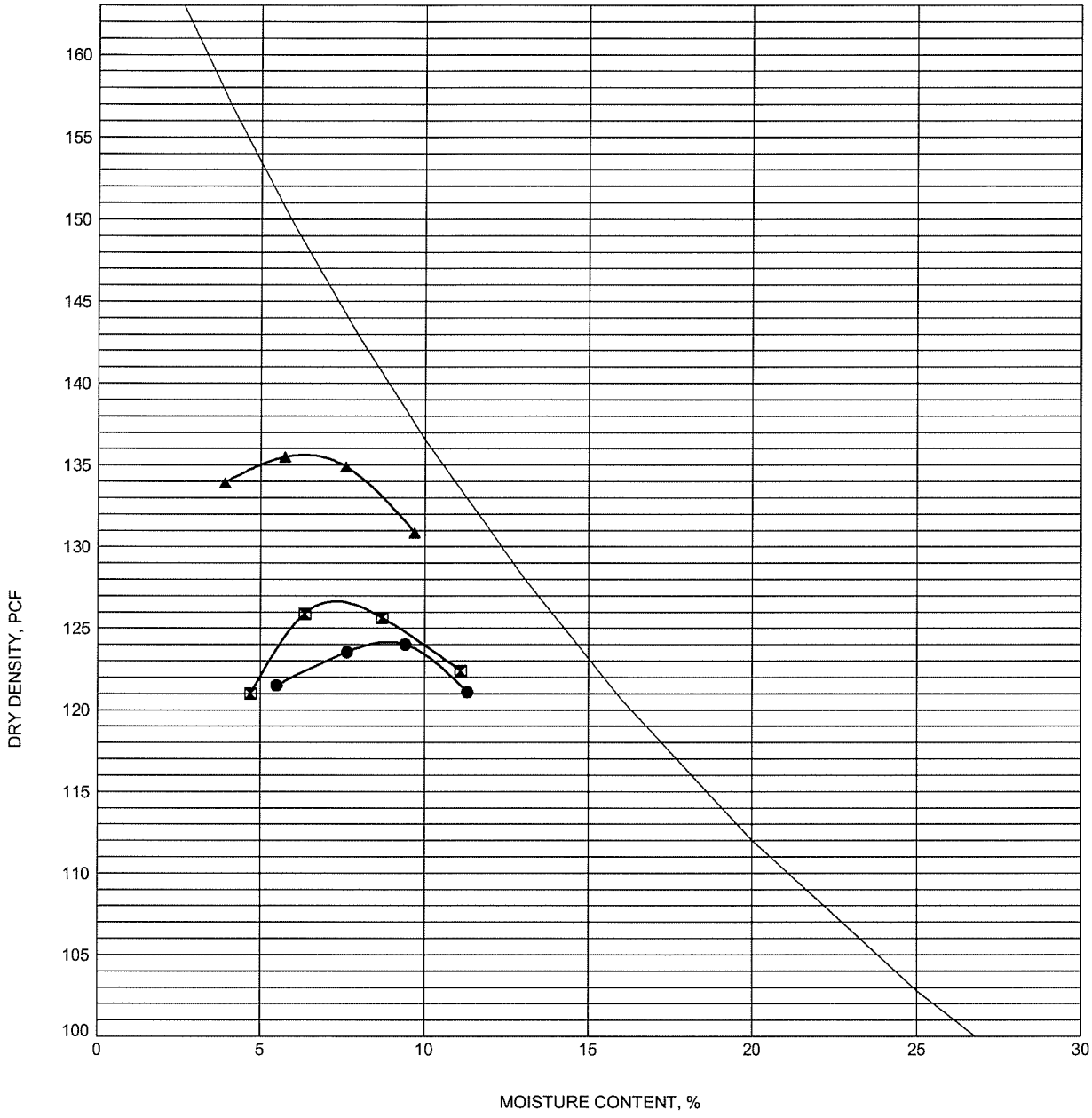
**Plastic Index**: Three samples were selected for plastic index testing in accordance with ASTM D4318. These tests provide information regarding soil plasticity and are also used for developing classifications for the soil in accordance with the Unified Classification System. The results are shown on Figure B-4.

**Direct Shear Testing:** One sample was selected for direct shear strength testing in accordance with ASTM D3080. This testing measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation bearing capacity and lateral earth pressure. Test results are shown on Figure B-5.

**Consolidation Testing:** One sample was selected for consolidation testing in accordance with ASTM D2435. This test is used to evaluate the magnitude and rate of settlement of a structure or earth fill. The results of this testing are presented graphically on Figure B-6.

**Analytical Testing:** Two samples were selected to evaluate the concentration of soluble sulfates and chlorides, pH level, and resistivity of and within the on-site soils. The results are shown in the following table.

| Sample Location | Sample Depth (ft.) | Water-Soluble Sulfates (%) | Chlorides (ppm) | Minimum Resistivity (ohm-cm) | pH |
|---|---|---|---|---|---|
| B-02 | 0.0 – 6.0 | 0.001 | 108 | 10,000 | 6.0 |
| B-04 | 0.0 – 4.0 | 0.001 | 60 | 15,000 | 6.9 |




| Specimen Identification | | | Classification | Max.Density | MC% |
|---|---|---|---|---|---|
| ● | B-02 | 0.0 | POORLY GRADED SAND with SILT SP-SM | 124.5 | 9.0 |
| ⊠ | B-04 | 0.0 | SILTY SAND SM | 127.0 | 7.5 |
| ▲ | B-04 | 6.3 | POORLY GRADED SAND with SILT and GRAVEL SP-SM | 136.0 | 7.0 |
| | | | | | |
| | | | | | |
| | | | | | |

PROJECT Geotechnical Exploration
Brookside Avenue

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DATE December 17, 2009

## MAXIMUM DENSITY-OPTIMUM MOISTURE CURVES

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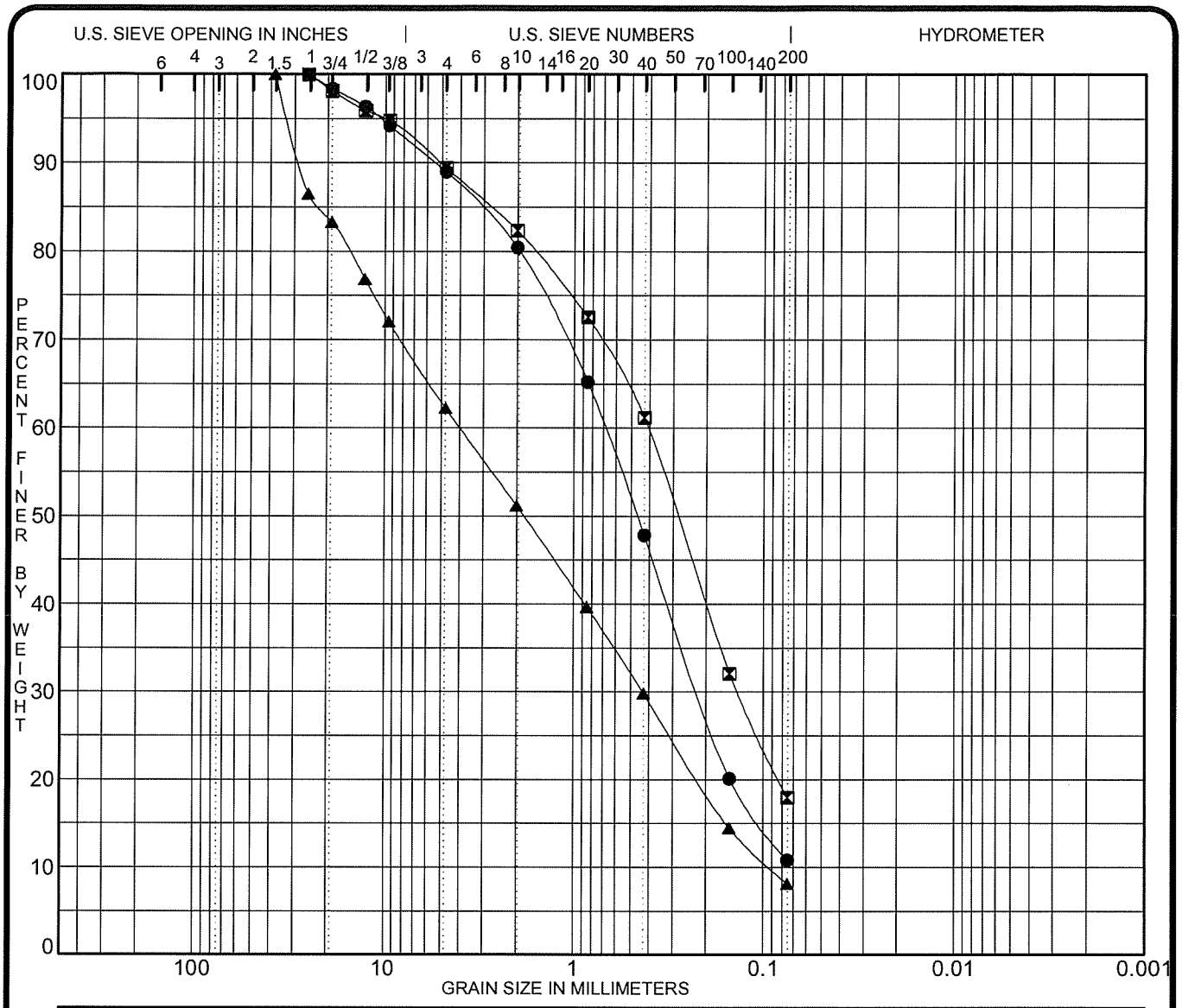
Figure No. B-3




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen Identification | | | Classification | S.G. | LL | PL | PI | Cc | Cu |
|---|---|---|---|---|---|---|---|---|---|
| ● | B-02 | 0.0 | POORLY GRADED SAND with SILT SP-SM | | NP | NP | NP | 0.97 | 9.8 |
| ⊠ | B-04 | 0.0 | SILTY SAND SM | | NP | NP | NP | | |
| ▲ | B-04 | 6.3 | POORLY GRADED SAND with SILT and GRAVEL SP-SM | | NP | NP | NP | 0.51 | 43.3 |

| Specimen Identification | | | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| ● | B-02 | 0.0 | 25.40 | 0.69 | 0.217 | | 11.0 | 78.2 | 10.8 | |
| ⊠ | B-04 | 0.0 | 25.40 | 0.41 | 0.135 | | 10.6 | 71.5 | 18.0 | |
| ▲ | B-04 | 6.3 | 38.00 | 3.98 | 0.430 | 0.0919 | 37.7 | 54.1 | 8.1 | |

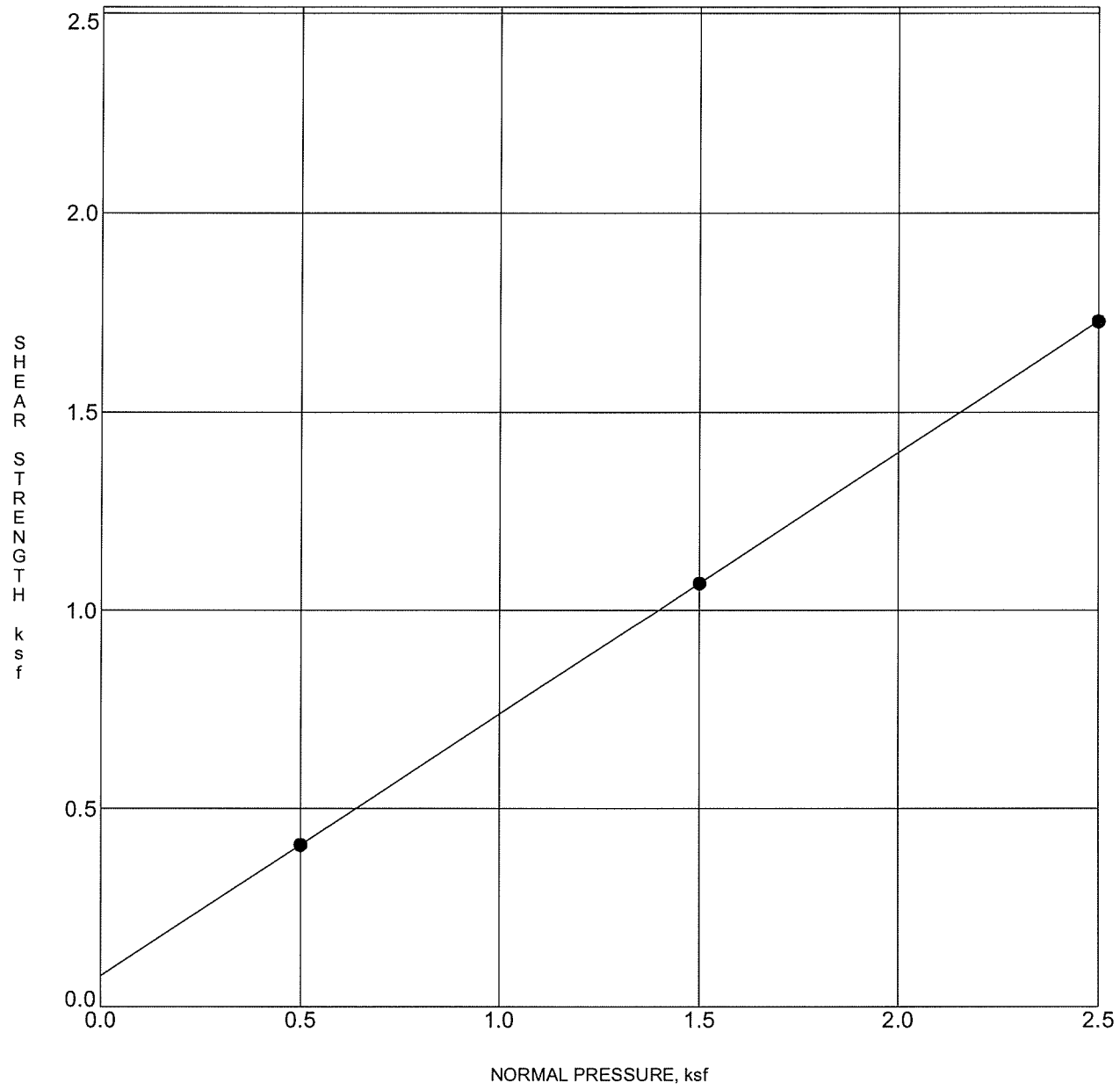
PROJECT Geotechnical Exploration
Brookside Avenue

PROJECT NO. B464-002
DATE December 17, 2009

## GRADATION CURVES

**Inland Foundation Engineering, Inc.**
San Jacinto, California 92583

Figure No. B-4




| Specimen Identification | | | Classification | Phi | Cohesion | DD | MC% |
|---|---|---|---|---|---|---|---|
| ● | **B-04** | **0.0** | **SILTY SAND SM** | **33** | **0.078** | **114** | **18** |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

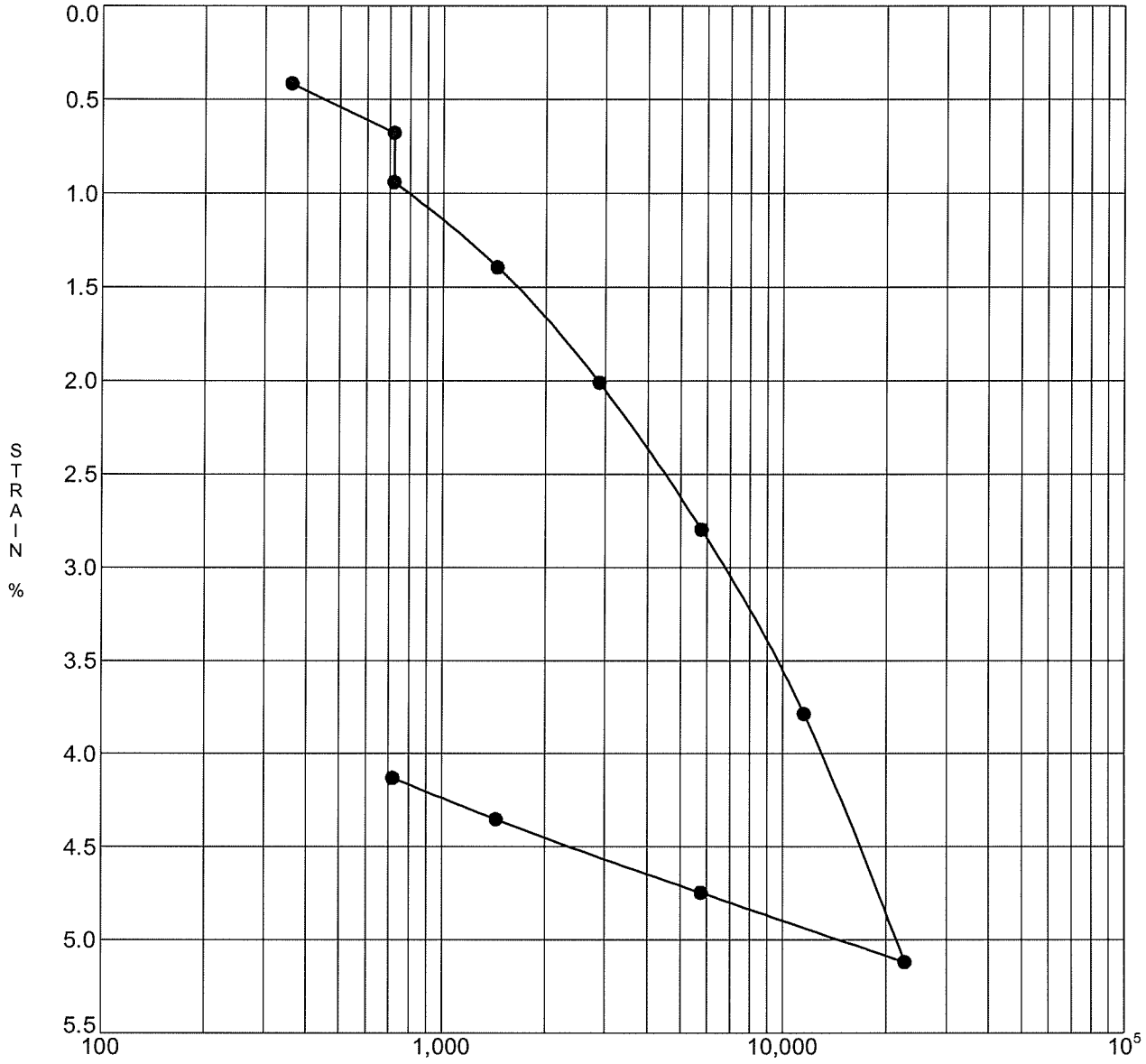
PROJECT Geotechnical Exploration
Brookside Avenue

PROJECT NO. B464-002
DATE December 17, 2009

## SHEAR TEST DIAGRAM

**Inland Foundation Engineering, Inc.**
San Jacinto, California 92583

Figure No. B-5




| Specimen Identification | | Classification | DD | MC% |
|---|---|---|---|---|
| ● B-05 2.5 | | **SAND with GRAVEL** | **118** | **2** |
| ⊠ | | | | |
| ▲ | | | | |
| ★ | | | | |
| ✕ | | | | |
| ✪ | | | | |

PROJECT Geotechnical Exploration
Brookside Avenue

PROJECT NO. B464-002
DATE December 17, 2009

## CONSOLIDATION TEST

**Inland Foundation Engineering, Inc.**
San Jacinto, California 92583

Figure No. B-6

June 2, 2023
Project No. C537-002

**Corion Enterprises**
100 Wilshire Blvd., Suite 700
Santa Monica, California 90401

Attention: Ms. JoAnn Horeni
Director, Client Relations

Subject: Infiltration Testing
Proposed Cherry Valley Storage
Brookside Avenue, North Side, East of Nancy Avenue
Cherry Valley Area, Riverside County, California

Dear Ms. Horeni:

This report presents the results of infiltration (percolation) testing performed for a stormwater infiltration system at the subject site. The testing was conducted in general conformance with our proposal dated April 25, 2023.

The following references were used for the testing and preparation of this report.

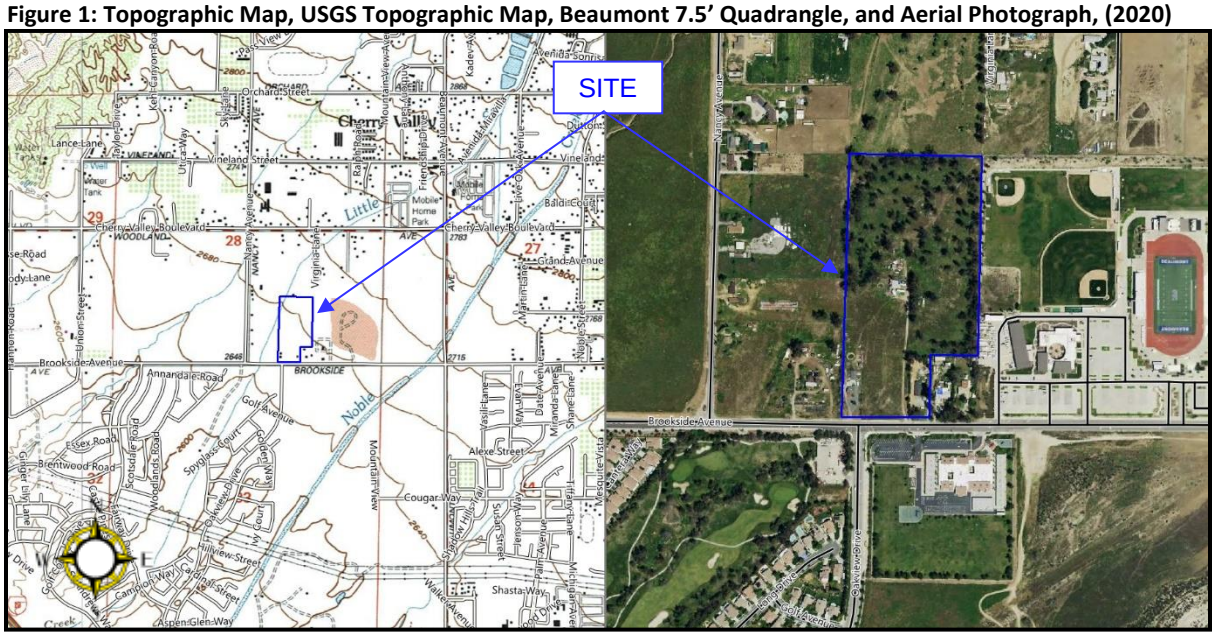
- Preliminary Grading Plan for Cherry Valley Storage, 38718 Brookside Drive, Cherry Valley, California, prepared by Strand Engineering, Inc., dated May 26, 2023

- Geotechnical Report Update, Proposed Mini Storage Facility, Brookside Avenue, North Side, East of Nancy Avenue, Cherry Valley Area, Riverside County, California, prepared by Inland Foundation Engineering, Inc., dated January 20, 2023, Project No. C537-002.

***PROJECT AND SITE DESCRIPTION***

The project site is located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County. The site location is shown below.

**Figure 1: Topographic Map, USGS Topographic Map, Beaumont 7.5' Quadrangle, and Aerial Photograph, (2020)**




The project site occupies approximately 8.4 acres and will be developed with a storage facility. The facility will include a small office building, self-storage structures, RV storage with shade structures, and drive aisles.

Three infiltration basins are proposed at the locations shown on Figure A-1. The basins will range in depth from approximately 4 to 8 feet below adjacent surface grades.

## *SUBSURFACE CONDTIONS*

Exploratory borings were drilled at each basin location to depths of approximately 20 feet below ground surface. Alluvial soil consisting of silty sand (SM) and sand with silt (SP-SM) was encountered to depths of about 3 to 5 feet. Gravel with sand (GP) was encountered below the surface soil to the depth explored, 20 feet. Logs of the exploratory borings are included with this report in Appendix A.

Groundwater was not encountered in the exploratory borings. No mottling or other indications of historic high groundwater were observed. Groundwater data compiled for the referenced geotechnical report update indicate the depth to historic high groundwater is more than 300 feet below ground surface.

Based on the conditions encountered in the borings and historical groundwater data, there will be a minimum of 5 feet of permeable soil below the infiltration facilities and a minimum of 10 feet between the bottom of the infiltration facilities and historical high groundwater levels.

***INFILTRATION TESTING***

Infiltration testing was conducted in general accordance with Appendix A of the Riverside County Low Impact Development BMP Design Handbook (2011). The Riverside County Department of Environmental Health shallow percolation test procedure was used. The percolation rates were converted to infiltration rates using the Porchet method.

Two percolation tests were performed at each proposed basin location. The test holes were drilled on May 30, 2023 to depths ranging from approximately 48 to 78 inches below existing ground surface. The test holes were approximately ten (10) inches in diameter. A two-inch thick layer of gravel was placed in the bottom of each test hole. The test holes were then pre-soaked by filling to ground surface (at least 5 times the hole radius).

Upon return to the site on May 31, 2023, all pre-soak water had percolated through the test holes and percolation testing of the test holes commenced. For all tests, more than 6 inches of water seeped away twice consecutively in less than 25 minutes, which meets the sandy soil criteria. The tests were then run for an additional hour with measurements taken every 10 minutes. For all tests except P-01, there was no standing water remaining in the hole at the end of the 10-minute reading interval. Copies of the field test data are included in Appendix A.

The measured percolation rates ranged from less than 0.33 to 0.67 minutes per inch. Percolation test rates were converted to infiltration rates ($I_c$) using the Porchet method and the following equation:

$$I_c = \Delta H 60 r / \Delta t (r + 2H_{avg})$$

Where:

r = Test Hole Radius (in.)
$H_{avg}$ = Average Height of Water during Test Interval (in.)
$\Delta H$ = Change in Water Height during Test Interval (in.), and
$\Delta t$ = Time Interval (in.)

The corresponding calculated infiltration rates ($I_c$) ranged from 9 to more than 26 inches per hour. These values exclude factors of safety. The table below provides a summary of the test data with values for $I_c$:

| Percolation Test No. | Percolation Rate (min/in) | Depth Below Existing Ground Surface (in) | Infiltration Rate ($I_c$) (in/hr) |
|---|---|---|---|
| **Basin 1** | | | |
| P-05 | <0.33 | 48 | >26 |
| P-06 | <0.33 | 78 | >26 |
| **Basin 2** | | | |
| P-03 | <0.33 | 48 | >26 |
| P-04 | <0.33 | 72 | >26 |
| **Basin 3** | | | |
| P-01 | 0.67 | 48 | 9 |
| P-02 | <0.33 | 68 | >26 |

Per Table 1-1 Option 2 (Percolation Tests) use FS=3

***LIMITATIONS***

This report was prepared for Corion Enterprises for their use in the design of the proposed stormwater infiltration systems at the subject location. This report may only be used by Corion Enterprises for this purpose. The use of this report by parties or for other purposes is not authorized without written permission by Inland Foundation Engineering, Inc. Inland Foundation Engineering, Inc. will not be liable for any projects connected with the unauthorized use of this report.

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We appreciate being of service to you on this project. If you have any questions, please contact our office.

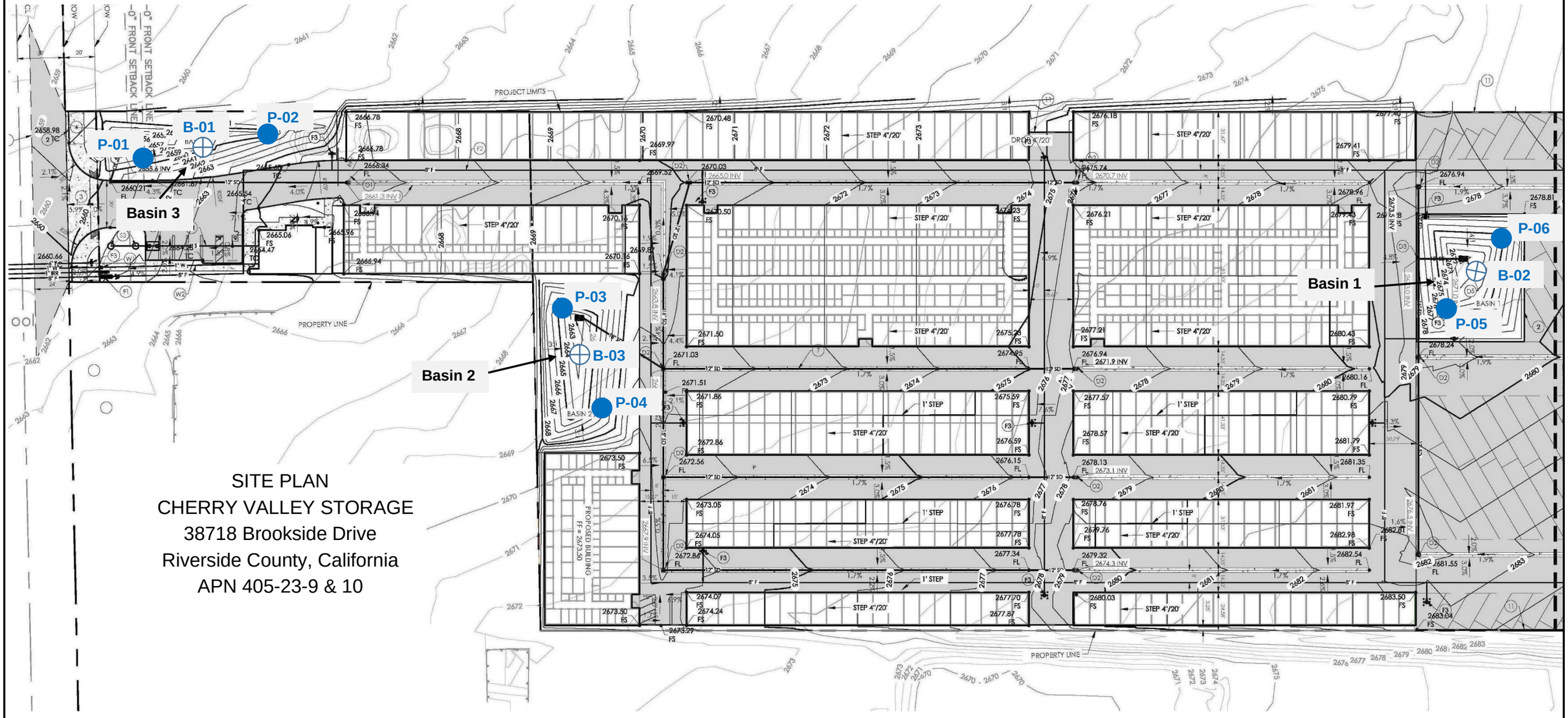
Respectfully,
**INLAND FOUNDATION ENGINEERING, INC.**

REGISTERED PROFESSIONAL ENGINEER ALLEN D. EVANS No. 2060 GEOTECHNICAL STATE OF CALIFORNIA

**Allen D. Evans, P.E., G.E.**
Principal

ADE:es
Distribution: Addressee

# *APPENDIX A*




SITE PLAN
CHERRY VALLEY STORAGE
38718 Brookside Drive
Riverside County, California
APN 405-23-9 & 10

Base Map: Preliminary Grading Plan prepared by Strand Engineering, Inc.

- Approximate Location of Percolation Test for Infiltration Basin
- Approximate Location of Deep Boring

N

IFE Inland Foundation Engineering, Inc.
1310 S. Santa Fe Avenue, San Jacinto, CA 92583 | (951) 654-1555

| | | |
|---|---|---|
| Figure No. A-1 | Corion Enterprises<br>Cherry Valley Storage<br>38718 Brookside Drive, Riverside County, CA | |
| | Drawn By: ES | Project No. C537-002 |
| | Scale: 1"= 60' | Date: June 2023 |

# LOG OF BORING B-01

| | | | | | |
|---|---|---|---|---|---|
| DRILLING RIG | **Mobile B61** | DATE DRILLED | **5/30/23** | HAMMER TYPE | |
| DRILLING METHOD | **Rotary Auger** | | | HAMMER WEIGHT | **-lb.** |
| LOGGED BY | **FWC** | | | HAMMER DROP | **-inches** |
| GROUND ELEVATION | **+/- 2671 ft** | | | BORING DIAMETER | **8-inches** |

| DEPTH (ft) | U.S.C.S. | GRAPHIC LOG | SUMMARY OF SUBSURFACE CONDITIONS | BULK SAMPLE | DRIVE SAMPLE | SAMPLE TYPE | BLOW COUNTS /6" | MOISTURE (%) | DRY UNIT WT. (pcf) |
|---|---|---|---|---|---|---|---|---|---|
| | | | This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations. | | | | | | |
| | SM | | **SILTY SAND,** fine to medium, gray brown, moist, medium dense. | | | | | | |
| 5 | GP | | **GRAVEL with SAND,** fine to coarse, gray brown, moist, medium dense. | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | End of boring at 20 feet. No groundwater or mottling encountered. Backfilled with native soil. | | | | | | |

**Inland Foundation Engineering, Inc.**

| | |
|---|---|
| CLIENT | **Corion Enterprises** |
| PROJECT NAME | **Cherry Valley Storage** |
| PROJECT LOCATION | **38718 Brookside Drive** |
| | **Riverside County, CA** |
| PROJECT NUMBER | **C537-002** |

FIGURE NO. A-2

IFE BORING - GINT STD US LAB.GDT - 6/1/23 14:29 - P:\C537\002\GINT.GPJ

# LOG OF BORING B-02

| | | | | | |
|---|---|---|---|---|---|
| DRILLING RIG | **Mobile B61** | DATE DRILLED | **5/30/23** | HAMMER TYPE | |
| DRILLING METHOD | **Rotary Auger** | | | HAMMER WEIGHT | **-lb.** |
| LOGGED BY | **FWC** | | | HAMMER DROP | **-inches** |
| GROUND ELEVATION | **+/- 2660 ft** | | | BORING DIAMETER | **8-inches** |

| DEPTH (ft) | U.S.C.S. | GRAPHIC LOG | SUMMARY OF SUBSURFACE CONDITIONS | BULK SAMPLE | DRIVE SAMPLE | SAMPLE TYPE | BLOW COUNTS /6" | MOISTURE (%) | DRY UNIT WT. (pcf) |
|---|---|---|---|---|---|---|---|---|---|
| | | | This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations. | | | | | | |
| | SP-SM | | **SAND with SILT,** and GRAVEL, fine to coarse, gray brown, slightly moist, loose. | | | | | | |
| 5 | | | | | | | | | |
| | GP | | **GRAVEL with SAND,** fine to coarse, gray brown, slightly moist, medium dense. | | | | | | |
| 10 | | | - boulders | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | End of boring at 20 feet. No groundwater or mottling encountered. Backfilled with native soil. | | | | | | |

**Inland Foundation Engineering, Inc.**

| | |
|---|---|
| CLIENT | **Corion Enterprises** |
| PROJECT NAME | **Cherry Valley Storage** |
| PROJECT LOCATION | **38718 Brookside Drive** |
| | **Riverside County, CA** |
| PROJECT NUMBER | **C537-002** |

FIGURE NO. A-3

IFE BORING - GINT STD US LAB.GDT - 6/1/23 14:29 - P:\C537\002\GINT.GPJ

# LOG OF BORING B-03

| | | | | | |
|---|---|---|---|---|---|
| DRILLING RIG | **Mobile B61** | DATE DRILLED | **5/30/23** | HAMMER TYPE | |
| DRILLING METHOD | **Rotary Auger** | | | HAMMER WEIGHT | **-lb.** |
| LOGGED BY | **FWC** | | | HAMMER DROP | **-inches** |
| GROUND ELEVATION | **+/- 2663 ft** | | | BORING DIAMETER | **8-inches** |

| DEPTH (ft) | U.S.C.S. | GRAPHIC LOG | SUMMARY OF SUBSURFACE CONDITIONS | BULK SAMPLE | DRIVE SAMPLE | SAMPLE TYPE | BLOW COUNTS /6" | MOISTURE (%) | DRY UNIT WT. (pcf) |
|---|---|---|---|---|---|---|---|---|---|
| | | | This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations. | | | | | | |
| | SM | | **SILTY SAND,** fine to medium, gray brown, slightly moist, medium dense. | | | | | | |
| 5 | GP | | **GRAVEL with SAND,** fine to coarse, gray brown, slightly moist, medium dense. | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | End of boring at 20 feet. No groundwater or mottling encountered. Backfilled with native soil. | | | | | | |

**Inland Foundation Engineering, Inc.**

| | |
|---|---|
| CLIENT | **Corion Enterprises** |
| PROJECT NAME | **Cherry Valley Storage** |
| PROJECT LOCATION | **38718 Brookside Drive** |
| | **Riverside County, CA** |
| PROJECT NUMBER | **C537-002** |

FIGURE NO. A-4

IFE BORING - GINT STD US LAB.GDT - 6/1/23 14:29 - P:\C537\002\GINT.GPJ

# PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

| | | |
|---|---|---|
| **Project:** Corian Enterprises | **Project No.:** C537-002 | **Date:** 5/31/2023 |
| **Test Hole No.:** P-01 | **Tested By:** Floyd Collins and Chris Dahlgren | |
| **Depth of Test Hole ($D_T$):** 48" | **USCS Soil Classification:** SM | |

| **Test Hole Dimensions (inches)** | **Length** | **Width** |
|---|---|---|
| **Diameter (if round)=** 10" **Sides (if rectangular) =** | | |

**Sandy Soil Criteria Test***

| Trial No. | Start Time | Stop Time | Time Interval, (min.) | Initial Depth to Water (in.) | Final Depth to Water (in.) | Change in Water Level (in.) | Greater than or Equal to 6" (Y/N) |
|---|---|---|---|---|---|---|---|
| **1** | 11:48 | 12:13 | 25 | 18 | 44 | 26 | Y |
| **2** | 12:16 | 12:41 | 25 | 18 | 44 | 26 | Y |
| **3** | | | | | | | |

***If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".**

| Trial No. | Start Time | Stop Time | $\Delta t$ Time Interval (min.) | $D_o$ Initial Depth to Water (in.) | $D_f$ Final Depth to Water (in.) | $\Delta D=\Delta H$ Change in Water Level (in.) | Perc. Rate min./in. | $H_{Avg}$ $(D_T - D_o) + (D_T - D_f) \div 2$ | $I_T$ $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$ |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 12:44 | 12:54 | 10 | 18 | 33 ½ | 15 ½ | 0.65 | 22.25 | 9 |
| **2** | 12:56 | 1:06 | 10 | 18 | 33 ½ | 15 ½ | 0.65 | 22.25 | 9 |
| **3** | 1:10 | 1:20 | 10 | 18 | 33 | 15 | 0.67 | 22.50 | 9 |
| **4** | 1:22 | 1:32 | 10 | 18 | 33 | 15 | 0.67 | 22.50 | 9 |
| **5** | 1:37 | 1:47 | 10 | 18 | 33 | 15 | 0.67 | 22.50 | 9 |
| **6** | 1:50 | 2:00 | 10 | 18 | 33 | 15 | 0.67 | 22.50 | 9 |
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**COMMENTS:** Presoaked on 5/30/23. Dry hole prior to testing. Hole filled to test level and tests begun. Temperature ~55°F during resting. Overcast.

# PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

| | | |
|---|---|---|
| **Project:** Corian Enterprises | **Project No.:** C537-002 | **Date:** 5/31/2023 |
| **Test Hole No.:** P-02 | **Tested By:** Floyd Collins and Chris Dahlgren | |
| **Depth of Test Hole ($D_T$):** 68” | **USCS Soil Classification:** SP-SM w/gravel | |

| **Test Hole Dimensions (inches)** | **Length** | **Width** |
|---|---|---|
| **Diameter (if round)=** 10” **Sides (if rectangular) =** | | |

**Sandy Soil Criteria Test***

| Trial No. | Start Time | Stop Time | Time Interval, (min.) | Initial Depth to Water (in.) | Final Depth to Water (in.) | Change in Water Level (in.) | Greater than or Equal to 6″ (Y/N) |
|---|---|---|---|---|---|---|---|
| **1** | 11:45 | 12:10 | 25 | 38 | 68 | 30 | Y |
| **2** | 12:12 | 12:37 | 25 | 38 | 68 | 30 | Y |
| **3** | | | | | | | |

***If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25″.**

| Trial No. | Start Time | Stop Time | $\Delta t$ Time Interval (min.) | $D_o$ Initial Depth to Water (in.) | $D_f$ Final Depth to Water (in.) | $\Delta D=\Delta H$ Change in Water Level (in.) | Perc. Rate min./in. | $H_{Avg}$ $(D_T - D_o) + (D_T - D_f) \div 2$ | $I_T$ $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$ |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 12:40 | 12:50 | 10 | 38 | 68* | 30 | <0.33 | 15.00 | >26 |
| **2** | 12:51 | 1:01 | 10 | 38 | 68* | 30 | <0.33 | 15.00 | >26 |
| **3** | 1:04 | 1:14 | 10 | 38 | 68* | 30 | <0.33 | 15.00 | >26 |
| **4** | 1:16 | 1:26 | 10 | 38 | 68* | 30 | <0.33 | 15.00 | >26 |
| **5** | 1:28 | 1:38 | 10 | 38 | 68* | 30 | <0.33 | 15.00 | >26 |
| **6** | 1:41 | 1:51 | 10 | 38 | 68* | 30 | <0.33 | 15.00 | >26 |
| | | | | | | | | | |

*No standing water in the hole at end of 10 minute test period

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|---|---|---|---|---|---|---|---|---|---|
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**COMMENTS:** Presoaked on 5/30/23. Dry hole prior to testing. Hole filled to test level and tests begun. Temperature ~55°F during resting. Overcast.

# PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

| | | |
|---|---|---|
| **Project:** Corian Enterprises | **Project No.:** C537-002 | **Date:** 5/31/2023 |
| **Test Hole No.:** P-03 | **Tested By:** Floyd Collins and Chris Dahlgren | |
| **Depth of Test Hole ($D_T$):** 48” | **USCS Soil Classification:** SP-SM w/gravel | |

| **Test Hole Dimensions (inches)** | **Length** | **Width** |
|---|---|---|
| **Diameter (if round)=** 10” **Sides (if rectangular) =** | | |

**Sandy Soil Criteria Test***

| Trial No. | Start Time | Stop Time | Time Interval, (min.) | Initial Depth to Water (in.) | Final Depth to Water (in.) | Change in Water Level (in.) | Greater than or Equal to 6″ (Y/N) |
|---|---|---|---|---|---|---|---|
| **1** | 9:35 | 10:00 | 25 | 18 | 48 | 30 | Y |
| **2** | 10:02 | 10:27 | 25 | 18 | 48 | 30 | Y |
| **3** | | | | | | | |

***If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25″.**

| Trial No. | Start Time | Stop Time | $\Delta t$ Time Interval (min.) | $D_o$ Initial Depth to Water (in.) | $D_f$ Final Depth to Water (in.) | $\Delta D=\Delta H$ Change in Water Level (in.) | Perc. Rate min./in. | $H_{Avg}$ $(D_T - D_o) + (D_T - D_f) \div 2$ | $I_T$ $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$ |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 10:28 | 10:38 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **2** | 10:40 | 10:50 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **3** | 10:51 | 11:01 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **4** | 11:03 | 11:13 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **5** | 11:14 | 11:24 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **6** | 11:26 | 11:36 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| | | | | | | | | | |

*No standing water in the hole at end of 10 minute test period

**COMMENTS:** Presoaked on 5/30/23. Dry hole prior to testing. Hole filled to test level and tests begun. Temperature ~53°F during resting. Overcast.

# PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

| | | |
|---|---|---|
| **Project:** Corian Enterprises | **Project No.:** C537-002 | **Date:** 5/31/2023 |
| **Test Hole No.:** P-04 | **Tested By:** Floyd Collins and Chris Dahlgren | |
| **Depth of Test Hole ($D_T$):** 72” | **USCS Soil Classification:** SP-SM w/gravel | |

| **Test Hole Dimensions (inches)** | **Length** | **Width** |
|---|---|---|
| **Diameter (if round)=** 10” **Sides (if rectangular) =** | | |

**Sandy Soil Criteria Test***

| Trial No. | Start Time | Stop Time | Time Interval, (min.) | Initial Depth to Water (in.) | Final Depth to Water (in.) | Change in Water Level (in.) | Greater than or Equal to 6″ (Y/N) |
|---|---|---|---|---|---|---|---|
| **1** | 9:33 | 9:58 | 25 | 42 | 72 | 30 | Y |
| **2** | 10:00 | 10:25 | 25 | 42 | 72 | 30 | Y |
| **3** | | | | | | | |

***If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25″.**

| Trial No. | Start Time | Stop Time | $\Delta t$ Time Interval (min.) | $D_o$ Initial Depth to Water (in.) | $D_f$ Final Depth to Water (in.) | $\Delta D=\Delta H$ Change in Water Level (in.) | Perc. Rate min./in. | $H_{Avg}$ $(D_T - D_o) + (D_T - D_f) \div 2$ | $I_T$ $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$ |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 10:33 | 10:43 | 10 | 42 | 72* | 30 | <0.33 | 15.00 | >26 |
| **2** | 10:44 | 10:54 | 10 | 42 | 72* | 30 | <0.33 | 15.00 | >26 |
| **3** | 10:56 | 11:06 | 10 | 42 | 72* | 30 | <0.33 | 15.00 | >26 |
| **4** | 11:07 | 11:17 | 10 | 42 | 72* | 30 | <0.33 | 15.00 | >26 |
| **5** | 11:19 | 11:29 | 10 | 42 | 72* | 30 | <0.33 | 15.00 | >26 |
| **6** | 11:30 | 11:40 | 10 | 42 | 72* | 30 | <0.33 | 15.00 | >26 |
| | | | | | | | | | |

*No standing water in the hole at end of 10 minute test period

**COMMENTS:** Presoaked on 5/30/23. Dry hole prior to testing. Hole filled to test level and tests begun. Temperature ~53°F during resting. Overcast.

# PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

| | | |
|---|---|---|
| **Project:** Corian Enterprises | **Project No.:** C537-002 | **Date:** 5/31/2023 |
| **Test Hole No.:** P-05 | **Tested By:** Floyd Collins and Chris Dahlgren | |
| **Depth of Test Hole ($D_T$):** 48" | **USCS Soil Classification:** SP-SM w/gravel | |

| **Test Hole Dimensions (inches)** | **Length** | **Width** |
|---|---|---|
| **Diameter (if round)=** 10" **Sides (if rectangular) =** | | |

**Sandy Soil Criteria Test***

| Trial No. | Start Time | Stop Time | Time Interval, (min.) | Initial Depth to Water (in.) | Final Depth to Water (in.) | Change in Water Level (in.) | Greater than or Equal to 6" (Y/N) |
|---|---|---|---|---|---|---|---|
| **1** | 7:25 | 7:50 | 25 | 18 | 48 | 30 | Y |
| **2** | 7:53 | 8:18 | 25 | 18 | 48 | 30 | Y |
| **3** | | | | | | | |

***If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".**

| Trial No. | Start Time | Stop Time | $\Delta t$ Time Interval (min.) | $D_o$ Initial Depth to Water (in.) | $D_f$ Final Depth to Water (in.) | $\Delta D=\Delta H$ Change in Water Level (in.) | Perc. Rate min./in. | $H_{Avg}$ $(D_T - D_o) + (D_T - D_f) \div 2$ | $I_T$ $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$ |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 8:20 | 8:30 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **2** | 8:32 | 8:42 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **3** | 8:44 | 8:54 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **4** | 8:56 | 9:06 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **5** | 9:08 | 9:18 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| **6** | 9:20 | 9:30 | 10 | 18 | 48* | 30 | <0.33 | 15.00 | >26 |
| | | | | | | | | | |

*No standing water in the hole at end of 10 minute test period

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| | | | | | | | | | |

**COMMENTS:** Presoaked on 5/30/23. Dry hole prior to testing. Hole filled to test level and tests begun. Temperature ~51°F during resting. Overcast.

# PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

| | | |
|---|---|---|
| **Project:** Corian Enterprises | **Project No.:** C537-002 | **Date:** 5/31/2023 |
| **Test Hole No.:** P-06 | **Tested By:** Floyd Collins and Chris Dahlgren | |
| **Depth of Test Hole ($D_T$):** 78” | **USCS Soil Classification:** SP-SM w/gravel | |

| **Test Hole Dimensions (inches)** | **Length** | **Width** |
|---|---|---|
| **Diameter (if round)=** 10” **Sides (if rectangular) =** | | |

**Sandy Soil Criteria Test***

| Trial No. | Start Time | Stop Time | Time Interval, (min.) | Initial Depth to Water (in.) | Final Depth to Water (in.) | Change in Water Level (in.) | Greater than or Equal to 6″ (Y/N) |
|---|---|---|---|---|---|---|---|
| **1** | 7:20 | 7:45 | 25 | 48 | 78 | 30 | Y |
| **2** | 7:47 | 8:12 | 25 | 48 | 78 | 30 | Y |
| **3** | | | | | | | |

***If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25″.**

| Trial No. | Start Time | Stop Time | $\Delta t$ Time Interval (min.) | $D_o$ Initial Depth to Water (in.) | $D_f$ Final Depth to Water (in.) | $\Delta D=\Delta H$ Change in Water Level (in.) | Perc. Rate min./in. | $H_{Avg}$ $(D_T - D_o) + (D_T - D_f) \div 2$ | $I_T$ $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$ |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 8:14 | 8:24 | 10 | 48 | 78* | 30 | <0.33 | 15.00 | >26 |
| **2** | 8:25 | 8:35 | 10 | 48 | 78* | 30 | <0.33 | 15.00 | >26 |
| **3** | 8:36 | 8:46 | 10 | 48 | 78* | 30 | <0.33 | 15.00 | >26 |
| **4** | 8:47 | 8:57 | 10 | 48 | 78* | 30 | <0.33 | 15.00 | >26 |
| **5** | 8:58 | 9:08 | 10 | 48 | 78* | 30 | <0.33 | 15.00 | >26 |
| **6** | 9:09 | 9:19 | 10 | 48 | 78* | 30 | <0.33 | 15.00 | >26 |
| | | | | | | | | | |

*No standing water in the hole at end of 10 minute test period

**COMMENTS:** Presoaked on 5/30/23. Dry hole prior to testing. Hole filled to test level and tests begun. Temperature ~51°F during resting. Overcast.