

Les Schwab Tire Center Storm Report



**7105 Old Meridian RD.
Falcon Colorado**

Prepared For:

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Cushing Terrell Project No. LSCO_21WIN

April, 16, 2021

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2.0 GENERAL LOCATION AND DESCRIPTION

2.1 Location

The project site is located at 7105 Old Meridian Rd, Falcon, Colorado and falls within El Paso County. The parcel is part of the larger Meridian Crossing Development, which includes the existing stormwater system infrastructure, including the treatment pond to the south. The site is located on the northeast side of the intersection of Meridian Rd and Old Meridian Rd. The site is located to north west of the existing storm water treatment facilities maintained by the Meridian Crossing Development and an existing storm line runs along the south west property line of the site. The property lies within the NE ¼ of Section 12, Township 13 S, Range 65 West of the Sixth Principal Meridian.

2.2 Description of Property

The existing site consists of an undeveloped 2.48 acre lot covered with native grasses and shrubs. In areas taken from the ALTA Survey the site consists of roughly 12% impervious road and sidewalk area with the remaining 88% being the native vegetation. There are no stream crossings or significant waterways located within the area being developed by this project. The site is accessed via the existing private roads that are centered on the north east and south east property lines of the site. These roads will provide means of vehicular ingress and egress.

The topography of the existing site consists of a roughly consistent grade which directs flow from the north of the site towards the south at slopes ranging from 2-5%. There is an existing storm line that runs west to east along the southern edge of the site before crossing Old Meridian Rd. that ultimately connects to the adjacent detention pond. The site is not located in a floodway or flood plain and is designated as area of minimal flood hazard (Zone X).

3.0 DRAINAGE BASINS

3.1 Existing Drainage Basins

See appendix A for drainage maps showing basin locations.

3.1.1 BASIN Z

Basin Z is the sole existing basin that consists on the entire 2.48 acres site. The flow path of this basin is from north to south into the existing private drive. Once leaving the property across the existing private drive runoff enters the adjacent lot. The groundcover of this basin is primarily native grasses but also contains a portion of the private drive. The rational calculation for the basin is shown below in table 3.1

Table 3.1

RATIONAL CALC EXISTING									
Basin	% Impervious	C10	C100	Area	TC	I 10 year	I 100 year	Q 10	Q 100
X	12	0.33	0.42	2.48	21	3.24	5.1	2.64	5.31
TOTAL	12			2.48				2.64	5.31

3.2 Proposed Drainage Basins

See appendix B for drainage maps showing basin locations. In general, all basins are collected by curb inlets and routed to the existing storm manhole located in the southern corner of the site. This manhole then drains to the existing stormwater pond described in section 5. The exception to this being basin OS which does not have its flows captured and instead follows the historic drainage pattern.

3.2.1 BASIN A

Basin A consists of much of the parking lot, drive aisle and the landscaped areas located in front of the building. The runoff for this basin is captured by curb and gutter and directed to the proposed curb inlet at the north corner of the parking lot.

3.2.2 BASIN B

Basin B consists of the building roof flows which are conveyed via downspouts to the proposed storm line along the rear of the structure.

3.2.3 BASIN C

Basin C consists of the parking, tire storage bullpen, and drive aisles located along the rear of the building. The flows are collected by curb and gutter and directed to the proposed curb inlet at the south corner of the parking.

3.2.4 BASIN D

Basin D is a small section of the drive aisle and the southern two parking spaces located in front of the building. This basin also receives flows from a small portion of the landscaping along Meridian Rd. this basin is collected in the proposed curb inlet located at the south west corner of the parking row.

3.2.5 BASIN E

Basin E consists of a portion of the south western drive aisle. Runoff is collected in the proposed inlet opposite the building.

3.2.6 BASIN F

Basin F consist of the drive aisle on the south end of the site. Runoff is collected by an inlet located just past the southern entrance to the site.

3.2.7 BASIN OS

Basin OS contains all areas not captured in the storm system. This basin follows existing drainage patterns and flows to the south into the adjacent lot. The total flows from this basin do not exceed the historic values.

Table 3.2

RATIONAL CALC PROPOSED									
Basin	% Impervious	C10	C100	Area	TC*	I 10 year	I 100 year	Q 10	Q 100
A	49	0.57	0.64	0.80	5	6	9	2.74	4.61
B	100	0.90	0.95	0.24	5	6	9	1.30	2.05
C	98	0.89	0.94	0.62	5	6	9	3.29	5.22
D	52	0.59	0.66	0.05	5	6	9	0.16	0.27
E	100	0.90	0.95	0.06	5	6	9	0.30	0.47
F	100	0.90	0.95	0.07	5	6	9	0.36	0.56
OS	56	0.61	0.69	0.66	5	6	9	2.42	4.10
TOTAL	70	0.71	0.77	2.48				10.56	17.29

*Due to small basin sizes the minimum time of concentration of 5 minutes was used for proposed basins

4.0 DRAINAGE DESIGN CRITERIA

4.1 Development Criteria Reference

This report was prepared using the El Paso County Drainage Criteria Manual (DCM) and the Mile High Flood District Criteria Manual. In creating this report reference was made to the "Meridian Crossing Final Drainage Report" which is included in Appendix F and describes the existing stormwater quality treatment and detention facilities that will be used by this project.

4.2 Hydrologic Criteria

Because the site in question is under 100 acres, the rational method was used to determine the peak stormwater runoff for all basins. For the purposes of sizing proposed stormwater structures, the major 100-year storm as described in the DCM was used. The rational method coefficients for these calculations were selected from Table 5-1 of the DCM. Time of concentration was assumed to be the 5-minute minimum value for all proposed basins due to their small size. For the existing basin, Figure 5-2 of the DCM was used to determine the time of concentration. All rainfall values were taken from Figure 5-1 of the DCM.

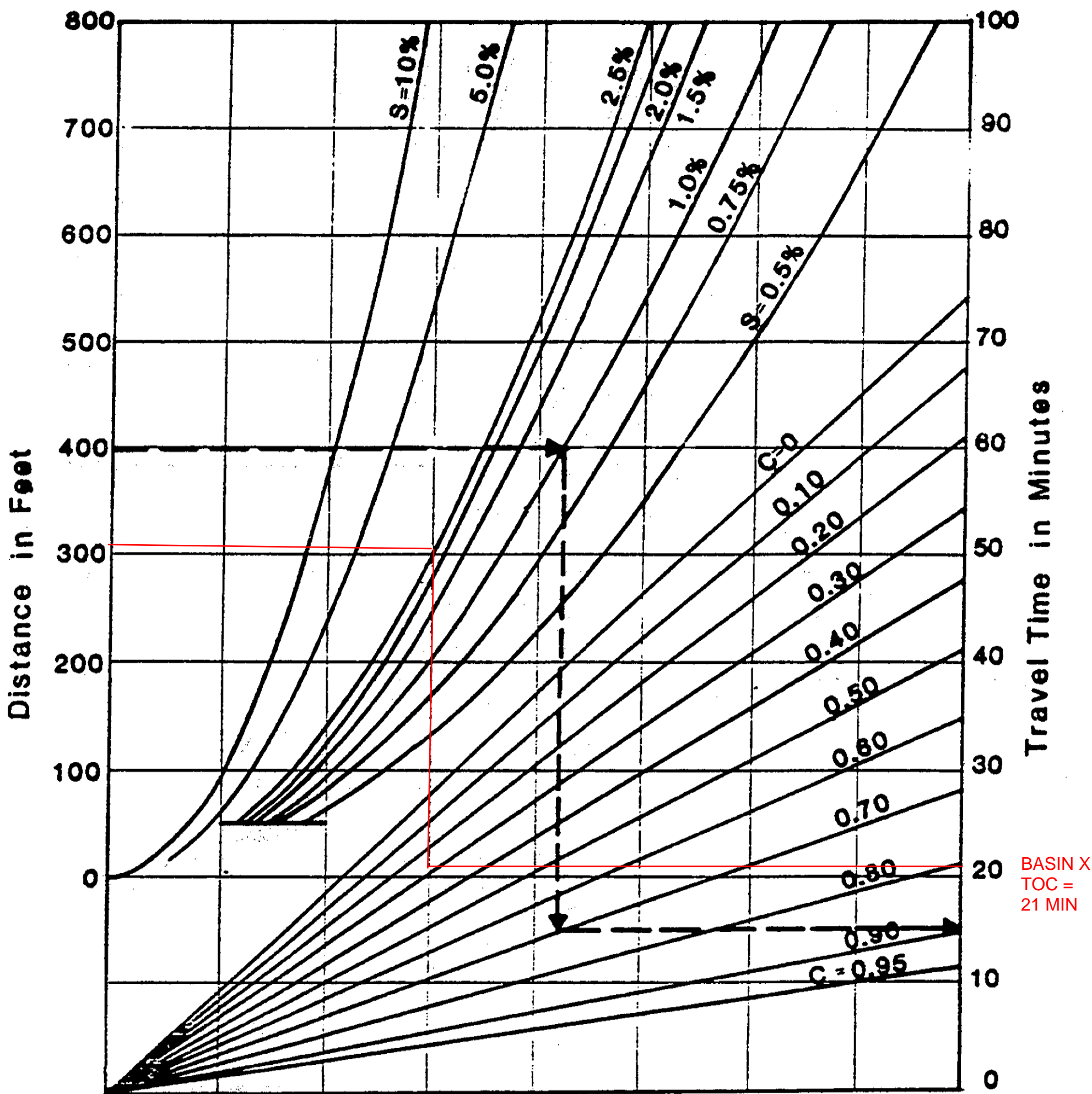
5.0 DRAINAGE FACILITY DESIGN

The drainage facilities proposed for this project consist of a series of curb inlets and storm manholes designed to collect the additional flows generated by the site and direct them to the existing treatment facility. The connection point to the existing storm infrastructure is the existing stormwater manhole located at the south corner of the site. The water enters the existing storm lines at this location where they are directed to the existing stormwater treatment and detention facility.

The design and calculations of this existing stormwater treatment and detention facility are not within the scope of this report and can be found in the "Meridian Crossing Final Drainage Report" which is included in Appendix F. This facility is described as a "Porous Landscape Detention" (PLD) and is described in detail on page 16 of the referenced report. This facility was sized to include flows created by the future development we are now proposing. The proposed

Les Schwab site can be described as the northern half of basin D-2 using the terminology of the referenced report. The assumed runoff coefficient for basin D-2 was 0.95 compared to 0.77 calculated above. No improvements are required for this existing pond and the pond is maintained by Park Place Enterprises, LLC.

APPENDIX A: HYDROLOGIC CALCULATION



REFERENCE : Wright - McLaughlin Engineers, Urban Storm Drainage Criteria Manual, Vol. 1,
 Denver Regional Council of Governments, Denver, Co. 1977

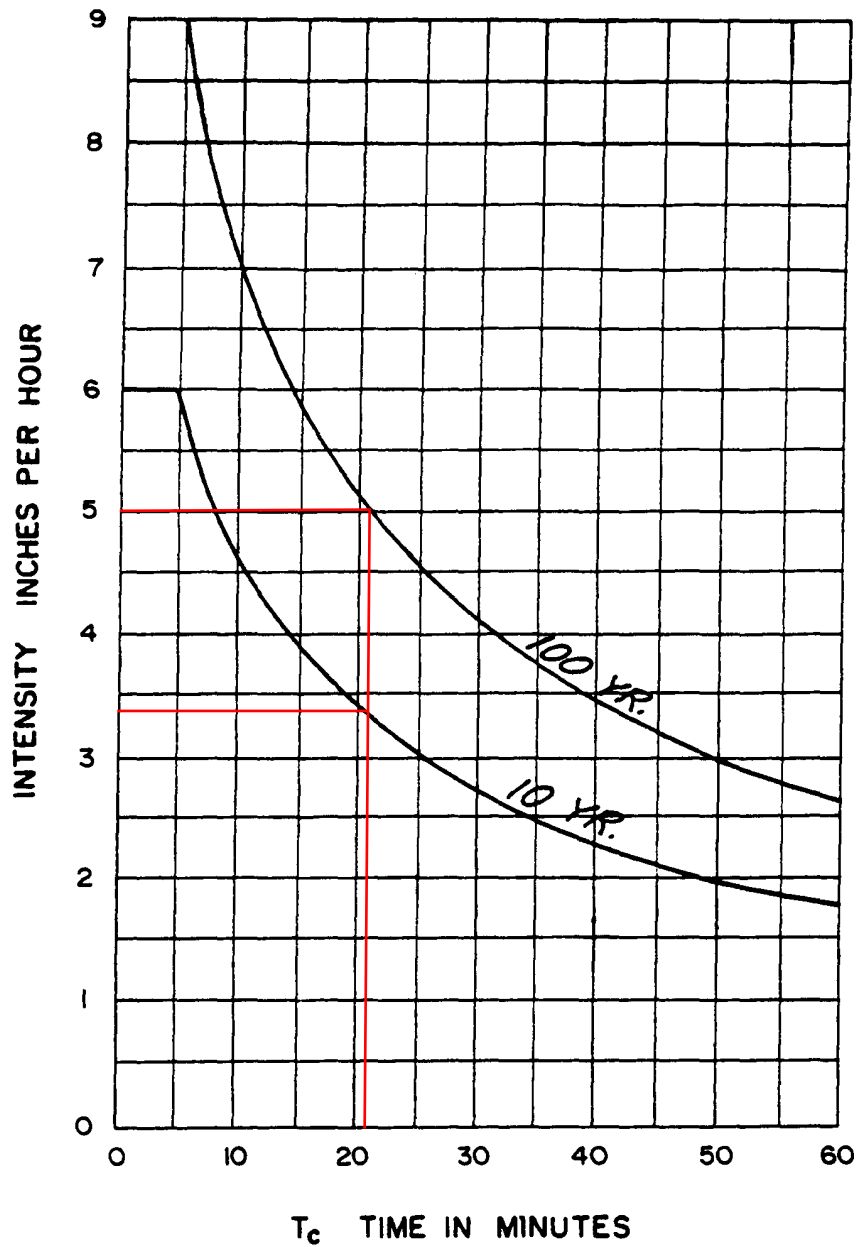


HDR Infrastructure, Inc.
 A Centerra Company

The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Overland Flow Curves

Date
 OCT. 1987
 Figure
 5-2



RE: Based upon Pikes Peak area council of governments/
areawide urban runoff control manual.

BASIN X:
10 YEAR = 3.24 IN/ HR
100 YR = 5.1 IN/HR

ALL PROPOSED:
10 YEAR = 6 IN/HR
100 YEAR = 9 IN/HR



HDR Infrastructure, Inc.
A Centerra Company

The City of Colorado Springs / El Paso County
Drainage Criteria Manual

Storm Rainfall
Time Intensity-Frequency Curves

Date
OCT. 1987

Figure
5 - 1

RATIONAL CALC EXISTING									
Basin	% Impervious	C10	C100	Area	TC	I 10 year	I 100 yesr	Q 10	Q 100
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C	98	0.89	0.94	0.62	5	6	9	3.29	5.22
D	52	0.59	0.66	0.05	5	6	9	0.16	0.27
E	100	0.90	0.95	0.06	5	6	9	0.30	0.47
F	100	0.90	0.95	0.07	5	6	9	0.36	0.56
OS	56	0.61	0.69	0.66	5	6	9	2.42	4.10
TOTAL	70	0.71	0.77	2.48				10.56	17.29

*Due to small basin sizes the minimum time of concentration of 5 minutes was used for proposed basins

APPENDIX B: BASIN MAPS



7105 OLD MERIDIAN RD.
FALCON, CO
LES SCHWAB TIRE CENTER

NOT FOR CONSTRUCTION - PRELIMINARY DESIGN

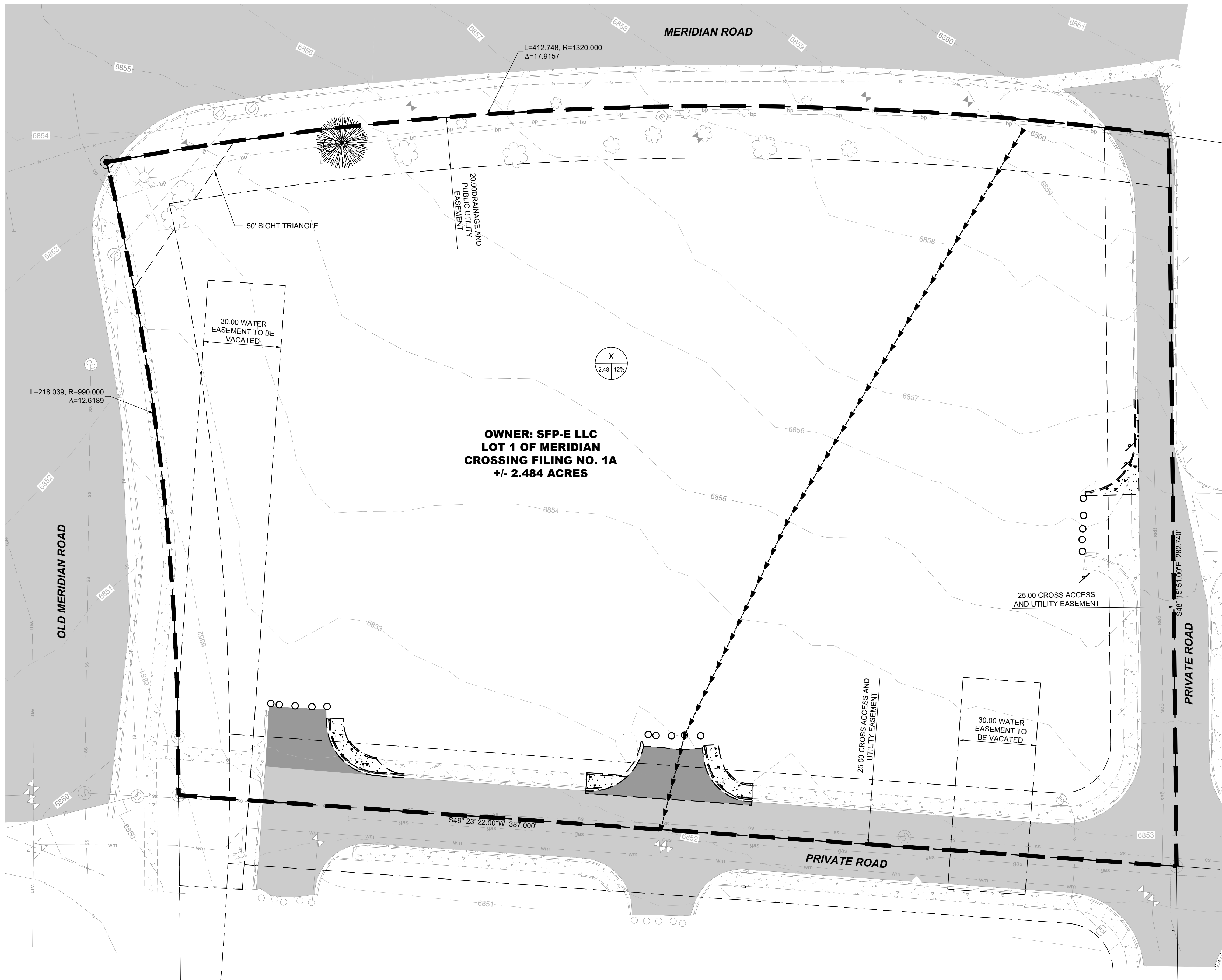
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SITE DEVELOPEMENT
PLANS

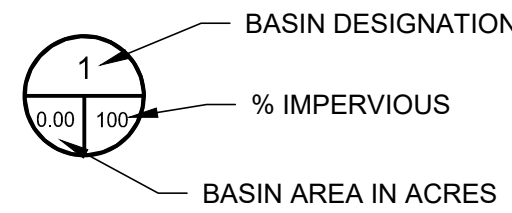
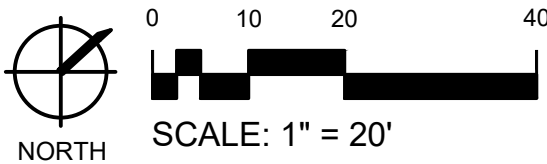
04.16.2021
DRAWN BY | WALKER
CHECKED BY | GRAHAM
REVISIONS

EXISTING
BASIN
MAP

D.1



1 EXISTING CONDITIONS PLAN
C001





7105 OLD MERIDIAN RD.
FALCON, CO
LES SCHWAB TIRE CENTER

NOT FOR CONSTRUCTION - PRELIMINARY DESIGN

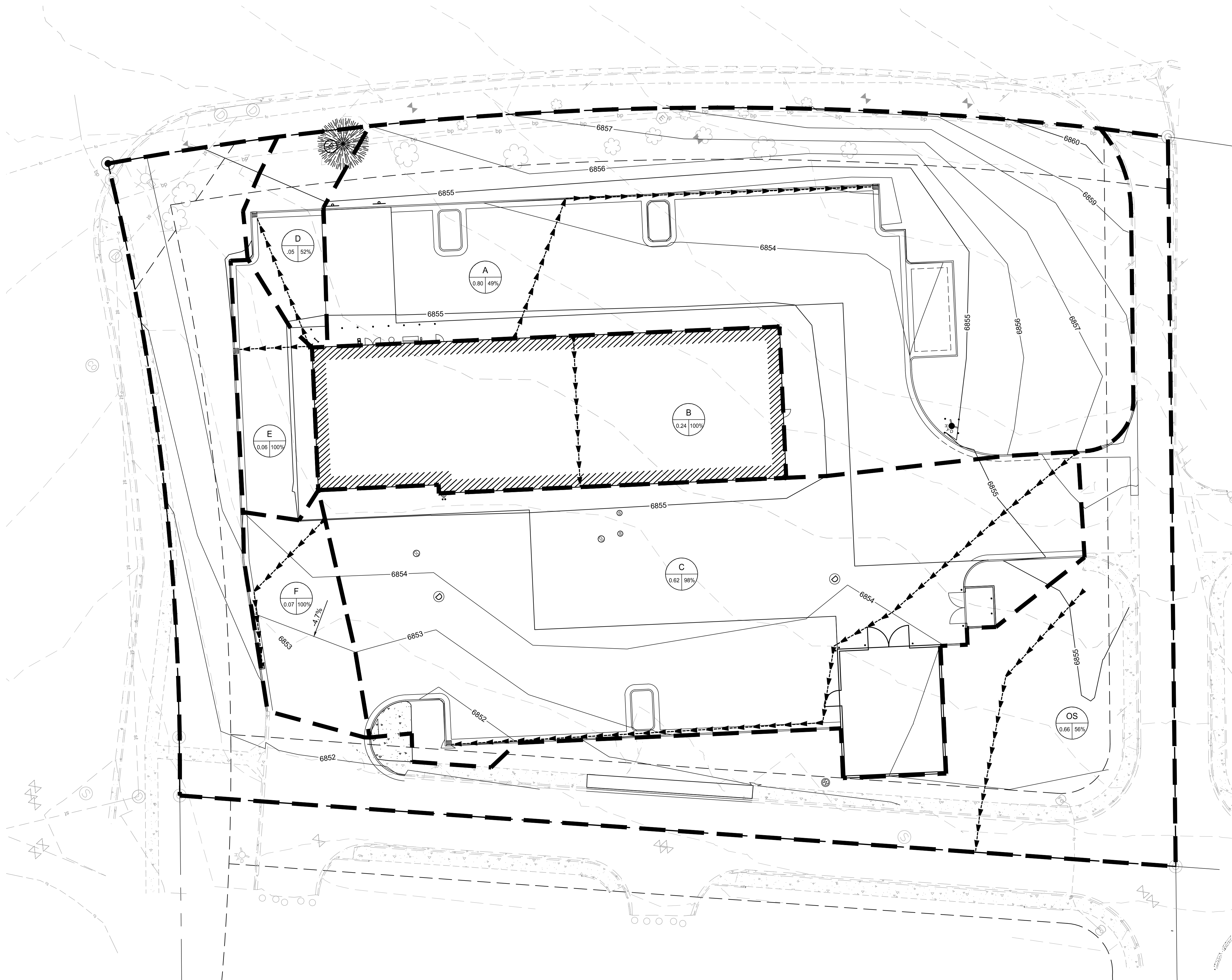
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SITE DEVELOPEMENT
PLANS

04.16.2021
DRAWN BY | WALKER
CHECKED BY | GRAHAM
REVISIONS

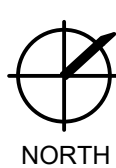
EXISTING
BASIN
MAP

D.2



1
C200

GRADING PLAN



0 10 20 40
SCALE: 1" = 20'

1
0.00 100%

BASIN DESIGNATION
% IMPERVIOUS
BASIN AREA IN ACRES



APPENDIX C: SOILS REPORT



Geotechnical Engineering Report

***Proposed Les Schwab Tire Center
NEC of Meridian Road and Rolling Thunder Way
Falcon, Colorado***

Prepared for:

SFP-E, LLC

P.O. Box 5350

Bend, Oregon 97708-5350

Prepared by:

Pickering, Cole & Hivner, LLC

PCH Project No. 12.298.16

September 27, 2016



September 27, 2016

SFP-E, LLC
P.O. Box 5350
Bend, Oregon 97708-5350

Attn: Mr. Matt Hannigan

**Re: Geotechnical Engineering Report
Proposed Les Schwab Tire Center
NEC of Meridian Road and Rolling Thunder Way
Falcon, Colorado
PCH Project No. 12.298.16**

Pickering Cole & Hivner, LLC (PCH) has completed a geotechnical engineering investigation for the proposed Les Schwab Tire Center to be located at the northeast corner of the above-referenced intersection in Falcon, Colorado. This study was performed in general accordance with our proposal number P12.333.16, executed August 10, 2016.

This geotechnical summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled General Comments should be read for an understanding of the report limitations.

- **Subsurface Conditions:** The soils at the site consist of silty to clayey sands, fine to coarse sands, and varying layers of lean clays. Sedimentary claystone bedrock was encountered below the sands/clays at depths ranging from about 13 to 18 feet below existing site grades. The bedrock extended to the depths explored. Groundwater was encountered in our building borings immediately after drilling at depths ranging from about 10 to 15 feet below existing site grades. The shallow pavement borings were dry at that time. When checked about three weeks later, ***groundwater was encountered in the deeper borings at depths ranging from about 4 to 7-½ feet below existing site grades.*** The shallow pavement borings remained dry at that time. Other specific information regarding the lithology encountered is noted on the attached Boring Logs.
- **Shallow Groundwater and Below-Grade Construction:** As discussed, groundwater was encountered at the site at depths ranging from about 4 to 7-½ feet below existing site grades. As currently planned the northeast portion of the building will include below-grade maintenance pits (maximum of about 7 feet below planned FFE). ***We recommend construction be limited to excavation depths as high as practical in these areas in order to reduce the potential for water intrusion, as well as to minimize encountering potentially soft/unstable soil conditions during construction.***

We recommend these maintenance pit areas be designed as water-tight structures, designed for buoyancy and hydrostatic pressures. Waterproofing consultants should be contacted for recommendations regarding the design and construction of water-tight below-grade foundations. As an alternative, subsurface drainage systems can be installed to collect subsurface water and maintain dry interior conditions. At a minimum, the drainage system would include installation of a perimeter drain system around and below the foundations of these below grade areas which would empty into the storm sewer or a sump pit where collected water could be discharged via a submersible pump.

- **Foundations and Floor Slabs:** Based on the information obtained from our subsurface exploration and laboratory testing of selected samples, the site appears suitable for proposed development. The native sand/clay soils encountered near foundation bearing elevations are considered suitable for support of conventional spread footing foundations and slab-on-grade floors at the site. However, areas of soft, unstable or low-density soils may also be encountered in the foundation excavations and may require the need for removal and recompaction/replacement prior to foundation and floor slab construction. Therefore, it is imperative that the soils exposed in foundation excavations be observed by the geotechnical engineer to confirm or modify our recommendations.
- **Pavement Design and Structural Sections:** Design of pavements for the project is based on the procedures outlined in the 1993 *Guideline for Design of Pavement Structures* by the American Association of State Highway and Transportation Officials (AASHTO) using an assumed traffic volume.

Light-duty pavements for automobile parking areas should include a minimum of 5-½ inches of asphalt concrete or, alternately, 5 inches of Portland cement concrete. Paved access drives should be paved with 6-½ inches of asphalt concrete. Heavy-duty pavements such as for driveway entrances, drive isles, heavy truck parking, and other areas where trucks will park and turn should include a minimum of 6 inches of Portland cement concrete.

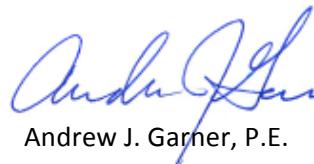
We appreciate being of service to you in the geotechnical engineering phase of this project, and are prepared to assist you during the construction phases as well. Please do not hesitate to contact us if you have any questions concerning this report or any of our testing, inspection, design and consulting services.

Sincerely,

Pickering, Cole & Hivner, LLC



Glenn D. Ohlsen, P.E.
Project Engineer



Andrew J. Garner, P.E.
Senior Project Manager



Copies to: Addressee (1 PDF copy)

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GEOTECHNICAL ENGINEERING REPORT

PROPOSED LES SCHWAB TIRE CENTER NEC of MERIDIAN ROAD and ROLLING THUNDER WAY FALCON, COLORADO

PCH Project No. 12.298.16

September 27, 2016

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for the proposed Les Schwab Tire Center to be located at the northeast corner of the intersection of Meridian Road and Rolling Thunder Way in Falcon, Colorado.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil and bedrock conditions
- Groundwater conditions
- Foundation design and construction
- Lateral earth pressures
- Floor slab design and construction
- Pavement structural sections
- Earthwork
- Drainage

The recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, our experience with similar subsurface conditions and structures, and our understanding of the proposed project.

PROJECT INFORMATION

We understand that the project will include the development of an approximate 2.5-acre site at the referenced intersection. Development will include construction of a new single-story Les Schwab Tire Center building encompassing approximately 11,878 square feet. We assume construction will include either load bearing CMU or light-gauge steel framed superstructure along with interior steel columns supporting a metal roof system. Reinforced concrete foundations will support the structures. The interior of the structures will include a conventional slab-on-grade with some bays having a recessed slab. Portions of the slab will bear approximately 6-½ to 7 feet below finished floor elevation (FFE). Maximum wall and column loads are anticipated to be on the order of about 3 to 5 kips per lineal foot and 100 to 200 kips,

respectively. We assume that a majority of the site is near rough construction grade, slightly below planned FFE.

Other major site development will include the installation of underground utilities, construction of a trash enclosure, as well as the construction of private asphalt or concrete paved parking areas and site landscape improvements.

If our understanding of the project, or assumptions above, is not accurate, or if you have additional useful information, please inform us as soon as possible.

SITE EXPLORATION PROCEDURES

The scope of the services performed for this project included site reconnaissance by a field engineer, a subsurface exploration program, laboratory testing and engineering analysis.

Field Exploration: As part of this study, we investigated the subsurface conditions on the site with a total of six (6) test borings. Borings were advanced to depths of about 25 to 35 feet below existing site grades with a truck-mounted drilling rig utilizing 4-inch diameter, solid stem auger.

A lithologic log of each boring was recorded by our field representative during the drilling operations. At selected intervals, samples of the subsurface materials were obtained by driving modified California barrel samplers. Penetration resistance measurements were obtained by driving the sample barrel into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index to the consistency, relative density or hardness of the materials encountered.

Groundwater measurements were made in each boring at the time of site exploration and about three weeks later. Borings were loosely backfilled with the auger cuttings upon completion of groundwater measurements.

Laboratory Testing: Samples retrieved during the field exploration were returned to the laboratory for observation by the project geotechnical engineer, and were classified in general accordance with the Unified Soil Classification System described in Appendix C. Samples of bedrock were classified in general accordance with the general notes for Rock Classification. At that time, an applicable laboratory-testing program was formulated to determine engineering properties of the subsurface materials. Following the completion of the laboratory testing, the field descriptions were confirmed or modified as necessary, and Boring Logs were prepared. These logs are presented in Appendix A.

Laboratory test results are presented in Appendix B. These results were used for the geotechnical engineering analyses and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable local or other accepted standards.

Selected soil and bedrock samples were tested for the following engineering properties:

- Water content
- Dry density
- Consolidation/Swell
- Grain size
- Plasticity Index
- Water-soluble sulfates

SITE CONDITIONS

The site is located at the northeast corner of Meridian Road and Rolling Thunder Way in Falcon, Colorado. The site is generally bordered by Meridian Road to the northwest, Rolling Thunder Way/Old Meridian Road to the southwest, and currently undeveloped lots and asphalt-paved private access roads in the other directions. In general, the surrounding area consists of commercial/retail development. At the time of our field exploration, the ground surface at the site was covered with a low to moderate growth of grass and weeds. The site was generally level, with a slight slope downwards to the south. We anticipate that cuts and fills of up to about 1 to 3 feet could be required to bring the site to construction grades and to provide positive site drainage.

SUBSURFACE CONDITIONS

Geology: Surficial geologic conditions at (or in the vicinity of) the site, as mapped by the U.S. Geological Survey (USGS) (¹Scott, et al, 1976) and (²Madole, R.F., 2003), consist of Eolian Sand of Holocene and Pleistocene Age. These materials are typically described as sand, sandy silt, and sandy clay. Bedrock underlying the surface units consists of the Dawson Formation of Paleocene and Upper Cretaceous Age. This formation generally includes sandstone, claystone and conglomerate.

The site is located just east of mapping completed by the Colorado Geological Survey (³Hart, 1972) for potentially swelling soil and bedrock. However, areas of “Low Swell Potential” were mapped to the west of the site. Potentially expansive materials in this category generally include bedrock and some surficial soils.

Due to the gently sloping nature of the site, the potential for other geologic hazards at the site is anticipated to be low. Seismic activity in the area is anticipated to be low, and the property should be relatively stable from a structural standpoint. With proper site grading around proposed structures, erosional problems at the site should be reduced.

¹ Scott, G.R., Taylor, R.B., Epis, R.C., and Wobus, R.A., 1976, *Geologic Map of the Pueblo 1 Degree x 2 Degree Quadrangle, South-Central Colorado*, United States Geological Survey, Map MF-775.

² Madole, R.F., 2003, *Geologic Map of the Falcon, NW 7.5 Minute Quadrangle, El Paso County, Colorado*, United States Geological Survey, Map OF03-08.

³ Hart, Stephen S., 1972, *Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado*, Colorado Geological Survey, Sheet 3 of 4.

Soil and Bedrock Conditions: The soils at the site consist of silty to clayey sands, fine to coarse sands, and varying layers of lean clays. Sedimentary claystone bedrock was encountered below the sands/clays at depths ranging from about 13 to 18 feet below existing site grades. The bedrock extended to the depths explored. Other specific information regarding the lithology encountered is noted on the attached Boring Logs.

Field and Laboratory Test Results: Field test results indicate that the sand soils vary from medium dense to dense in relative density. The clay soils are very stiff to hard in consistency. Laboratory test results indicate that the clayey soils and claystone bedrock at the site exhibit low expansive potential when inundated in our laboratory.

Groundwater Conditions: Groundwater was encountered in our building borings immediately after drilling at depths ranging from about 10 to 15 feet below existing site grades. The shallow pavement borings were dry at that time. ***When checked about three weeks later, groundwater was encountered in the deeper borings at depths ranging from about 4 to 7-½ feet below existing site grades.*** The shallow pavement borings remained dry at that time.

Based upon review of U.S. Geological Survey Maps (⁴Hillier, et al, 1980), regional groundwater beneath the project area is expected to be encountered in unconsolidated alluvial deposits or in the Dawson Aquifer at depths generally greater than 20 feet below present ground surface.

Zones of perched and/or trapped groundwater, where not already present, may also occur at times in the subsurface soils overlying bedrock, on top of the bedrock surface or within permeable fractures in the bedrock materials. The location and amount of perched water is dependent upon several factors including hydrologic conditions, type of site development, irrigation demands on or adjacent to the site, fluctuations in water features, seasonal and weather conditions.

The possibility of groundwater fluctuations should be considered when developing design and construction plans for the project.

ENGINEERING RECOMMENDATIONS

Geotechnical Considerations: The site appears suitable for the proposed construction as long as the recommendations included herein are incorporated into the design and construction aspects of the project. Based on our borings, the site should be suitable for the proposed construction, however, the presence of relatively shallow groundwater may impact both the design and construction of the project.

As discussed, groundwater was encountered at the site at depths ranging from about 4 to 7-½ feet below existing site grades. As currently planned the northeast portion of the building will include below-

⁴Hillier, Donald E.; and Hutchinson, E. Carter, 1980, *Depth to Water Table (1976-1977) in the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado*, United States Geological Survey, Map I-857-H.

grade maintenance pits (maximum of about 7 feet below planned FFE). ***We recommend construction be limited to excavation depths as high as practical in these areas in order to reduce the potential for water intrusion, as well as to minimize encountering potentially soft/unstable soil conditions during construction.***

We recommend these maintenance pit areas be designed as water-tight structures, designed for buoyancy and hydrostatic pressures. Waterproofing consultants should be contacted for recommendations regarding the design and construction of water-tight below-grade foundations. As an alternative, subsurface drainage systems can be installed to collect subsurface water and maintain dry interior conditions. At a minimum, the drainage system would include installation of a perimeter drain system around and below the foundations of these below grade areas which would empty into the storm sewer or a sump pit where collected water could be discharged via a submersible pump.

Design and construction recommendations for the foundation system and other earth-connected phases of the project are outlined below.

Foundation Design and Construction: Due to the presence of non- to low expansive soils, spread footing foundations are considered acceptable for support of the structure on this site. Based on the borings advanced on the site, we believe that the native soils will be suitable for support of foundations; however, it is possible that soft, unstable, or low-density soils may also be present, particularly for foundations approaching the groundwater level. ***The geotechnical engineer responsible for special inspections should be contacted to observe and evaluate the suitability of the soils beneath foundation excavations at the site, prior to forming for footing construction. If any areas of soft, unstable or low-density soils are observed, removal and recompaction/replacement will be required.***

The following foundation design criteria may be used for the structural design of foundations:

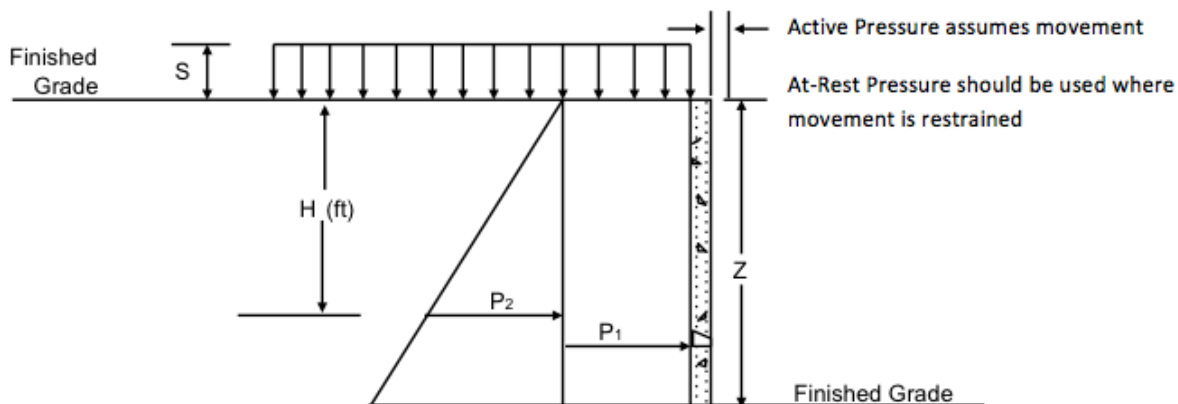
Criteria	Design Value
Bearing Strata	Undisturbed native sand/clay soils or properly compacted fill materials approved by the Geotechnical Engineer
Maximum net allowable bearing pressure ¹	2,000 psf
Min. depth below grade, exterior wall footings ²	36 inches
Min. depth below grade, interior footings ²	12 inches
Estimated maximum total foundation movement ³	1 inch
Estimated maximum differential foundation movement ³	½ to ¾ inch

1. The design bearing pressure above applies to dead loads plus one-half of design live load conditions. The design bearing pressure may be increased by 1/3 when considering total loads that include wind or seismic conditions.
2. Finished grade is the lowest adjacent grade for perimeter footings and floor level for interior footings.

3. Based on assumed structural loads. Footings should be proportioned to apply relative constant dead load pressure in order to reduce differential movement between adjacent footings.

Foundation movements could occur if water from any source infiltrates the foundation soils; therefore, proper drainage should be provided in the final design and during construction. Failure to maintain proper surface drainage could result in excessive soil-related foundation movement.

Lateral Earth Pressures: Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction, wetting of backfill materials, and/or compaction and the strength of the materials being restrained. Loads that should be considered by the structural engineer on walls are shown below.



Active earth pressure is commonly used for design of freestanding cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall rotation. Walls with unbalanced backfill levels on opposite sides (i.e. basement walls) should be designed for earth pressures at least equal to those indicated in the following table. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.

EARTH PRESSURE COEFFICIENTS

Earth pressure conditions	Coefficient for backfill type	Equivalent fluid pressure, pcf	Surcharge pressure P_1 , psf	Earth pressure P_2 , psf
Active (K_a)	On-site clayey soils - 0.38	45	$(0.38)S$	$(45)H$
At-Rest (K_o)	On-site clayey soils - 0.54	65	$(0.54)S$	$(65)H$
Passive (K_p)	On-site clayey soils - 2.3	275	---	---

Conditions applicable to the above conditions include:

- for active earth pressure, wall must rotate about base, with top lateral movements $0.01 Z$ to $0.02 Z$, where Z is wall height

- for passive earth pressure, wall must move horizontally to mobilize resistance
- uniform surcharge, where S is surcharge pressure
- in-situ soil backfill weight a maximum of 120 pcf
- horizontal backfill, compacted to at least 95 percent of standard Proctor maximum dry density
- loading from heavy compaction equipment not included
- **no groundwater acting on wall**
- no safety factor included
- ignore passive pressure in frost zone

Backfill placed against structures may consist of the on-site soils processed to a soil-like consistency with maximum particle sizes on the order of 4 to 6 inches. The design equivalent fluid pressures may be reduced if the imported granular soils are used. To calculate the resistance to sliding, a value of 0.35 may be used as the ultimate coefficient of friction between the footing and the underlying soil. If utilizing passive pressure for resistance, a coefficient of 0.30 should be used.

We recommend a perimeter drain be installed at the foundation level to control the water level behind any basement/below-grade walls. ***If this is not possible or if the below-grade space is being designed to be watertight, then combined hydrostatic and lateral earth pressures should be calculated for lean clay backfill using an equivalent fluid weighing 90 and 100 pcf for active and at-rest conditions, respectively.*** These pressures do not include the influence of surcharge, equipment or floor loading, which should be added. Heavy equipment should not operate within a distance closer than the exposed height of retaining walls to prevent lateral pressures more than those provided.

Below-grade Construction: As discussed, groundwater (perched water) was encountered at the site at depths ranging from about 4 to 7-½ feet below existing site grades. As currently planned the northeast portion of the building will include below-grade maintenance pits (maximum of about 7 feet below planned FFE). ***We recommend construction be limited to excavation depths as high as practical in these areas in order to reduce the potential for water intrusion, as well as to minimize encountering potentially soft/loose soil conditions during construction.***

Based on the limited size of the maintenance pits, we believe it is prudent to construct these below-grade areas to be water-tight. This would include waterproofing the foundation and walls of the pits and designing the pits for buoyancy forces and hydrostatic lateral loading conditions below groundwater depth. Waterproofing consultants should be contacted for recommendations regarding the design and construction of water-tight below-grade foundations.

As an alternative, installation of a perimeter drainage system is recommended around the perimeter of these below-grade spaces. The drainage system should include a trench in which a perforated pipe is placed, sloped at a minimum 1/8 inch per foot to a suitable outlet, such as the storm sewer or a sump and pump system.

In our opinion, the drainage system should consist of a minimum 4-inch diameter perforated or slotted pipe, embedded in free-draining gravel, placed in a trench at least 12 inches in width. The edge of the trench should be sloped at a 1:1 slope beginning at the bottom outside edge of the footing. The trench should not be cut vertically at the edge of the footing. Gravel should extend a minimum of 2 to 3 inches beneath the bottom of the pipe and at least 6 inches above the pipe. The gravel should be encapsulated in a filter fabric prior to placement of foundation backfill. A general detail of this system is included herein. If the pits are designed to be water-tight, the drain system would not be required.

Seismic Considerations: Based on the soil conditions encountered in the test holes drilled on the site, we estimate that a Site Class D is appropriate for the site according to the 2009 International Building Code (Table 1613.5.2). This parameter was estimated based on extrapolation of data beyond the deepest depth explored, using methods allowed by the code. Actual shear wave velocity testing/analysis and/or exploration to 100 feet was not performed.

Floor Slab Design and Construction: The existing, non- to low expansive soils at the site are generally considered suitable for support of the floor slab. Some movement of a slab-on-grade floor system is still possible should the subgrade soils become elevated in moisture content. We estimate that total slab movement will be about 1-inch. If movement cannot be tolerated, we should be contacted to provide alternatives for additional subgrade preparation or the use of a structural floor system.

To reduce potential slab movements, the subgrade soils should be prepared as outlined in the "Earthwork" section of this report and adequate surface drainage needs to be maintained.

For structural design of concrete slabs-on-grade, a modulus of subgrade reaction of 100 pounds per cubic inch (pci) may be used for floors supported on the on-site soils. Additional floor slab design and construction recommendations are as follows:

- Positive separations and/or isolation joints should be provided between slabs and all foundations, columns or utility lines to allow independent movement.
- Control joints should be provided in slabs to control the location and extent of cracking.
- A minimum 2-inch void space should be constructed above or below non-bearing partition walls placed on the floor slab. If this void space is constructed as a slip joint at the top of the wall, some minor drywall cracking could occur due to slab movement, prior to mobilization of this joint. Special framing details should be provided at doorjamb and frames within partition walls to avoid potential distortion. Partition walls should be isolated from suspended ceilings.
- Interior trench backfill placed beneath slabs should be compacted in accordance with recommended specifications outlined below.

- The use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 for procedures and cautions regarding the use and placement of a vapor retarder.
- Floor slabs should not be constructed on frozen subgrade.
- Other design and construction considerations, as outlined in Section 302.1R of the *ACI Design Manual*, are recommended.

Private Pavement Thickness Design and Construction: Design of private pavements for the project is based on the procedures outlined in the 1993 *Guideline for Design of Pavement Structures* by the American Association of State Highway and Transportation Officials (AASHTO). The AASHTO design method takes into account several variables, including subgrade soil and traffic conditions. We assume that there will be no new pavements in the public right-of-way. If public roadway construction is to be included in the project, additional geotechnical investigation and a formal pavement design may be required for those improvements.

- **Subgrade Soil:** The on-site sandy and clayey soils are considered to generally provide good to poor pavement support, respectively. We estimated a design R-value of 5 for flexible pavement (asphalt) thickness design based on the properties of the poorer clayey soils. Likewise, modulus of subgrade reaction (K-value) of 100 pounds per cubic inch (pci) was used for design of rigid concrete pavements.
- **Assumed Traffic:** We assume that pavements associated with the project will include private drive lanes, driveways, fire lanes, and surface parking for automobiles and light trucks. We assume that private pavements will be surfaced with either asphalt concrete or Portland cement concrete. Any improvements to adjacent public roadways will need to be designed and constructed according to the governing standards.

Based on our experience with similar projects, the following traffic criteria were used for determining pavement thicknesses using a design life of 20 years:

- Driveways and parking stalls - maximum daily traffic of 1,000 cars per day (equivalent single-axle loads, ESAL's of 22,000)
- Main site access drives and fire lanes – up to 5 trips/day by single-axle delivery trucks per day, 1 combined-axle truck per day and 1 trash truck per day, plus maximum daily traffic of 1,000 cars per day (73,000 ESAL's)

The owner should review these assumptions, and we should be contacted to confirm or modify these resulting pavement sections, if needed.

- **Pavement Sections:** For flexible pavement design a drainage coefficient of 1.0, a terminal serviceability index of 2.0, and an inherent reliability of 85 percent were used. Using, the appropriate ESAL values, environmental criteria and other factors, the design structural numbers (SN) of the pavement sections were determined on the basis of the 1993 AASHTO design equation.

In addition to the flexible pavement design analyses, a rigid pavement design analysis was completed based upon AASHTO design procedures. Along with soil and traffic conditions, rigid pavement design is based on the Modulus of Rupture of the concrete, and other factors previously outlined. A modulus of rupture of 600 psi (working stress 450 psi) was used for pavement concrete. The rigid pavement thickness for each traffic category was determined on the basis of the AASHTO design equation.

We have considered full depth-asphalt paving, a composite section with asphalt concrete over aggregate base course, and full depth rigid concrete sections. Alternatives for flexible and rigid pavements are summarized for each traffic area as follows:

Traffic Area	Alternative	Private Pavement Thickness (Inches)		
		Asphalt Concrete (AC)	Aggregate Base Course (ABC)	Portland Cement Concrete (PCC)
Automobile Parking and Standard-Duty Automobile and Light Truck Parking Only	A	5-½	--	--
	B	4	6	--
	C	--	--	5
Main Access Drives, and Heavy-Duty areas Private Drives, Fire Lanes, Delivery truck access	A	6-½	--	--
	B1	4	9	--
	B2	4-½	7	--
	B3	5	6	--
	C	--	--	6

A minimum 6-inch thickness of Portland cement concrete pavement is recommended at the location of dumpsters where trash trucks park and load, and should be considered in other areas with heavy truck traffic. Each alternative should be investigated with respect to current material availability and economic conditions.

- **Subgrade Preparation:** We recommend the pavement areas be rough graded and then thoroughly proof rolled with a loaded tandem axle dump truck, water truck, or other heavy equipment approved by the observing engineer prior to final grading and paving. Particular attention should be

paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted engineered fills.

At a minimum, in order to provide a more uniform subgrade for site pavements, we recommend that all pavements be constructed on a minimum of 12 inches of properly moisture conditioned and recompacted on-site soils. Confirmation of the moisture content and compaction level of the subgrade soils should be confirmed just prior to paving.

- **Pavement Materials:** Aggregate base course (if used on the site) should consist of a blend of sand and gravel which meets strict specifications for quality and gradation. Use of materials meeting Colorado Department of Transportation (CDOT) Class 5 or 6 specifications is recommended for base course. Aggregate base course should be placed in lifts not exceeding 6 inches and compacted to a minimum of 95 percent of the standard Proctor density (ASTM D698).

Asphalt concrete should be composed of a mixture of aggregate, filler and additives (if required) and approved bituminous material. The asphalt concrete should conform to approved mix designs stating the Hveem properties, optimum asphalt content, and job mix formula and recommended mixing and placing temperatures. Aggregate used in asphalt concrete should meet particular gradations. Material meeting CDOT Grading S or SX specifications or equivalent is recommended for asphalt concrete. Mix designs should be submitted prior to construction to verify their adequacy. Asphalt material should be placed in maximum 3-inch lifts and compacted within a range of 92 to 96 percent of the theoretical maximum (Rice) density (ASTM D2041) or 95 percent Hveem density (ASTM D1560, D1561).

Where rigid pavements are used, the concrete should meet CDOT Class P requirements and be obtained from an approved mix design with the following minimum properties:

- Modulus of Rupture @ 28 days 600 psi minimum
- Strength Requirements.....ASTM C94
- Cement Type.....Type II Portland
- Entrained Air Content 6 to 8%
- Concrete Aggregate ASTM C33 and CDOT Section 703

Concrete should be deposited by truck mixers or agitators and placed a maximum of 90 minutes from the time the water is added to the mix. Other specifications outlined by CDOT should be followed.

Longitudinal and transverse joints should be provided as needed in concrete pavements for expansion/contraction and isolation. The location and extent of joints should be based upon the final pavement geometry. Sawed joints should be cut within 24 hours of concrete placement and

should be a minimum of 25 percent of slab thickness plus 1/4 inch. All joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer.

- **Compliance:** Recommendations for pavement design and construction presented depend upon compliance with recommended material specifications. To assess compliance, observation and testing should be performed under the observation of the geotechnical engineer.
- **Pavement Performance:** Future performance of pavements constructed on the subgrade at this site will be dependent upon several factors, including:
 - Maintaining stable moisture content of the subgrade soils.
 - Providing for a planned program of preventative maintenance.

The performance of all pavements can be enhanced by minimizing excess moisture, which can reach the subgrade soils. The following recommendations should be considered at minimum:

- Site grading at a minimum 2 percent grade onto or away from pavements.
- Water should not be allowed to pond behind curbs.
- Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade.
- Sealing all landscaped areas in or adjacent to pavements to minimize or prevent moisture migration to subgrade soils.
- Placing compacted backfill against the exterior side of curb and gutter.
- Placing curb, gutter and/or sidewalk directly on subgrade soils without the use of base course materials.

Preventative maintenance should be planned and provided for an ongoing pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment.

Preventative maintenance consists of both localized maintenance (e.g. crack sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements.

Earthwork:

General Considerations: The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project.

All earthwork on the project should be observed and evaluated by the geotechnical engineer contracted for special inspection services. The evaluation of earthwork should include observation and testing of engineered fills, subgrade preparation, foundation bearing soils and other geotechnical conditions exposed during the construction of the project.

Site Preparation: Strip and remove existing vegetation and other deleterious materials from proposed building and pavement areas. All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction. Stripped materials consisting of vegetation and organic materials should be wasted from the site or used to revegetate landscaped areas or exposed slopes after completion of grading operations.

The site should be initially graded to create a relatively level surface to receive fill and to provide for a relatively uniform thickness of fill beneath proposed building structures. All exposed areas that will receive fill, once properly cleared, should be scarified to a minimum depth of 8 to 12 inches, conditioned to near optimum moisture content and compacted.

Perched groundwater and/or soft subgrade soils may be encountered in foundation excavations. Stabilization of these materials will be required prior to foundation construction, if encountered. Stabilization would likely include placing or “crowding” larger-sized crushed gravel or recycled concrete into the high moisture content, weak clay soils in order to provide for a stable base. We estimate that the amount of aggregate required to build a stable base may be on the order of 18 to 24 inches in thickness. The thickness of this gravel layer may be reduced using a layer bi-axial (or triaxial) geogrid reinforcement below the gravel. The removed clays should be replaced with engineered fill consisting of imported granular soils. Engineered fills should be placed as described below. ***The geotechnical engineer contracted for special inspection services should be contacted during excavation to provide further guidance based on actual site conditions.***

It is anticipated that excavations for the proposed construction can be accomplished with conventional, heavy-duty earthmoving equipment. The stability of the site subgrade may also be affected by precipitation, repetitive construction traffic, or other factors. If unstable conditions are encountered or develop during construction, workability may be improved by scarifying and aeration. Overexcavation of wet zones and replacement with granular materials may be necessary.

Subgrade Preparation: The engineer should evaluate foundation subgrade soils in order to confirm or modify our recommendations for the bearing soils. All subgrade soils below new fill, slab-on-grade floors, exterior PCC flatwork, and pavements should be scarified to a minimum depth of 12 inches, moisture conditioned and compacted as discussed below just prior to construction of these elements.

Fill Materials: Clean on-site soils or approved imported materials may be used as fill material. Imported soils (if required) should conform to the following:

<u>Gradation</u>	<u>Percent finer by weight (ASTM C136)</u>
6"	100
3"	70-100
No. 4 Sieve.....	50-100
No. 200 Sieve.....	20-50
• Liquid Limit	35 (max)
• Plasticity Index	15 (max)
• Maximum expansive potential (%)*	1.0

*Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about optimum water content. The sample is confined under a 500 psf surcharge and submerged.

Compaction Requirements: Engineered fill for site development and grading should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill soils should be placed and compacted according to the following criteria:

Item	Description
Fill Lift Thickness	8 to 12 inches or less in loose thickness
Compaction Requirements	Clayey soils: 95% of standard Proctor dry density (ASTM D698) Non-plastic sands: 95% of modified Proctor dry density (ASTM 1557)
Moisture Content	Clayey soils: Optimum to +4% above optimum moisture content Optimum to +2% above optimum in pavement areas Non-plastic sands: -2% below to +2% above optimum

At a minimum, fill soils placed for any sub-excavation fill, site grading, utility trench backfill and foundation backfill should be tested to confirm that earthwork is being performed according to our recommendations and project specifications. Subsequent lifts of fill should not be placed on previous lifts if the moisture content or dry density is determined to be less than specified.

Excavation and Trench Construction: Caving sand soils may be encountered in excavations during construction. The individual contractor(s) should be made responsible for designing and constructing stable, temporary excavations as needed to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

The soils to be penetrated by the proposed excavations may vary significantly across the site. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, the actual conditions should be evaluated to determine any excavation modifications necessary to maintain safe conditions.

As a safety measure, it is recommended that all vehicles and soil piles be kept to a minimum lateral distance from the crest of the slope equal to no less than the slope height. The exposed slope face should be protected against the elements.

As discussed, shallow groundwater was encountered at depths ranging from 4 to 7-½ feet below existing site grades. Where excavations penetrate the groundwater, temporary dewatering will be required during excavation, foundation work and backfilling operations for proper construction. Pumping from sumps may be utilized to control water within the excavations.

Additional Design and Construction Considerations:

Exterior Slab Design and Construction: Flatwork will be subject to movement, particularly when bearing on backfill soils adjacent to the foundation and underground utility lines. The amount of movement will be related to the compactive effort used when the fill soils are placed and future wetting of the subgrade soils. The potential for damage would be greatest where exterior slabs are constructed adjacent to the building or other structural elements.

To reduce the potential for damage, we recommend:

- exterior slabs in critical areas be supported on a zone of recompacted soils.
- Supporting of flatwork at building entrances and other critical areas on haunches attached by the building foundations.
- placement of effective control joints on relatively close centers and isolation joints between slabs and other structural elements.
- provision for adequate drainage in areas adjoining the slabs.
- use of designs which allow vertical movement between the exterior slabs and adjoining structural elements.

Underground Utility Systems: All underground piping within or near the proposed structure should be designed with flexible couplings, so minor deviations in alignment do not result in breakage or distress. Utility knockouts in foundation walls should be oversized to accommodate differential movements.

It is strongly recommended that a representative of the geotechnical engineer provide full-time observation and compaction testing of trench backfill within building and pavement areas.

Concrete Corrosion Protection: Water-soluble sulfate concentrations of select samples ranged up to 400 parts per million (ppm). ACI rates the measured concentrations as being a low to moderate risk of concrete sulfate attack. Based on these results, Type II Portland cement (or equivalent) should be used for concrete on and below grade. Project concrete should be designed in accordance with the provisions of the *ACI Design Manual*, Section 318, Chapter 4.

Surface Drainage: All grades must be adjusted to provide positive drainage away from the structures during construction and maintained throughout the life of the proposed project. Infiltration of water into utility or foundation excavations must be prevented during construction. Landscaped irrigation adjacent to the foundation system should be minimized or eliminated.

Water permitted to pond near or adjacent to the perimeter of the structure (either during or post-construction) can result in significantly higher soil movements than those discussed in this report. As a result, any estimations of potential movement described in this report cannot be relied upon if positive drainage is not obtained and maintained, and water is allowed to infiltrate the fill and/or subgrade.

Exposed ground (unpaved, landscaped areas) should be sloped at a minimum of 5 to 10 percent grade for at least 5 feet beyond the perimeter of the building/structure, where possible. Swales sidewalk chases, area drains may be required to facilitate drainage. Backfill against footings, exterior walls and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration. After building construction and prior to project completion, we recommend that verification of final grading be performed to document that positive drainage, as described above, has been achieved.

Flatwork will be subject to post construction movement due to soil heave/settlement and frost action. Maximum grades practical should be used for paving and flatwork to prevent areas where water can pond. In addition, allowances in final grades should take into consideration post-construction movement of flatwork, particularly if such movement would be critical. Where paving or flatwork abuts the structure, care should be taken that joints are properly sealed and maintained to prevent the infiltration of surface water.

Planters located adjacent to the structure should preferably be self-contained. Landscaping in close proximity to the foundation should be limited to well-maintained and timed drip irrigation only. Sprinkler mains and spray heads should be located a minimum of 5 feet away from the building line.

Roof drains should discharge on pavements or be extended away from the structure a minimum of 5 feet through the use of splash blocks or downspout extensions. A preferred alternative is to have the roof drains discharge to storm sewers by solid pipe or daylighted to a detention pond or other appropriate outfall.

GENERAL COMMENTS

PCH should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. PCH should also be retained to provide testing and observation during the excavation, grading, foundation and construction phases of the project.

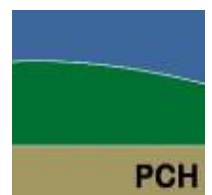
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

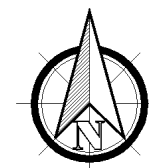
The scope of services for this project does not include, either specifically or by implication, any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes are planned in the nature, design, or location of the project as outlined in this report, the conclusions and recommendations contained in this report shall not be considered valid unless PCH reviews the changes, and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

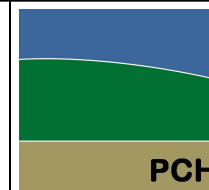
**BORING LOCATION DIAGRAM
BORING LOGS**





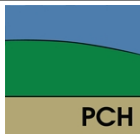
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 PROPOSED BORING LOCATIONS

BORING LOCATION DIAGRAM
LES SCHWAB TIRE CENTER
FALCON, COLORADO
PCH PROJECT NO. 12.298.16



Pickering, Cole, & Hivner, LLC
 1070 W. 124th Ave., Suite 300
 Westminster, CO 80234
 (303) 996-2999

PCH



Pickering, Cole, & Hivner
1070 W. 124 Avenue, Suite 300
Westminster, CO. 80234
Telephone: 303.996.2999

BORING NUMBER 1

PAGE 1 OF 1

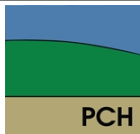
CLIENT SFP-E, LLC c/o Galloway
PROJECT NUMBER 12.298.16
DATE STARTED 8/17/16 COMPLETED 8/17/16
DRILLING CONTRACTOR Elite Drilling
DRILLING METHOD CME-55/Solid Stem Auger
HAMMER TYPE Automatic
LOGGED BY SM CHECKED BY AG

PROJECT NAME Les Schwab Tire Center - Falcon, CO
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way
GROUND SURFACE ELEV. Not Provided PROPOSED ELEV. Not Provided
SURFACE CONDITIONS Low to moderate growth of grass and weeds
GROUND WATER LEVELS:
▽ DURING DRILLING 15.00 ft
▽ AFTER DRILLING 7.50 ft - 9/6/16

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 9/27/16 09:01 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS GEO 2016\12.298.16 LES SCHWAB - FALCON.GPJ

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	USCS SYMBOL	SAMPLE TYPE	RECOVERY %	PENETRATION blows/in	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	SWELL-CONSOL /SURCHARGE LOAD, %psf
		0							
	FINE to COARSE SAND with SILT , varies trace clay, brown, light brown, white, moist, medium dense	5	SW-SM	CB	100	30 / 12	5.8	121	
		7							
	CLAYEY SAND , grey to bluish-grey, moist to wet, medium dense	10	SC	CB	100	38 / 12	11.1	123	+0.3/500
		15	SC	CB	100	46 / 12	12.1	124	
		17							
	CLAYSTONE BEDROCK , varies sandy, brown, dark brown, grey, calcareous, moist to wet, very hard	20	-	CB	100	50 / 7	11.7	125	
		25	-	CB	100	50 / 6	10.1	127	
		30	-	CB	100	50 / 4	11.5	126	
		35	-	CB	100	50 / 6	15.6	117	

Approximate bottom of borehole at 35.0 feet.



Pickering, Cole, & Hivner
1070 W. 124 Avenue, Suite 300
Westminster, CO. 80234
Telephone: 303.996.2999

BORING NUMBER 2

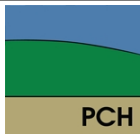
PAGE 1 OF 1

CLIENT SFP-E, LLC c/o Galloway
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DATE STARTED 8/17/16 COMPLETED 8/17/16
DRILLING CONTRACTOR Elite Drilling
DRILLING METHOD CME-55/Solid Stem Auger
HAMMER TYPE Automatic
LOGGED BY SM CHECKED BY AG

PROJECT NAME Les Schwab Tire Center - Falcon, CO
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way
GROUND SURFACE ELEV. Not Provided PROPOSED ELEV. Not Provided
SURFACE CONDITIONS Low to moderate growth of grass and weeds
GROUND WATER LEVELS:
▽ DURING DRILLING 10.00 ft
▽ AFTER DRILLING 7.50 ft - 9/6/16

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	USCS SYMBOL	SAMPLE TYPE	RECOVERY %	PENETRATION blows/in	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	SWELL-CONSOL /SURCHARGE LOAD, %psf
		0							
	CLAYEY SAND , varies to Silty Sand, dark brown, light brown, white, grey, calcareous, moist to wet, medium dense to dense		SC	CB	100	23 / 12	6.9	126	-0.2/200
		5	SM	CB	100	25 / 12	4.1	117	
		10	SC	CB	100	50 / 9	8.3	134	
	CLAYSTONE BEDROCK , varies sandy, grey to bluish-grey, moist, hard to very hard	15	-	CB	100	50 / 9	10.9	119	+0.6/1000
		20	-	CB	100	50 / 5	12.2	126	
		25	-	CB	100	50 / 3	10.7	128	

Approximate bottom of borehole at 25.0 feet.



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BORING NUMBER 3

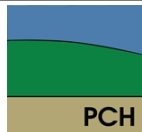
PAGE 1 OF 1

CLIENT	SFP-E, LLC c/o Galloway	PROJECT NAME	Les Schwab Tire Center - Falcon, CO
PROJECT NUMBER	12.298.16	PROJECT LOCATION	Meridian Rd. & Rolling Thunder Way
DATE STARTED	8/17/16	COMPLETED	8/17/16
GROUND SURFACE ELEV.	Not Provided	PROPOSED ELEV.	Not Provided
DRILLING CONTRACTOR	Elite Drilling	SURFACE CONDITIONS	Low to moderate growth of grass and weeds
DRILLING METHOD	CME-55/Solid Stem Auger	GROUND WATER LEVELS:	
HAMMER TYPE	Automatic	▽ DURING DRILLING	11.00 ft
LOGGED BY	SM	▽ AFTER DRILLING	5.00 ft - 9/6/16
CHECKED BY	AG		

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 9/27/16 09:01 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS GEO 2016\12.298.16 LES SCHWAB - FALCON.GPJ

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	USCS SYMBOL	SAMPLE TYPE	RECOVERY %	PENETRATION blows/in	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	SWELL-CONSOL /SURCHARGE LOAD, %psf
		0							
		5	SM	CB	100	25 / 12	9.5	118	
		10	SM	CB	100	50 / 12	9.5	127	
		13							
		15	-	CB	100	50 / 6	9.4	123	+0.4/1000
		20	-	CB	100	50 / 6	11.1	125	
		25	-	CB	100	50 / 4	10.5	123	

Approximate bottom of borehole at 25.0 feet.



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BORING NUMBER 4

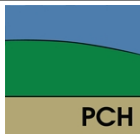
PAGE 1 OF 1

CLIENT	SFP-E, LLC c/o Galloway	PROJECT NAME	Les Schwab Tire Center - Falcon, CO
PROJECT NUMBER	12.298.16	PROJECT LOCATION	Meridian Rd. & Rolling Thunder Way
DATE STARTED	8/17/16	COMPLETED	8/17/16
GROUND SURFACE ELEV.	Not Provided	PROPOSED ELEV.	Not Provided
DRILLING CONTRACTOR	Elite Drilling	SURFACE CONDITIONS	Low to moderate growth of grass and weeds
DRILLING METHOD	CME-55/Solid Stem Auger	GROUND WATER LEVELS:	
HAMMER TYPE	Automatic	▽ DURING DRILLING	11.00 ft
LOGGED BY	SM	▽ AFTER DRILLING	4.00 ft - 9/6/16
CHECKED BY	AG		

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 9/27/16 09:01 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS GEO 2016\112.298 - 16 LES SCHWAB - FALCON.GPJ

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	USCS SYMBOL	SAMPLE TYPE	RECOVERY %	PENETRATION blows/in	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	SWELL-CONSOL /SURCHARGE LOAD, %psf
		0							
	<u>CLAYEY SAND</u> , dark brown, moist, medium dense								
		5	SC	CB	100	29 / 12	9.8	117	
7	<u>LEAN CLAY with SAND</u> , grey to bluish-grey, moist, very stiff to hard								
		10	CL	CB	100	32 / 12	10.7	122	+1.8/500
		15	CL	CB	100	50 / 8	10.6	117	+0.1/1000
18	<u>CLAYSTONE BEDROCK</u> , varies sandy, brown, grey to bluish-grey, olive, dry to moist, hard to very hard								
		20	-	CB	100	50 / 6	11.1	125	
		25	-	CB	100	50 / 3	10.8	125	
		30	-	CB	100	50 / 9	18.1	112	
		35	-	CB	100	50 / 3	10.9	121	

Approximate bottom of borehole at 35.0 feet.



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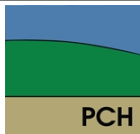
BORING NUMBER P1

PAGE 1 OF 1

CLIENT <u>SFP-E, LLC c/o Galloway</u>	PROJECT NAME <u>Les Schwab Tire Center - Falcon, CO</u>
PROJECT NUMBER <u>12.298.16</u>	PROJECT LOCATION <u>Meridian Rd. & Rolling Thunder Way</u>
DATE STARTED <u>8/17/16</u> COMPLETED <u>8/17/16</u>	GROUND SURFACE ELEV. <u>Not Provided</u> PROPOSED ELEV. <u>Not Provided</u>
DRILLING CONTRACTOR <u>Elite Drilling</u>	SURFACE CONDITIONS <u>Low to moderate growth of grass and weeds</u>
DRILLING METHOD <u>CME-55/Solid Stem Auger</u>	GROUND WATER LEVELS:
HAMMER TYPE <u>Automatic</u>	<input type="checkbox"/> DURING DRILLING <u>None</u>
LOGGED BY <u>SM</u> CHECKED BY <u>AG</u>	<input checked="" type="checkbox"/> AFTER DRILLING <u>None - 9/6/16</u>

GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	USCS SYMBOL	SAMPLE TYPE	RECOVERY %	PENETRATION blows/in	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	SWELL-CONSOL /SURCHARGE LOAD, %psf
	SILTY SAND , brown, light brown, white, tan, dry to moist, medium dense	0							
		3	SM	CB	100	20 / 12	4.6	122	
	SANDY LEAN CLAY , bluish-grey, dry to moist, very stiff	5	CL	CB	100	34 / 12	4.6	116	



Approximate bottom of borehole at 5.0 feet.



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BORING NUMBER P2

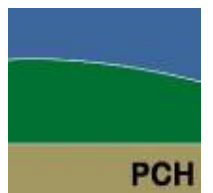
CLIENT	SFP-E, LLC c/o Galloway	PROJECT NAME	Les Schwab Tire Center - Falcon, CO
PROJECT NUMBER	12.298.16	PROJECT LOCATION	Meridian Rd. & Rolling Thunder Way
DATE STARTED	8/17/16	COMPLETED	8/17/16
GROUND SURFACE ELEV.	Not Provided	PROPOSED ELEV.	Not Provided
DRILLING CONTRACTOR	Elite Drilling	SURFACE CONDITIONS	Low to moderate growth of grass and weeds
DRILLING METHOD	CME-55/Solid Stem Auger	GROUND WATER LEVELS:	
HAMMER TYPE	Automatic	▽ DURING DRILLING	None
LOGGED BY	SM	▽ AFTER DRILLING	None - 9/6/16
CHECKED BY	AG		

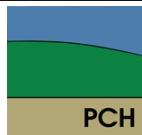
GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	USCS SYMBOL	SAMPLE TYPE	RECOVERY %	PENETRATION blows/in	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	SWELL-CONSOL /SURCHARGE LOAD, %psf
		0							
	SANDY LEAN CLAY , dark brown, grey to bluish-grey, moist								
	SILTY SAND , white, tan, dry to moist, medium dense		SM	CB	100	23 / 12	8.7	115	-0.1/200
		5	SM	CB	100	18 / 12	12.1	121	

Approximate bottom of borehole at 5.0 feet.

APPENDIX B

LABORATORY TEST RESULTS





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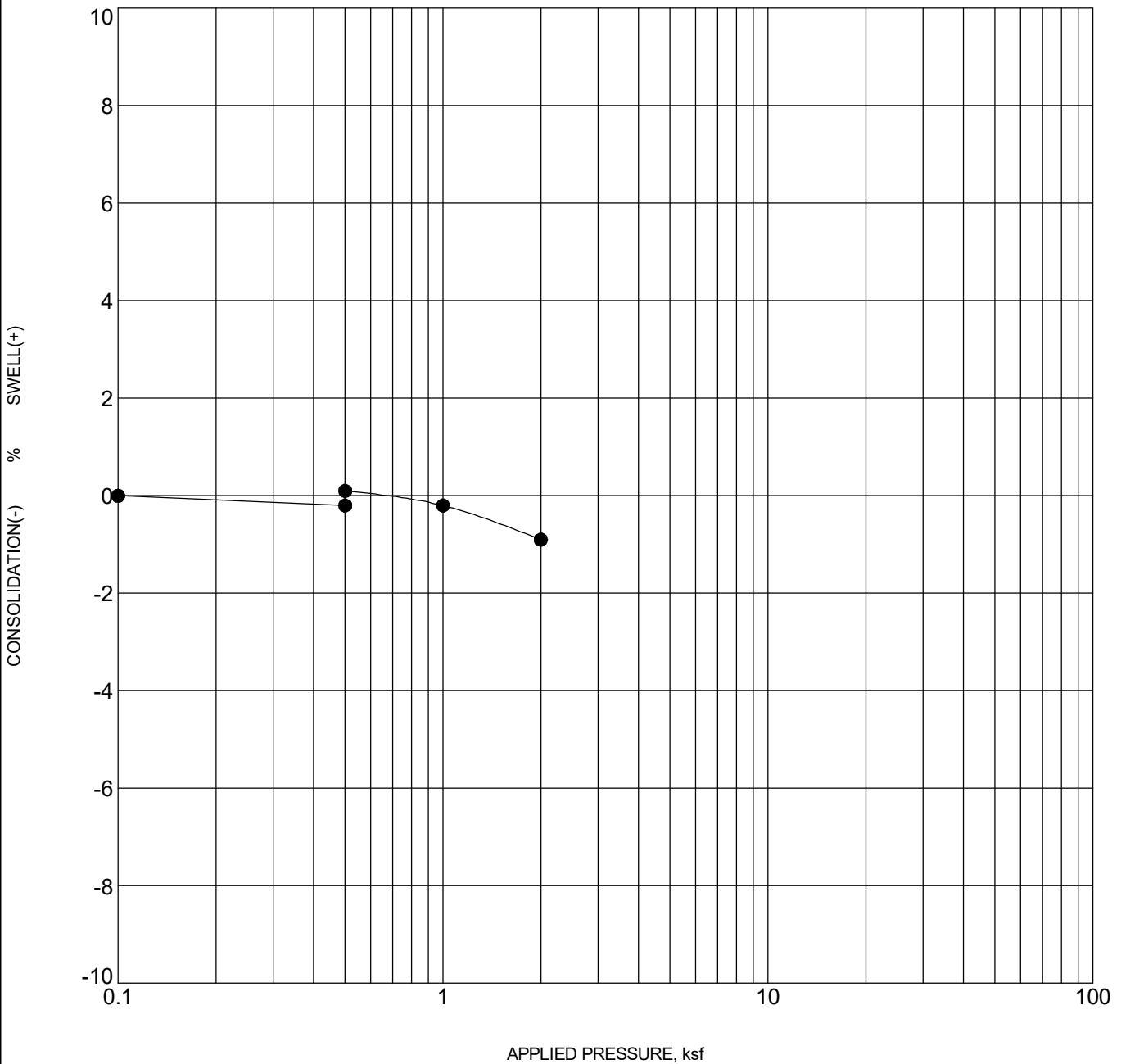
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

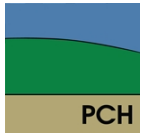
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● 1	9.0	CLAYEY SAND	123	11

Note: Water Added to Sample at 500 psf.

Date: 9/6/16



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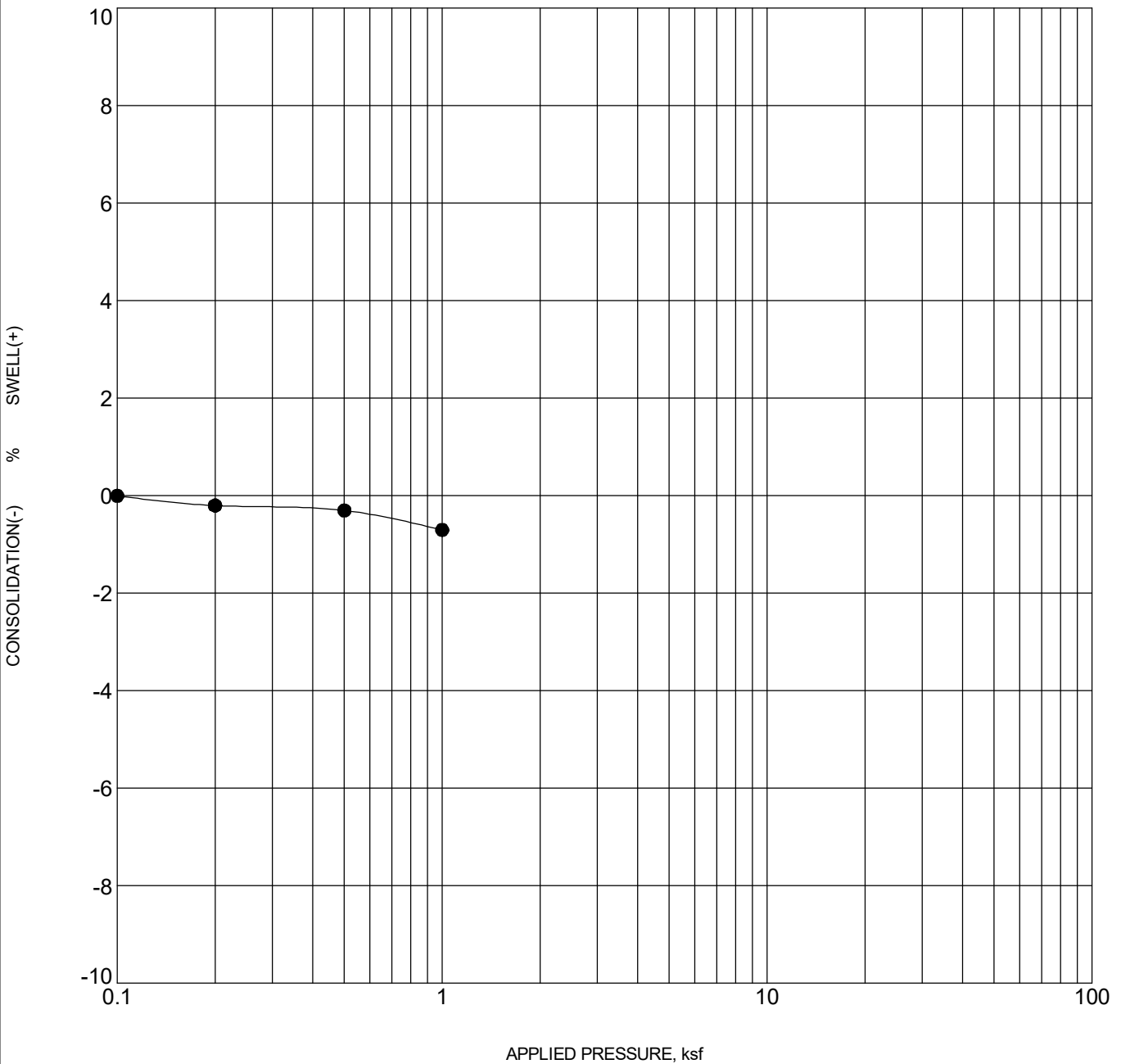
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

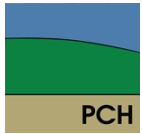
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● 2	2.0	CLAYEY SAND	126	7

Note: Water Added to Sample at 200 psf.

Date: 9/6/16



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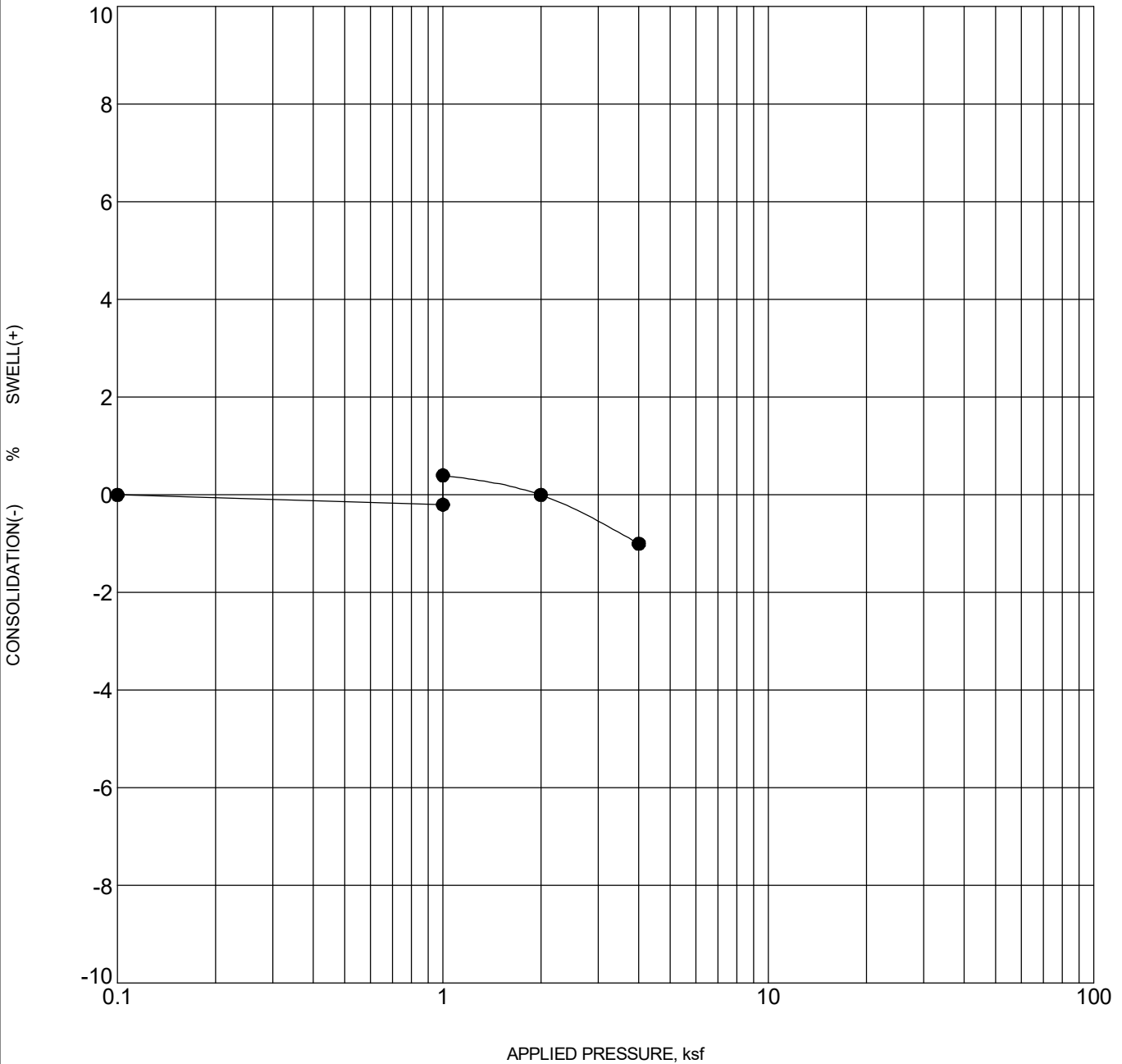
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

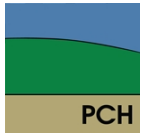
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● 2	14.0	CLAYSTONE BEDROCK	119	11

Note: Water Added to Sample at 1000 psf.

Date: 9/6/16



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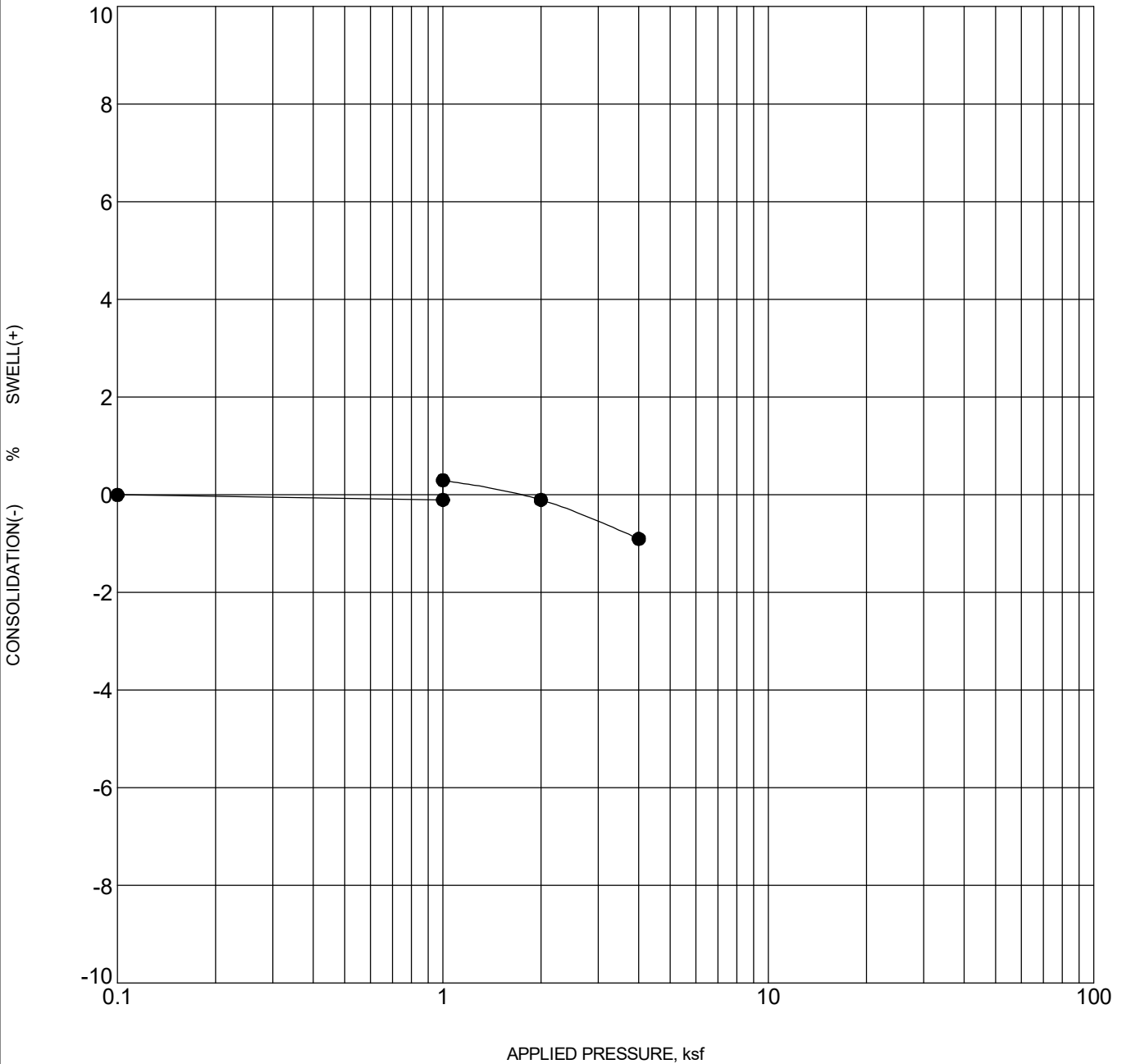
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

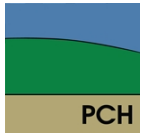
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● 3	14.0	CLAYSTONE BEDROCK	123	9

Note: Water Added to Sample at 1000 psf.

Date: 9/6/16



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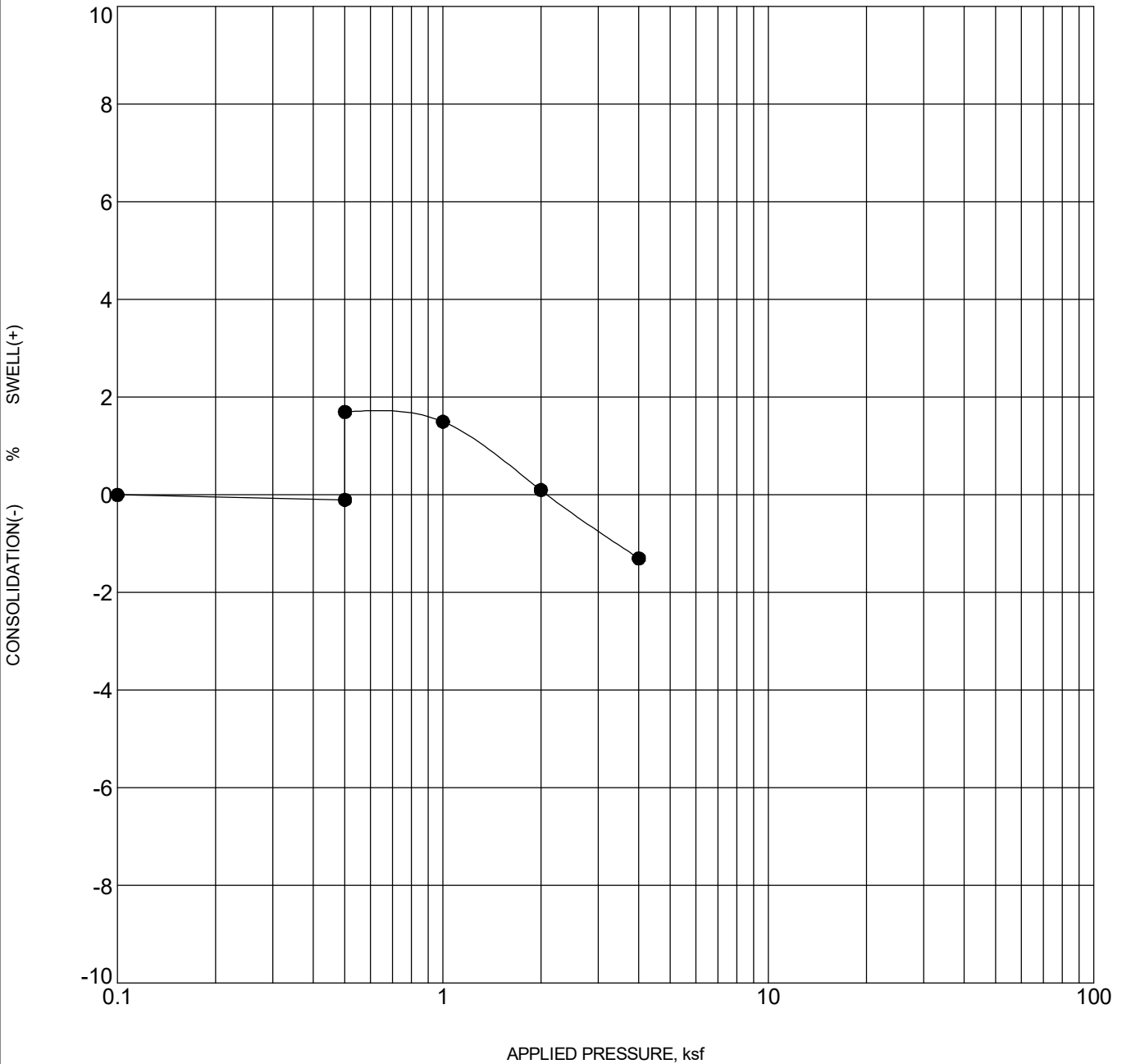
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

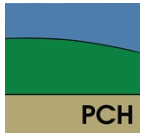
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● 4	9.0	SANDY LEAN CLAY(CL)	122	11

Note: Water Added to Sample at 500 psf.

Date: 9/6/16



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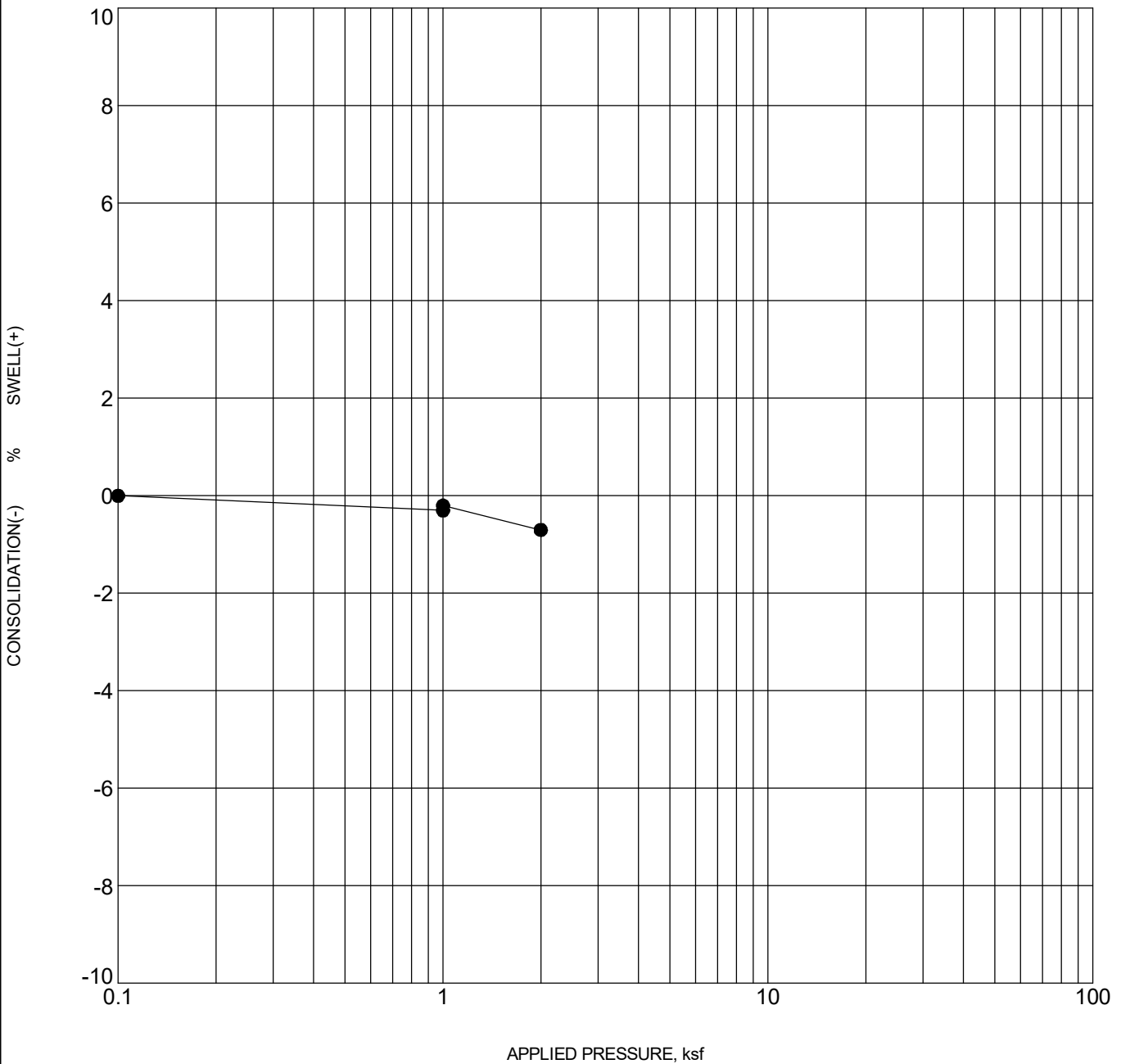
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

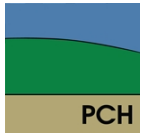
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● 4	14.0	LEAN CLAY with SAND	117	11

Note: Water Added to Sample at 1000 psf.

Date: 9/6/16



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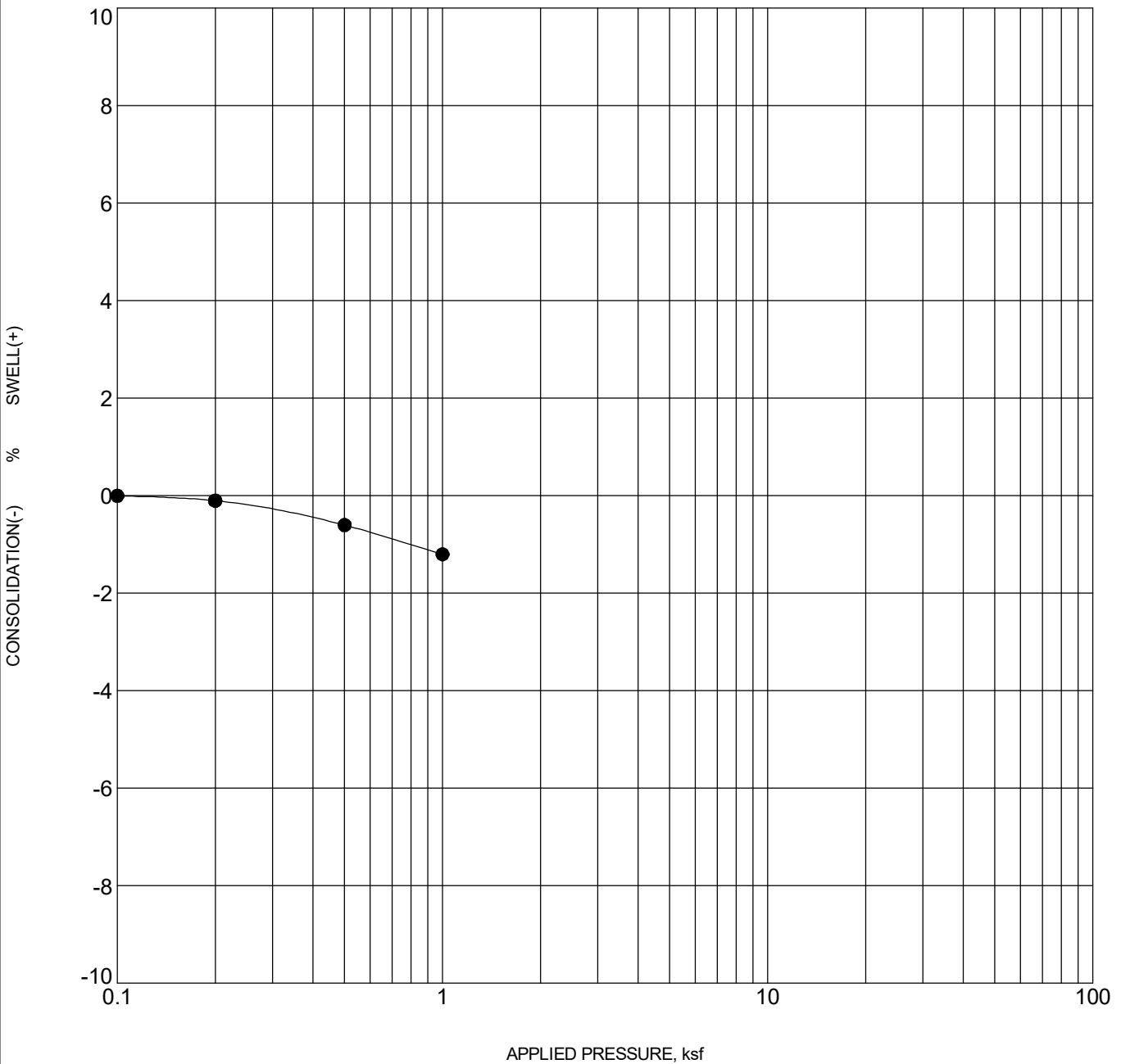
SWELL/CONSOLIDATION TEST

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

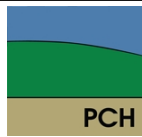
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way



BOREHOLE	DEPTH	Classification	γ_d	MC%
● P2	2.0	SILTY SAND(SM)	115	9

Note: Water Added to Sample at 200 psf.

Date: 9/6/16



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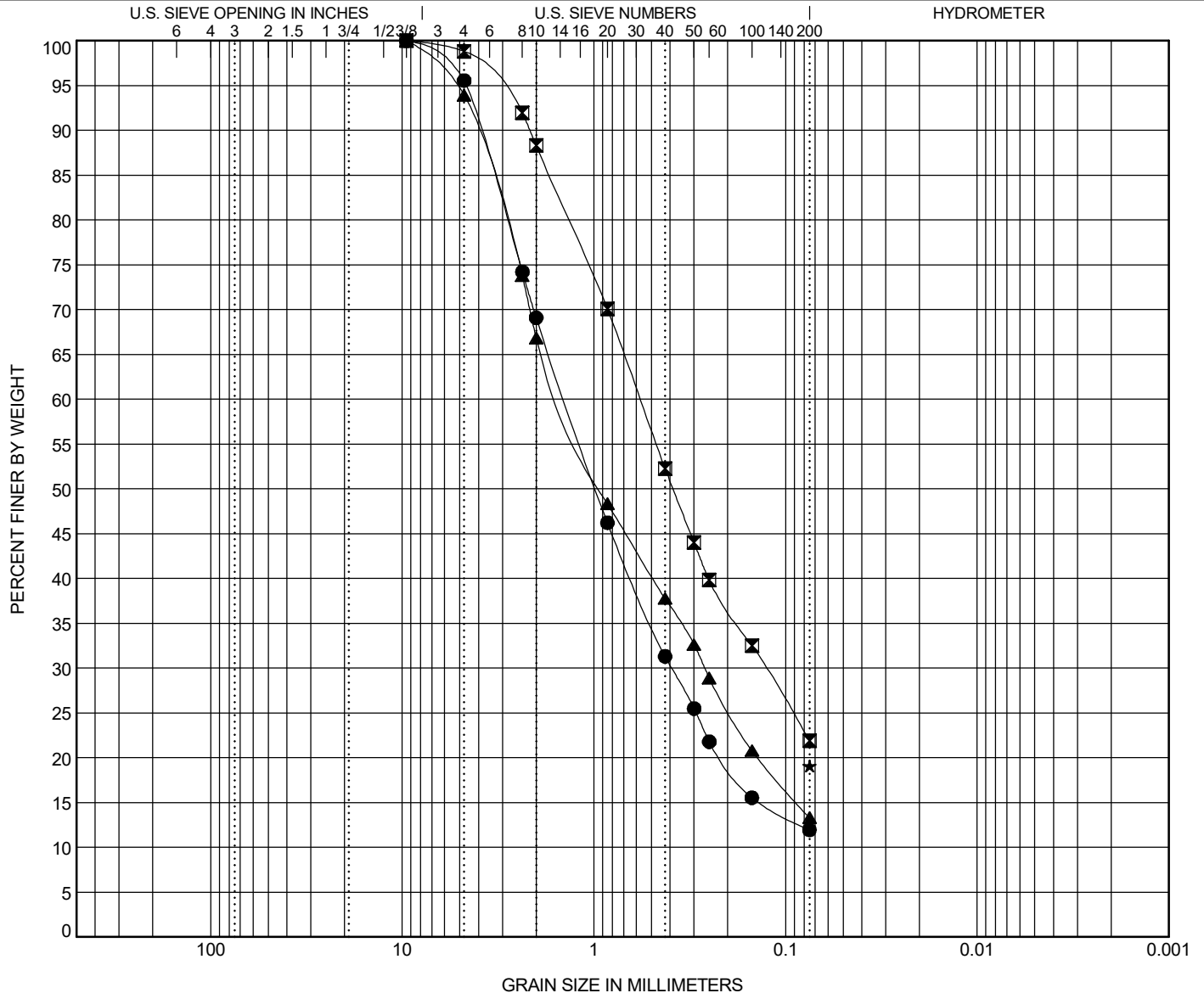
GRAIN SIZE DISTRIBUTION

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center

PROJECT NUMBER 12.298.16

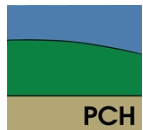
PROJECT LOCATION Meridian Rd. & Rolling Thunder Way - Falcon, CO



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● 1	4.0	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP	2.11	27.68
☒ 3	9.0	SILTY SAND(SM)	NP	NP	NP		
▲ P1	2.0	SILTY SAND(SM)	NP	NP	NP		
★ P2	2.0	SILTY SAND(SM)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 1	4.0	9.5	1.423	0.393		4.4	83.6	12.0	
☒ 3	9.0	9.5	0.574	0.127		1.2	76.9	21.9	
▲ P1	2.0	9.5	1.456	0.264		6.1	80.6	13.3	
★ P2	2.0	0.075						19.1	



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SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 1

CLIENT SFP-E, LLC c/o Galloway

PROJECT NAME Les Schwab Tire Center - Falcon, CO

PROJECT NUMBER 12.298.16

PROJECT LOCATION Meridian Rd. & Rolling Thunder Way

Borehole	Depth	Soil Description	Water Content (%)	Dry Density (pcf)	Swell (+) or Consolidation (-)/ Surcharge (%/psf)	Water Soluble Sulfates (ppm)	Passing #200 Sieve (%)	Atterberg Limits		
								Liquid Limit	Plastic Limit	Plasticity Index
1	4	FINE to COARSE SAND with SILT	5.8	121.4			12	NP	NP	NP
1	9	CLAYEY SAND	11.1	122.9	+0.3/500					
1	14	CLAYEY SAND	12.1	124.2						
1	19	CLAYSTONE BEDROCK	11.7	125.0						
1	24	CLAYSTONE BEDROCK	10.1	127.5						
1	29	CLAYSTONE BEDROCK	11.5	125.7						
1	34	CLAYSTONE BEDROCK	15.6	117.2						
2	2	CLAYEY SAND	6.9	126.2	-0.2/200	0				
2	4	CLAYEY SAND	4.1	117.5						
2	9	CLAYEY SAND	8.3	134.1						
2	14	CLAYSTONE BEDROCK	10.9	118.6	+0.6/1000					
2	19	CLAYSTONE BEDROCK	12.2	125.8						
2	24	CLAYSTONE BEDROCK	10.7	127.7						
3	4	CLAYEY SAND to SILTY SAND	9.5	117.9						
3	9	SILTY SAND(SM)	9.5	127.1			22	NP	NP	NP
3	14	CLAYSTONE BEDROCK	9.4	123.2	+0.4/1000					
3	19	CLAYSTONE BEDROCK	11.1	125.1						
3	24	CLAYSTONE BEDROCK	10.5	123.3						
4	4	CLAYEY SAND	9.8	117.3						
4	9	SANDY LEAN CLAY(CL)	10.7	122.4	+1.8/500	400	70	39	22	17
4	14	LEAN CLAY with SAND	10.6	117.3	+0.1/1000					
4	19	CLAYSTONE BEDROCK	11.1	124.7						
4	24	CLAYSTONE BEDROCK	10.8	124.9						
4	29	CLAYSTONE BEDROCK	18.1	111.8						
4	34	CLAYSTONE BEDROCK	10.9	121.1						
P1	2	SILTY SAND (SM)	4.6	122.5			13	NP	NP	NP
P1	4	SANDY LEAN CLAY	4.6	115.9						
P2	2	SILTY SAND(SM)	8.7	115.0	-0.1/200		19	NP	NP	NP
P2	4	SILTY SAND	12.1	121.2						

APPENDIX C

**GENERAL NOTES
PERIMETER DRAIN DETAIL**



GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1½" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube – 2.5" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
CB:	California Barrel - 1.92" I.D., 2.5" O.D., unless otherwise noted	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 2.5" O.D. California Barrel samplers (CB) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per inch," and is not considered equivalent to the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling
WCI:	Wet Cave in	WD:	While Drilling
DCI:	Dry Cave in	BCR:	Before Casing Removal
AB:	After Boring	ACR:	After Casing Removal

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

FINE-GRAINED SOILS

<u>(CB)</u> <u>Blows/Ft.</u>	<u>(SS)</u> <u>Blows/Ft.</u>	<u>Consistency</u>
< 3	0-2	Very Soft
3-5	3-4	Soft
6-10	5-8	Medium Stiff
11-18	9-15	Stiff
19-36	16-30	Very Stiff
> 36	> 30	Hard

COARSE-GRAINED SOILS

<u>(CB)</u> <u>Blows/Ft.</u>	<u>(SS)</u> <u>Blows/Ft.</u>	<u>Relative</u> <u>Density</u>
0-5	< 3	Very Loose
6-14	4-9	Loose
15-46	10-29	Medium Dense
47-79	30-50	Dense
> 79	> 50	Very Dense

BEDROCK

<u>(CB)</u> <u>Blows/Ft.</u>	<u>(SS)</u> <u>Blows/Ft.</u>	<u>Consistency</u>
< 24	< 20	Weathered
24-35	20-29	Firm
36-60	30-49	Medium Hard
61-96	50-79	Hard
> 96	> 79	Very Hard

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Terms of</u> <u>Other Constituents</u>	<u>Percent of</u> <u>Dry Weight</u>
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Major Component</u> <u>of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Terms of</u> <u>Other Constituents</u>	<u>Percent of</u> <u>Dry Weight</u>
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^C	Cu ≥ 4 and 1 ≤ Cc ≤ 3 ^E	GW	Well graded gravel ^F	
			Cu < 4 and/or 1 > Cc > 3 ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F,G,H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F,G,H}	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^D	Cu ≥ 6 and 1 ≤ Cc ≤ 3 ^E	SW	Well graded sand ^I	
			Cu < 6 and/or 1 > Cc > 3 ^E	SP	Poorly graded sand ^I	
		Sands with Fines More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G,H,I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G,H,I}	
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above “A” line ^J	CL	Lean clay ^{K,L,M}	
			PI < 4 or plots below “A” line ^J	ML	Silt ^{K,L,M}	
		Organic	Liquid limit - oven dried < 0.75	OL	Organic clay ^{K,L,M,N}	
			Liquid limit - not dried		Organic silt ^{K,L,M,O}	
		Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above “A” line	CH	Fat clay ^{K,L,M}
				PI plots below “A” line	MH	Elastic silt ^{K,L,M}
	Organic		Liquid limit - oven dried < 0.75	OH	Organic clay ^{K,L,M,P}	
			Liquid limit - not dried		Organic silt ^{K,L,M,Q}	
	Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

^ABased on the material passing the 3-in. (75-mm) sieve

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols: GW-GM well graded gravel with silt, GW-GC well graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^DSands with 5 to 12% fines require dual symbols: SW-SM well graded sand with silt, SW-SC well graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^KIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

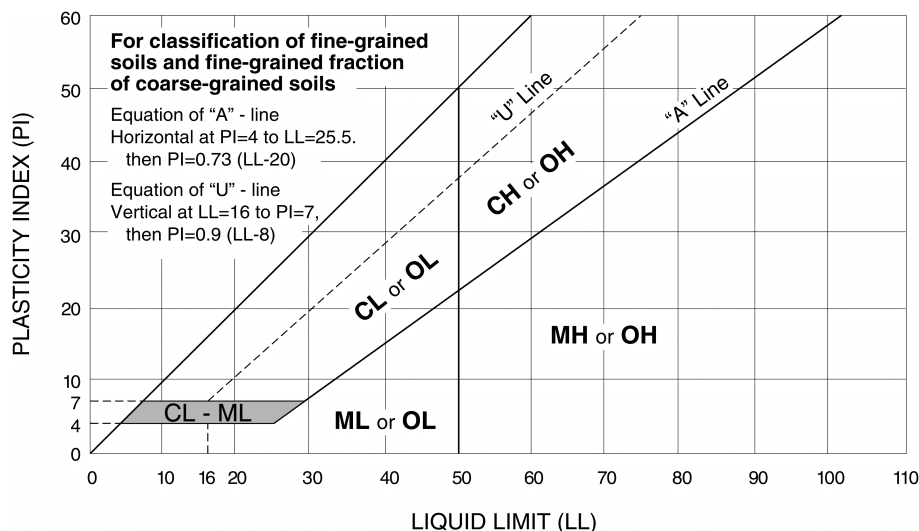
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



ROCK CLASSIFICATION

(Based on ASTM C-294)

Sedimentary Rocks

Sedimentary rocks are stratified materials laid down by water or wind. The sediments may be composed of particles or pre-existing rocks derived by mechanical weathering, evaporation or by chemical or organic origin. The sediments are usually indurated by cementation or compaction.

Chert	Very fine-grained siliceous rock composed of micro-crystalline or cryptocrystalline quartz, chalcedony or opal. Chert is various colored, porous to dense, hard and has a conchoidal to splintery fracture.
Claystone	Fine-grained rock composed of or derived by erosion of silts and clays or any rock containing clay. Soft massive and may contain carbonate minerals.
Conglomerate	Rock consisting of a considerable amount of rounded gravel, sand and cobbles with or without interstitial or cementing material. The cementing or interstitial material may be quartz, opal, calcite, dolomite, clay, iron oxides or other materials.
Dolomite	A fine-grained carbonate rock consisting of the mineral dolomite $[\text{CaMg}(\text{CO}_3)_2]$. May contain noncarbonate impurities such as quartz, chert, clay minerals, organic matter, gypsum and sulfides. Reacts with hydrochloric acid (HCL).
Limestone	A fine-grained carbonate rock consisting of the mineral calcite (CaCO_3). May contain noncarbonate impurities such as quartz, chert, clay minerals, organic matter, gypsum and sulfides. Reacts with hydrochloric acid (HCL).
Sandstone	Rock consisting of particles of sand with or without interstitial and cementing materials. The cementing or interstitial material may be quartz, opal, calcite, dolomite, clay, iron oxides or other material.
Shale	Fine-grained rock composed of or derived by erosion of silts and clays or any rock containing clay. Shale is hard, platy, of fissile may be gray, black, reddish or green and may contain some carbonate minerals (calcareous shale).
Siltstone	Fine grained rock composed of or derived by erosion of silts or rock containing silt. Siltstones consist predominantly of silt sized particles (0.0625 to 0.002 mm in diameter) and are intermediate rocks between claystones and sandstones and may contain carbonate minerals.

ROCK CLASSIFICATION

(Based on ASTM C-294)

Metamorphic Rocks

Metamorphic rocks form from igneous, sedimentary, or pre-existing metamorphic rocks in response to changes in chemical and physical conditions occurring within the earth's crust after formation of the original rock. The changes may be textural, structural, or mineralogic and may be accompanied by changes in chemical composition. The rocks are dense and may be massive but are more frequently foliated (laminated or layered) and tend to break into platy particles. The mineral composition is very variable depending in part on the degree of metamorphism and in part on the composition of the original rock.

Marble	A recrystallized medium- to coarse-grained carbonate rock composed of calcite or dolomite, or calcite and dolomite. The original impurities are present in the form of new minerals, such as micas, amphiboles, pyroxenes, and graphite.
Metaquartzite	A granular rock consisting essentially of recrystallized quartz. Its strength and resistance to weathering derive from the interlocking of the quartz grains.
Slate	A fine-grained metamorphic rock that is distinctly laminated and tends to split into thin parallel layers. The mineral composition usually cannot be determined with the unaided eye.
Schist	A highly layered rock tending to split into nearly parallel planes (schistose) in which the grain is coarse enough to permit identification of the principal minerals. Schists are subdivided into varieties on the basis of the most prominent mineral present in addition to quartz or to quartz and feldspars; for instance, mica schist. Greenschist is a green schistose rock whose color is due to abundance of one or more of the green minerals, chlorite or amphibole, and is commonly derived from altered volcanic rock.
Gneiss	One of the most common metamorphic rocks, usually formed from igneous or sedimentary rocks by a higher degree of metamorphism than the schists. It is characterized by a layered or foliated structure resulting from approximately parallel lenses and bands of platy minerals, usually micas or prisms, usually amphiboles, and of granular minerals, usually quartz and feldspars. All intermediate varieties between gneiss and schist and between gneiss and granite are often found in the same areas in which well-defined gneisses occur.

ROCK CLASSIFICATION

(Based on ASTM C-294)

Igneous Rocks

Igneous rocks are formed by cooling from a molten rock mass (magma). Igneous rocks are divided into two classes (1) plutonic, or intrusive, that have cooled slowly within the earth; and (2) volcanic, or extrusive, that formed from quickly cooled lavas. Plutonic rocks have grain sizes greater than approximately 1 mm, and are classified as coarse- or medium-grained. Volcanic rocks have grain sizes less than approximately 1 mm, and are classified as fine-grained. Volcanic rocks frequently contain glass. Both plutonic and volcanic rocks may consist of porphyries that are characterized by the presence of large mineral grains in a fine-grained or glassy groundmass. This is the result of sharp changes in rate of cooling or other physico-chemical conditions during solidification of the melt.

Granite

Granite is a medium- to coarse-grained light-colored rock characterized by the presence of potassium feldspar with lesser amounts of plagioclase feldspars and quartz. The characteristic potassium feldspars are orthoclase or microcline, or both; the common plagioclase feldspars are albite and oligoclase. Feldspars are more abundant than quartz. Dark-colored mica (biotite) is usually present, and light-colored mica (muscovite) is frequently present. Other dark-colored ferromagnesian minerals, especially hornblende, may be present in amounts less than those of the light-colored constituents.

Quartz-Monzonite and Grano-Diorite

Rocks similar to granite but contain more plagioclase feldspar than potassium feldspar.

Basalt

Fine-grained extrusive equivalent of gabbro and diabase. When basalt contains natural glass, the glass is generally lower in silica content than that of the lighter-colored extrusive rocks.

**LABORATORY TEST
SIGNIFICANCE AND PURPOSE**

TEST	SIGNIFICANCE	PURPOSE
<i>California Bearing Ratio</i>	Used to evaluate the potential strength of subgrade soil, subbase, and base course material, including recycled materials for use in road and airfield pavements.	<i>Pavement Thickness Design</i>
<i>Consolidation</i>	Used to develop an estimate of both the rate and amount of both differential and total settlement of a structure.	<i>Foundation Design</i>
<i>Direct Shear</i>	Used to determine the consolidated drained shear strength of soil or rock.	<i>Bearing Capacity, Foundation Design, and Slope Stability</i>
<i>Dry Density</i>	Used to determine the in-place density of natural, inorganic, fine-grained soils.	<i>Index Property Soil Behavior</i>
<i>Expansion</i>	Used to measure the expansive potential of fine-grained soil and to provide a basis for swell potential classification.	<i>Foundation and Slab Design</i>
<i>Gradation</i>	Used for the quantitative determination of the distribution of particle sizes in soil.	<i>Soil Classification</i>
<i>Liquid & Plastic Limit, Plasticity Index</i>	Used as an integral part of engineering classification systems to characterize the fine-grained fraction of soils, and to specify the fine-grained fraction of construction materials.	<i>Soil Classification</i>
<i>Permeability</i>	Used to determine the capacity of soil or rock to conduct a liquid or gas.	<i>Groundwater Flow Analysis</i>
<i>pH</i>	Used to determine the degree of acidity or alkalinity of a soil.	<i>Corrosion Potential</i>
<i>Resistivity</i>	Used to indicate the relative ability of a soil medium to carry electrical currents.	<i>Corrosion Potential</i>
<i>R-Value</i>	Used to evaluate the potential strength of subgrade soil, subbase, and base course material, including recycled materials for use in road and airfield pavements.	<i>Pavement Thickness Design</i>
<i>Soluble Sulfate</i>	Used to determine the quantitative amount of soluble sulfates within a soil mass.	<i>Corrosion Potential</i>
<i>Unconfined Compression</i>	To obtain the approximate compressive strength of soils that possess sufficient cohesion to permit testing in the unconfined state.	<i>Bearing Capacity Analysis for Foundations</i>
<i>Water Content</i>	Used to determine the quantitative amount of water in a soil mass.	<i>Index Property Soil Behavior</i>

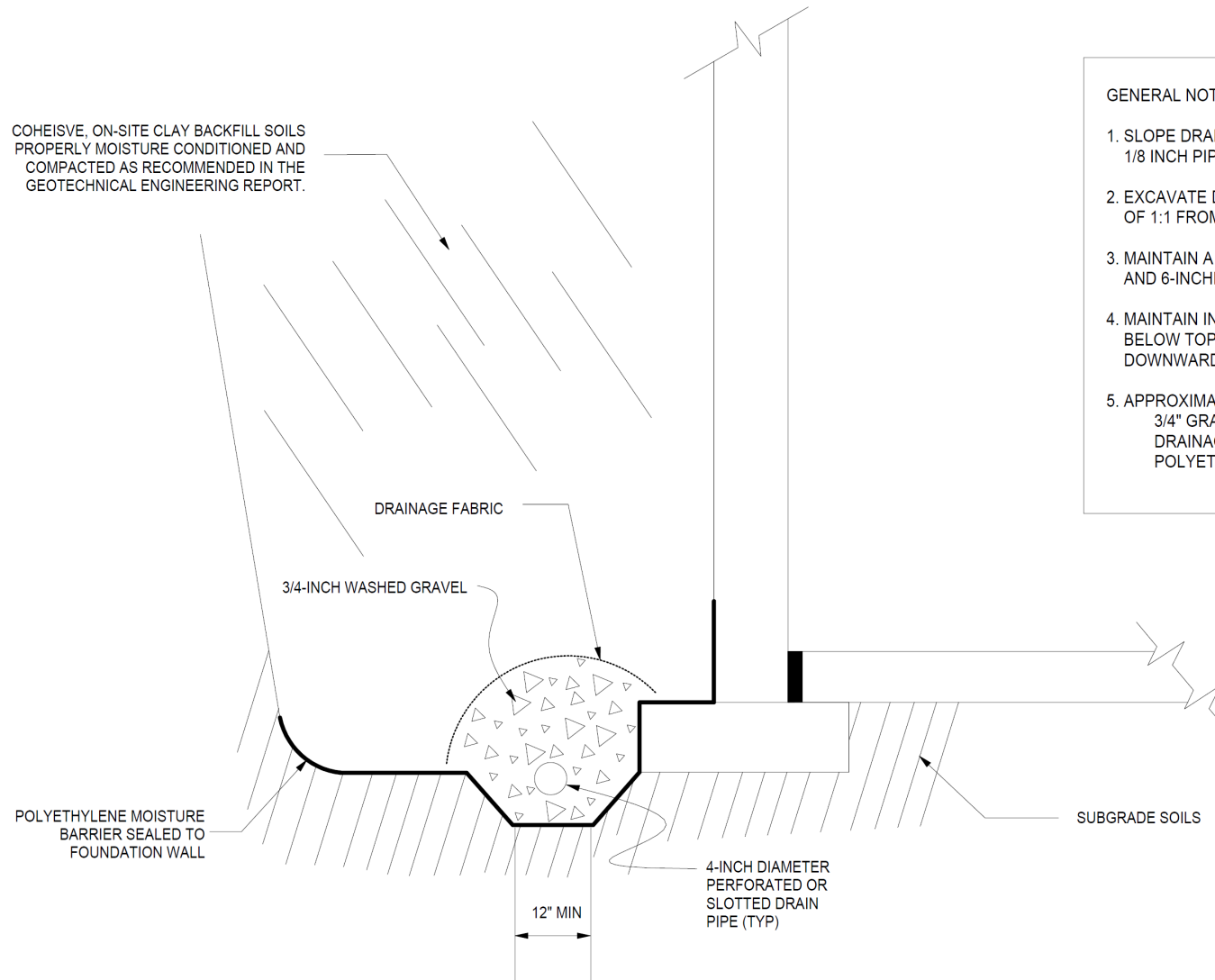
REPORT TERMINOLOGY (Based on ASTM D653)

<i>Allowable Soil Bearing Capacity</i>	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.
<i>Alluvium</i>	Soil, the constituents of which have been transported in suspension by flowing water and subsequently deposited by sedimentation.
<i>Aggregate Base Course</i>	A layer of specified material placed on a subgrade or subbase usually beneath slabs or pavements.
<i>Backfill</i>	A specified material placed and compacted in a confined area.
<i>Bedrock</i>	A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation.
<i>Bench</i>	A horizontal surface in a sloped deposit.
<i>Caisson (Drilled Pier or Shaft)</i>	A concrete foundation element cast in a circular excavation which may have an enlarged base. Sometimes referred to as a cast-in-place pier or drilled shaft.
<i>Coefficient of Friction</i>	A constant proportionality factor relating normal stress and the corresponding shear stress at which sliding starts between the two surfaces.
<i>Colluvium</i>	Soil, the constituents of which have been deposited chiefly by gravity such as at the foot of a slope or cliff.
<i>Compaction</i>	The densification of a soil by means of mechanical manipulation
<i>Concrete Slab-on-Grade</i>	A concrete surface layer cast directly upon a base, subbase or subgrade, and typically used as a floor system.
<i>Differential Movement</i>	Unequal settlement or heave between, or within foundation elements of structure.
<i>Earth Pressure</i>	The pressure exerted by soil on any boundary such as a foundation wall.
<i>ESAL</i>	Equivalent Single Axle Load, a criteria used to convert traffic to a uniform standard, (18,000 pound axle loads).
<i>Engineered Fill</i>	Specified material placed and compacted to specified density and/or moisture conditions under observations of a representative of a geotechnical engineer.
<i>Equivalent Fluid</i>	A hypothetical fluid having a unit weight such that it will produce a pressure against a lateral support presumed to be equivalent to that produced by the actual soil. This simplified approach is valid only when deformation conditions are such that the pressure increases linearly with depth and the wall friction is neglected.
<i>Existing Fill (or Man-Made Fill)</i>	Materials deposited throughout the action of man prior to exploration of the site.
<i>Existing Grade</i>	The ground surface at the time of field exploration.

REPORT TERMINOLOGY (Based on ASTM D653)

<i>Expansive Potential</i>	The potential of a soil to expand (increase in volume) due to absorption of moisture.
<i>Finished Grade</i>	The final grade created as a part of the project.
<i>Footing</i>	A portion of the foundation of a structure that transmits loads directly to the soil.
<i>Foundation</i>	The lower part of a structure that transmits the loads to the soil or bedrock.
<i>Frost Depth</i>	The depth at which the ground becomes frozen during the winter season.
<i>Grade Beam</i>	A foundation element or wall, typically constructed of reinforced concrete, used to span between other foundation elements such as drilled piers.
<i>Groundwater</i>	Subsurface water found in the zone of saturation of soils or within fractures in bedrock.
<i>Heave</i>	Upward movement.
<i>Lithologic</i>	The characteristics which describe the composition and texture of soil and rock by observation.
<i>Native Grade</i>	The naturally occurring ground surface.
<i>Native Soil</i>	Naturally occurring on-site soil, sometimes referred to as natural soil.
<i>Optimum Moisture Content</i>	The water content at which a soil can be compacted to a maximum dry unit weight by a given compactive effort.
<i>Perched Water</i>	Groundwater, usually of limited area maintained above a normal water elevation by the presence of an intervening relatively impervious continuous stratum.
<i>Scarify</i>	To mechanically loosen soil or break down existing soil structure.
<i>Settlement</i>	Downward movement.
<i>Skin Friction (Side Shear)</i>	The frictional resistance developed between soil and an element of the structure such as a drilled pier.
<i>Soil (Earth)</i>	Sediments or other unconsolidated accumulations of solid particles produced by the physical and chemical disintegration of rocks, and which may or may not contain organic matter.
<i>Strain</i>	The change in length per unit of length in a given direction.
<i>Stress</i>	The force per unit area acting within a soil mass.
<i>Strip</i>	To remove from present location.
<i>Subbase</i>	A layer of specified material in a pavement system between the subgrade and base course.
<i>Subgrade</i>	The soil prepared and compacted to support a structure, slab or pavement system.

COHEISVE, ON-SITE CLAY BACKFILL SOILS
PROPERLY MOISTURE CONDITIONED AND
COMPACTED AS RECOMMENDED IN THE
GEOTECHNICAL ENGINEERING REPORT.

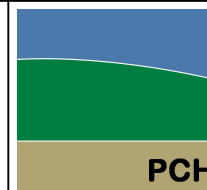


GENERAL NOTES:

1. SLOPE DRAIN TRENCH AND PIPE AT A MINIMUM OF 1/8 INCH PIPE PER LINEAL FOOT TO SUITABLE OUTFALL.
2. EXCAVATE DRAIN TRENCH AT A MAXIMUM SLOPE OF 1:1 FROM EDGE OF FOOTING.
3. MAINTAIN A MINIMUM OF 3-INCHES OF GRAVEL BELOW AND 6-INCHES ABOVE DRAIN PIPES.
4. MAINTAIN INVERT OF DRAIN PIPE A MINIMUM OF 6 INCHES BELOW TOP OF FOOTING. PERFORATIONS SHOULD BE FACING DOWNWARD.
5. APPROXIMATE QUANTITIES (PER LINEAL FOOT):
3/4" GRAVEL - 1 1/2 CUBIC FT.
DRAINAGE FABRIC - 2 SQUARE FT.
POLYETHELENE - 6 SQUARE FT.

NOT TO SCALE

TYPICAL EXTERIOR PERIMETER DRAIN DETAIL FOOTING FOUNDATION



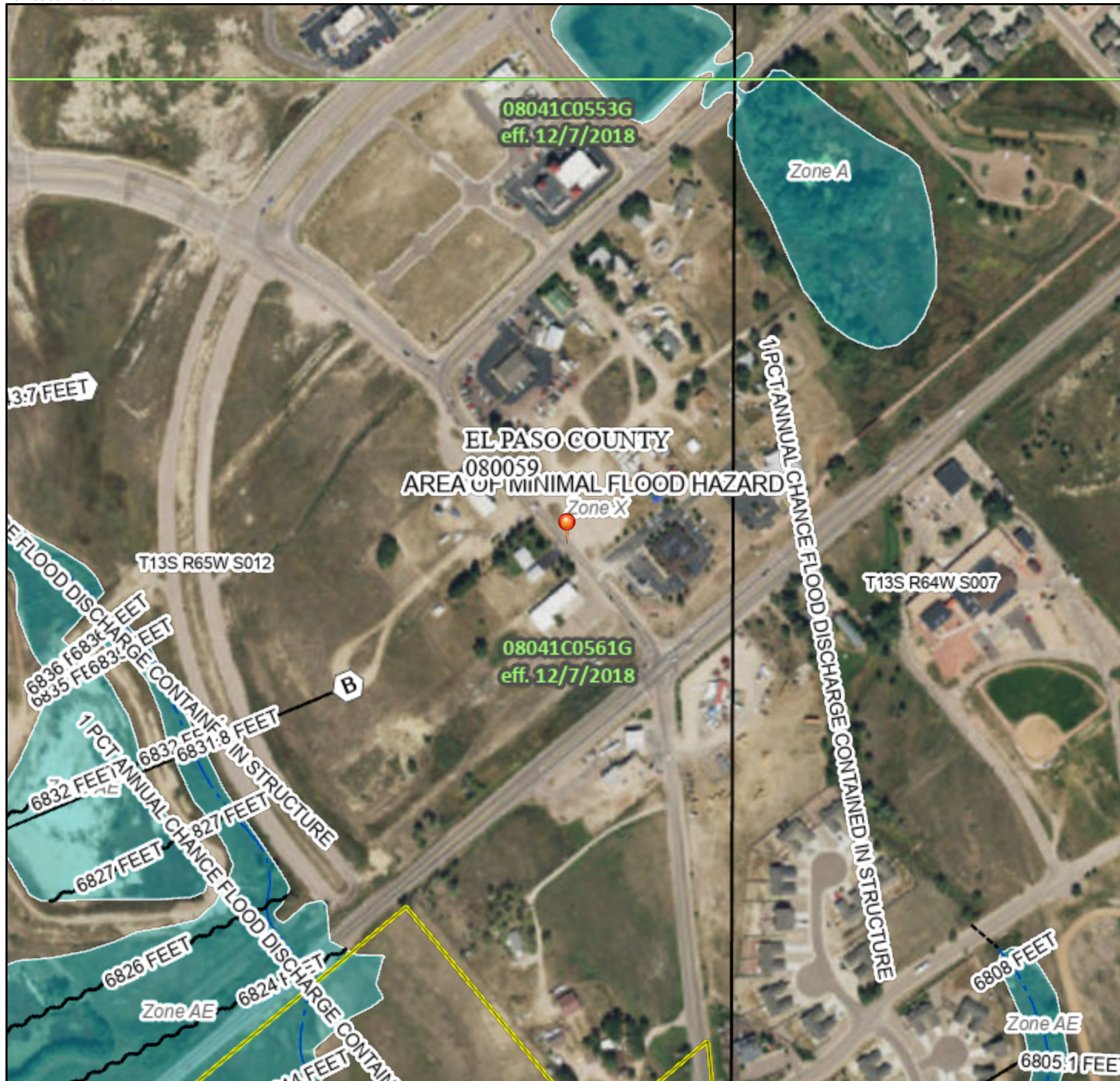
Pickering, Cole, & Hivner, LLC
1070 W. 124TH Ave., Suite 300
Westminster, CO 80234
(303) 996-2999

APPENDIX D: FEMA RIMETTE

National Flood Hazard Layer FIRMette



104°36'53"W 38°56'17"N



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
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



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 4/14/2021 at 9:15 AM 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.

0 250 500 1,000 1,500 2,000 Feet 1:6,000

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

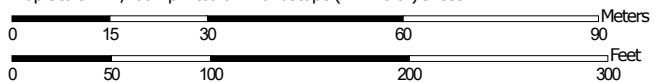
APPENDIX E: WEB SOIL SURVEY

Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.

Map Scale: 1:1,160 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

4/19/2021
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	0.3	13.1%
9	Blakeland-Fluvaquentic Haplaquolls	A	2.2	86.9%
Totals for Area of Interest			2.5	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



APPENDIX F: MERIDIAN CROSSING STORM REPORT

MERIDIAN CROSSING
FINAL DRAINAGE REPORT
EL PASO COUNTY, COLORADO

July 2008

PREPARED FOR:

Park Place Enterprises

15 Miranda Road
Colorado Springs, CO 80906

PREPARED BY:

Springs Engineering

31 N. Tejon, Suite 315
Colorado Springs, CO 80903
719.227.7388

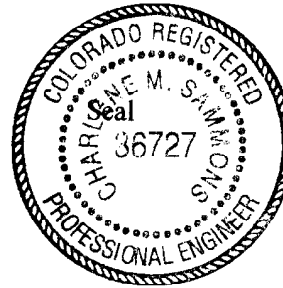
PROJECT NO. 057-07-032

CERTIFICATIONS

Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for liability caused by negligent acts, errors or omissions on my part in preparing this report.

Charlene M. Sammons
Charlene M. Sammons, P.E. #36727



Developer's Statement:

I, the developer, have read and will comply with all the requirements specified in this drainage report.

By (signature): [Signature]
Title: PARK PLACE ENTERPRISES, LLC
Managing Member
Address: 15 MIRADA RD.
Colorado Springs, CO 80906

El Paso County's Statement:

Filed in accordance with Section 51.1 of the El Paso Land Development Code, as amended.

[Signature]
John McCarty, County Engineer/Director

8-19-08
Date

Conditions:

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Appendix H: Operations and Maintenance Manual
Appendix I: Ultimate Design StormCAD Calculations

EXECUTIVE SUMMARY

The purpose of this Preliminary Drainage Report (PDR) and Final Drainage Report (FDR) is to present final drainage design and improvements for Meridian Crossing, located at the northeast corner of Meridian Road and Old Meridian Road, in the Falcon Highlands development. Runoff quantities and proposed facilities have been calculated using the current City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM). Existing facilities have been analyzed to ensure they are able to function as designed with the new facilities and construction.

This report encompasses approximately 9.5 acres of proposed commercial development in the southeast corner of the Falcon Highlands development. A proposed collector (Flower Road) will traverse the site, connecting Meridian Road to McLaughlin Road. This development will also include improvements to McLaughlin Road.

Flower Road and McLaughlin Road are to be designed as Non-Residential Collectors, per the El Paso County Criteria Manual, with a design speed of 40 miles per hour (mph) and a posted speed of 35 mps. Curb and gutter will be installed along both of these roads.

INTRODUCTION

The Meridian Crossing subdivision is a 9.5 acre commercial development located on the northwest side of the Town of Falcon. Meridian Crossing is located east and south of Falcon Highlands Market Place Filing No. 1 and adjacent to the southeast side of the "New" Meridian Road alignment. Existing development occurring in the area includes the Falcon Highlands subdivision to the west, the Beckett at Woodmen Hills development to the east and the Falcon Highlands Market Place to the west.

The area containing Meridian Crossing has been studied as part of the Falcon Area Drainage Basin Planning Study (DBPS)-Preliminary Design Report by URS, dated December 15, 2000 and Falcon Highlands Master Drainage and Development Plan (MDDP) by URS, dated October 2004.

Purpose

The purpose of the following Final Drainage Report (FDR) is to present the final design drainage improvements for the Meridian Crossing commercial development. Drainage improvements will include curb inlets, roadside ditches, and Water Quality Capture Ponds.

Runoff quantities and proposed facilities have been calculated using the current City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM) Volumes I and II.

Limits of Study

The Meridian Crossing FDR details the hydrology and hydraulics for the West Tributary of the Falcon Basin. Storm flow is routed by and from the proposed site and then directed through the proposed and future developments to US Highway 24. This includes an analysis of the storm systems, which includes the culverts and inlets along Meridian Road and Rolling Thunder Way. The area of study is bounded by Flower Road to the north and east, Meridian Road to the north and west, Old Meridian Road to the west and McLaughlin Road on the south

EXISTING CONDITIONS

General Location

The proposed Meridian Crossing is approximately 9.5 acres and is located at the southeast corner of Meridian Road and Old Meridian Road in Falcon, Colorado, Section 12, Township 13 South, Range 65 West of the 6th Principal Meridian. Currently, the site is zoned CR.

Falcon Highlands, Woodmen Hills, Falcon Vista, Meridian Ranch, Elkhorn Estates and Falcon Hills are all developments within a 5-mile radius of the site.

Land Use

The proposed site has just recently been rezoned to a Commercial Regional (CR) zone.

Topography and Floodplains

The topography of the surrounding area is typical of a high desert, short prairie grass with relatively flat slopes generally ranging from 2% to 4%. The area generally drains to the south. The site combines with the outlet flow of Detention Pond WU prior to crossing through the existing box culverts at Highway 24. Existing drainage swales convey these flows.

The Flood Insurance Rate Map (FIRM No. 08041C0575-F dated 3/17/99) indicates that there is a floodplain north and east of the proposed site (Falcon Basin Middle Tributary). FEMA has approved a LOMR for the Middle Tributary Floodplain (Case No. 06-08-B427P, with an effective date of November 3, 2006). This flow will now be contained within a storm drainage system and detention pond, which realigns the floodplain to the east of the site. (See Figure 3: Floodplain Map) The floodplain ties in with the FIRM after the detention pond at McLaughlin Road.

Geology

Soil Conservation Service soil survey records indicate the project area is covered by soils classified in the Blakeland Series, which are categorized in the Hydrological Group B.

The Blakeland (8) loamy sand is a deep, excessively drained soil that can exceed depths of 60 inches. Permeability of this soil is rapid with an effective rooting depth of 60 inches. This soil has good potential for urban development. The available water capacity is moderate to low. Surface runoff is slow, and the hazard of erosion is moderate.

The Blakeland (9) complex soil is comprised of approximately 60 percent Blakeland loamy sand, 30 percent Fluvaquentic Haplaquolls and 10 percent other soils. This soil is found more in sloping areas. It is deep and somewhat excessively drained. It formed in sandy alluvium and eolian material derived from arkosic sedimentary rock. Permeability of Blakeland soils is rapid, with an effective rooting depth of 60 inches. The available water capacity is moderate to low. Surface runoff is slow, and the hazard of erosion is moderate. The Fluvaquentic Haplaquolls are generally located in swale areas, and are deep, poorly drained soils. They formed in alluvium derived from arkosic sedimentary rock.

The Blakeland soil is well suited to wildlife habitat, home sites, streets and roads. This soil needs to be protected from erosion when vegetation has been removed from building sites. The Fluvaquentic Haplaquolls soil is good for wetlands. This soil has poor potential for home sites. The main limitation of this soil is the high water table and potential for flooding.

Note: (#) indicated Soil Conservation Survey soil classification number. See Figure 2: SCS Soils Map.

Climate

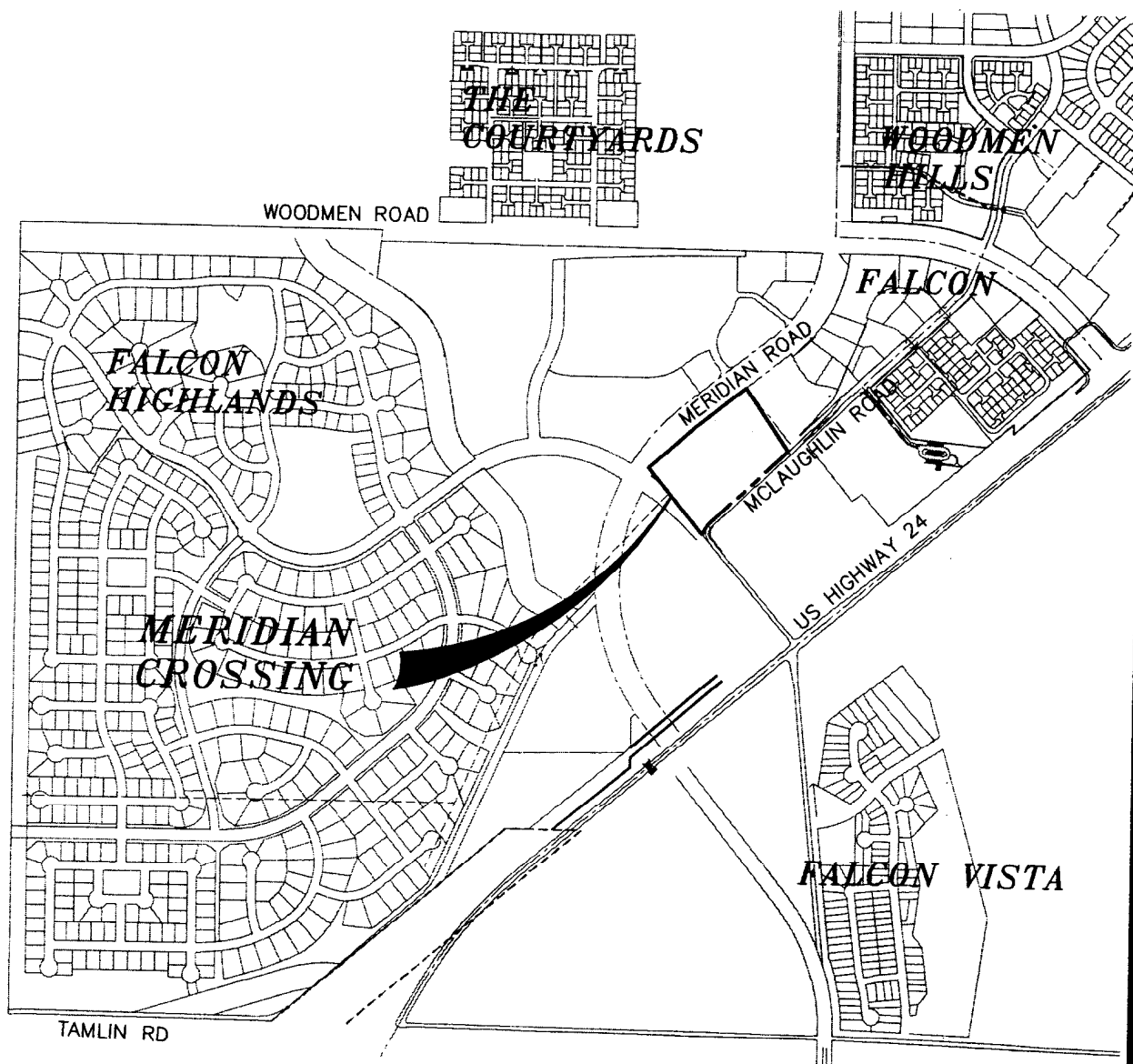
Mild summers and winters, light precipitation; high evaporation and moderately high wind velocities characterize the climate of the study area.

The average annual monthly temperature is 48.4 F with an average monthly low of 30.3 F in the winter and an average monthly high of 68.1 F in the summer. Two years in ten will have a maximum temperature higher than 98 F and a minimum temperature lower than -16 F. Precipitation averages 15.73 inches annually, with 80% of this occurring during the months of April through September. The average annual Class A pan evaporation is 45 inches.

Natural Hazards Analysis

Natural hazards analysis indicates that there is high ground water, potentially expansive claystone bedrock and wetlands located on or near the proposed site. Refer to the Geologic Hazards Evaluation Retail Site Woodmen Road and Meridian Road report by Entech Engineering. Usually, in areas where high ground water is an issue, underdrains are built to help alleviate the problem. However, since the proposed site is a commercial development, construction will be done as slab-on-grade and no basements. If lower levels are built, an underdrain system would be required. Wetland areas in the site have been identified and approved by Corps of Engineers. A mitigation plan for the site has been approved and implementation began in the fall of 2005. A copy of this plan is on file with the Falcon Highlands Metropolitan District.

Soils in this area are cohesionless, sloughing of steep banks during drilling and/or excavation could occur. By siting improvements in a manner that provides an opportunity to lay the banks of excavations back at a 1:1 slope during construction, the problems associated with sloughing soils can be minimized.



VICINITY MAP

N.T.S.

MERIDIAN CROSSING

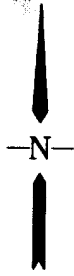
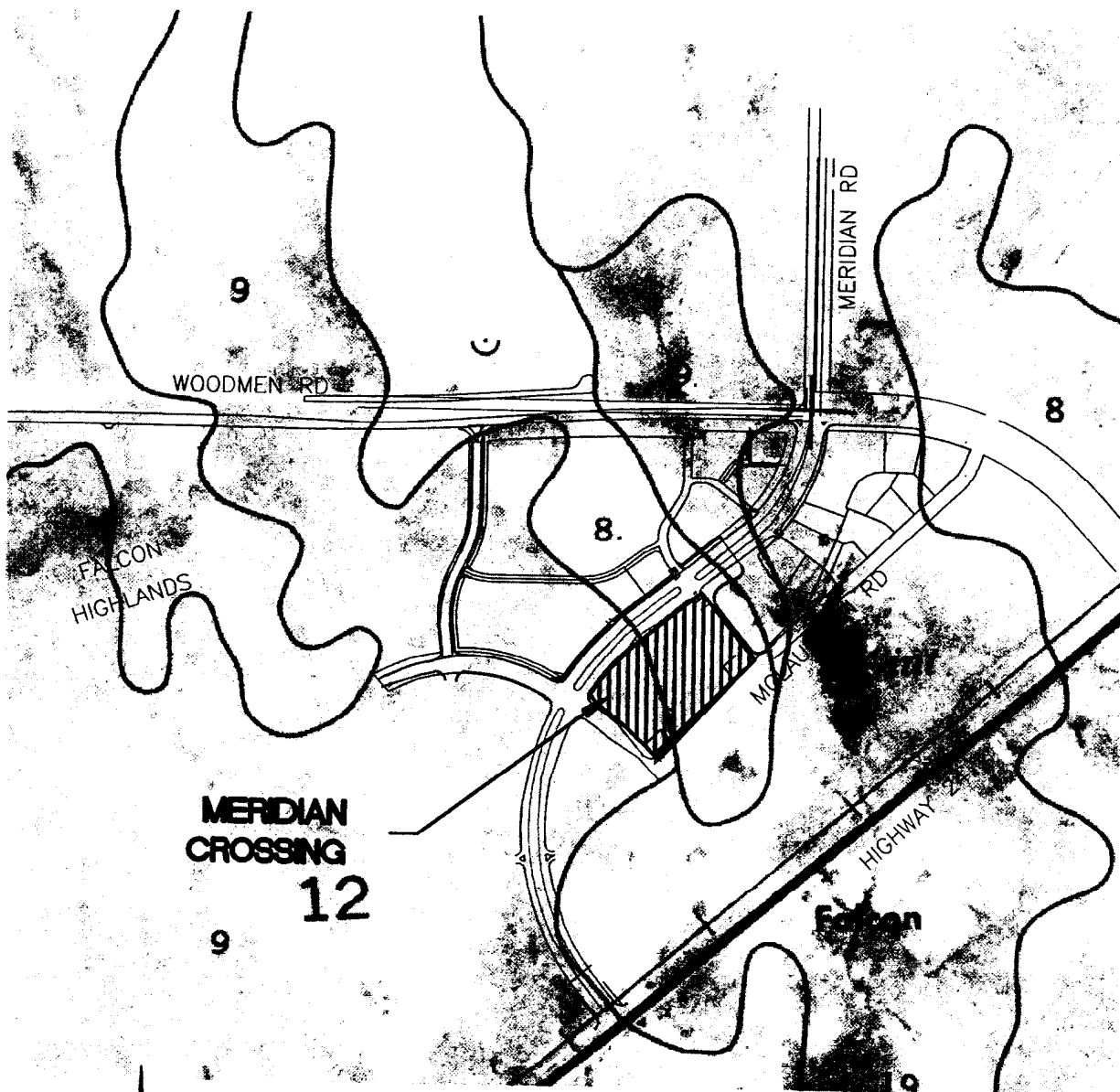
VICINITY MAP

SE *Springs*
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, CO 80903
TEL: (719) 227-7388
FAX: (719) 227-7392

FIGURE 1

PROJECT NO. 057-07-032



SOIL MAP
N.T.S.

MERIDIAN CROSSING

SCS Soils Map

SE *Springs*
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, CO 80903
TEL: (719) 227-7388
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FIGURE 2

PROJECT NO. 057-07-032

DRAINAGE DESIGN CRITERIA

SCS Hydrograph Method

Hydrologic modeling was used to the West Tributary of the Falcon Basin, which routes through Meridian Crossing. Modeling was completed using The United States Army Corps of Engineers Hydrologic Engineering Center-HEC-1 version 4.1. The Soil Conservation Service (SCS) (since renamed National Resources Conservation Service (NRCS)) curve number method was selected for calculating the runoff volume from the drainage basins per the Drainage Criteria Manual (DCM). The precipitation data, basin delineation, CN runoff coefficients, and time of concentrations were taken from the Falcon Basin DBPS. Modifications have been performed on the original data, as new developments have been built and boundary lines have changed. The model has been updated to reflect the most current changes occurring in the Falcon area. The existing models in the appendix are those which were included in the FDR for Pond WU, as this report updated and modified the existing conditions of the West Tributary as originally analyzed in the Falcon Basin DBPS. Below is a summary of major design points entering the Falcon Highlands development, through the site, and where the flows exit the Falcon Highlands site. The Falcon Highlands Master Drainage Development Plan (MDDP) corrected an area in the volume of the Woodmen Hills detention pond (Pond W).

The West Tributary was analyzed in the MDDP/PDR/FDR for Falcon Highlands Filing No. 1. This report made the assumption that Pond WU would capture flows from Basins W-39, W-40, W-41 and W-42. With the construction of Meridian Road, flows from Basin W-42 do not release into the detention pond and instead combine with the outflow from the pond. With this change in routing, actual design point locations have changed slightly. The existing DBPS analysis and this report show design point WU as the flow at Highway 24 as it passes through the existing box culverts. The proposed DBPS analysis and the Market Place report have Design Point WU as the flows entering the pond with the pond release flows as the Highway 24 flows. This report made the change, as stated previously, Basin W-42 no longer enters the pond, but combines at Highway 24 and a design point was needed to evaluate flows at this location. See the table below for a summary of major design points through the West Tributary in the Falcon Highlands development. Pond WU will release at less than historic rates for both, the 5-year and 100-year events.

Design Point	Existing*		Proposed		Location
	5-Yr	100-Yr	5-Yr	100-Yr	
WS	137	1575	145	1705	Woodmen
WT	143	1621	244	1867	Tamlin Road (Removed)
Pond WU			118	1313	Highway 24/Pond Outlet
WU	148	1648	135	1339	Highway 24 (Pr Condition)
WV	149	1640	135	1338	Falcon Highway

*Existing flows have been modified per the approved Falcon Highlands Final Drainage Report for Regional Detention Pond WU. This report adjusted routing for Basin W-42 and has modified the existing flows at Design Point WU. The "existing" flows which will be the target in this report are those existing flows which have been identified in the previous mentioned report, not those which were stated in the DBPS.

Rational Method

Because the Meridian Crossing is less than 100 acres, the rational method was used to estimate stormwater runoff for basins, and to size inlets, culverts and ditches, as required by the current

City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM). The rational method coefficients "C" were selected from Table 5-1 of the DCM, the time of concentration was calculated per DCM requirements and intensities for each basin were calculated from storm intensity curve formulas provided by the City of Colorado Springs. The rational method was used to determine onsite flows. Rational Method results are shown in Appendix B and C.

Water Quality Criteria

The water quality capture volume (WQCV) was calculated based on equations found in the Drainage Criteria Manual Volume 2, Stormwater quality Policies, Procedures and Best Management Practices (BMP's). The WQCV allows suspended sediment and absorbed pollutants to settle out of the water and improve the overall quality of runoff leaving the facility and reduce the potential for erosion. The positive impact on water quality is significant see appendix for proposed pond calculations.

Street Capacity

Street capacity is based on the DCM criteria, as stated in Chapter 6. Capacity of the streets (Flower Road and McLaughlin Road) will be based on the minor and major storms. Minor storm criteria is based on pavement encroachment and the major storm criteria is based on allowable depth and pavement encroachment. In all cases, flow encroachment shall not extend past the right-of-way (R.O.W.). Mannings equation will be used to determine the street capacity based on the following criteria from the DCM. Flower and McLaughlin Roads are both collector roads. Both streets shall meet the following criteria from the Table 6-1 in the DCM:

Roadway Classification	Use of street in storm		Cross flow in streets for storm	
	Initial	Major	Initial	Major
Collector	No curb overtopping. Flow spread must be limited to a max. 20 foot spread from each curb face	Residential dwellings, public, commercial and industrial buildings shall not be inundated at the ground line. The depth of water at the gutter flow line shall not exceed 12 inches.	Where cross pans are allowed, depth of flow shall not exceed 6 inches at flow line.	12 inches of depth at gutter flow line.

DRAINAGE BASINS

Existing Drainage Analysis

Since the site is currently undeveloped, the existing drainage analysis was determined by analyzing existing runoff quantities and patterns. The site is covered predominantly with grasses. Existing storm runoff is generally from the north to the south through natural drainage swales, as well as gutter flow in a previously constructed roadway (Meridian Road). (See Figure 5: Existing Drainage Plan) On-site basins, being smaller than 100 acres, were analyzed using the rational method. See below for a brief discussion of each of these basins.

- Basin E-1 (2.18 acres) consists of the southeast half of Meridian Road, at a high point in the road adjacent to Pond MN. Basin E-1 slopes to the south to design point 1. An existing at grade inlet intercepts this flow. Any flow-by from this inlet will be directed onto Old Meridian Road. The remainder of the flow will continue east along Old Meridian Road, which allows street flow to runoff into an existing roadside ditch. This flow then enters a temporary culvert under Old Meridian Road. Basin E-1 produces runoff quantities of 9.4 cfs and 17.6 cfs for the 5-year and 100-year storms.
- Basin E-2 (8.76 acres) consists of an area just east of Old Meridian Road and between Meridian Road and McLaughlin Road. This area is currently undeveloped. Basin E-2 slopes to the southwest to design point 2. Currently, a temporary culvert exists to transfer flow from the east side of Old Meridian Road to the south side. An estimated 13.7 cfs and 31.4 cfs are produced for the 5-year and 100-year storms.
- Basin E-3 (13.96 acres) consists of an area northeast of Old Meridian and McLaughlin Roads in the "Town of Falcon". The flow from this basin will be directed towards the intersection of State Highway 24 and Meridian Road, where it is conveyed under an existing culvert under Old Meridian Road. This flow is directed towards the existing structure at Design Point 6. The basin generates 16.4 cfs and 37.5 cfs for the 5-year and 100-year storms.
- Basin E-4 (2.15 acres) consists of the east half of Meridian Road from Old Meridian Road to the right-in access point to the south. Basin E-4 slopes to the south. Flow from this basin will be conveyed through curb and gutter to the right in access drive, where a sump inlet intercepts the flow. An 18-inch rcp will then release into a temporary channel along Meridian Road, which conveys the flow to design point 6. An estimated 9.3 cfs and 17.5 cfs are produced for the 5-year and 100-year storms.
- Basin E-5 (9.41 acres) consists of an undeveloped native area just east and south of the Falcon Highlands detention pond (Pond WU). Runoff from this basin combines with flows from design point 7 and the detention pond outlet and crosses under US Highway 24 through existing culverts at design point 8. Basin E-5 generates 12.1 cfs and 27.8 cfs for the 5-year and 100-year storms.
- Basin E-6 (2.62 acres) consists of the west half of Meridian Road from the right-in access point to Highway 24. Basin E-6 slopes to the south to design point 4. Runoff will flow south via curb and gutter along this section of Meridian Road. A sump inlet at

the low point, just before Highway 24, intercepts the runoff. This inlet connects to the box culvert under Meridian Road. This flow will continue to the existing box culverts at Highway 24. The Falcon Highlands detention pond also discharges to the existing culvert at Highway 24. However, the detention pond was designed to release flows at 80% of historic flow. The existing culvert under Highway 24 will have enough capacity, because the peak discharge from design point 7 will occur long before the peak discharge of the pond. An estimated 11.6 cfs and 21.7 cfs are produced for the 5-year and 100-year storms.

- Basin E-7 (2.32 acres) consists of the east half of Meridian Road from the right-in access point south to Highway 24. Basin E-7 slopes to the south to design point 15. Runoff will flow south through curb and gutter along this section of Meridian Road. A sump inlet intercepts this flow and connects to the box culvert under Meridian Road. An estimated 10.5 cfs and 19.7 cfs are produced from Basin E-7 for the 5-year and 100-year storms.
- Basin E-8 (23.89 acres) consists of the area south of Old Meridian Road and east of Meridian Road. This area is currently undeveloped. This flow sheetflows across the basin to design point 6. A concrete box culvert conveys the flow under Meridian Road to the existing culvert under Highway 24. An estimated 32.2 cfs and 73.7 cfs are produced for the 5-year and 100-year storms.

Existing Design Points

- Design Point 1 is an existing 15' on-grade inlet in Meridian Road, north of Old Meridian Road. This inlet intercepts flow from Basin E-1, street flow from Meridian Road, south of Pond MN to Old Meridian Road. The inlet releases the flow into a temporary ditch along Old Meridian Road, which conveys the flow to Design Point 2. Flows at this location are 9.4 and 17.6 cfs.
- Design Point 2 collects flow from Basin E-2 and combines it with the flow in the temporary channel from DP-1. A temporary 24-inch culvert under Old Meridian Road conveys the flow to the south towards Design Point 6. This design point has flows of 22.9 and 48.7 cfs.
- Design Point 3 is an existing 20' sump inlet that intercepts the street flow in Meridian Road from Basin D-4. The inlet releases flows into an existing temporary roadside ditch along Meridian Road to Design Point 6. Flows at this location are 9.3 and 17.5 cfs.
- Design Point 4 is an existing 25' sump inlet used to intercept the west side of Meridian Road, north of Highway 24 (Basin E-6). This flow enters the existing storm system and is conveyed to Design Point 7. This design point has flows of 11.6 and 21.7 cfs.
- Design Point 5 is an existing 20' sump inlet in Meridian Road opposite Design Point 4. This inlet intercepts street flow from Basin E-7 and combines with flows in the storm system under Meridian Road. Flows are released at Design Point 7. The design point generates flows of 10.5 and 19.7 cfs.

- Design Point 6 combines flows from Basins E-3 and E-8 with flows from Design Points 2 and 3. Two 12' (W) x 3' (H) reinforced concrete box culverts (RCBC's) convey the flow under Meridian Road to Design Point 7. Flows generated at this design point are 67.8 and 149.7 cfs.
- Design Point 7 is the location where the storm system releases flows. It is the combined flow from Design Points 4, 5 and 6. Once released, flows will continue through an existing ditch to Design Point 8 at Highway 24. Flows at this location are 67.0 and 148.5 cfs.
- Design Point 8 combines the flow from Basin E-5 with flows from Design Point 7 and Detention Pond WU. There are three 12' (W) x 6' (H) RCBC's under Highway 24 to convey flows. These flows will continue towards the south, in a FEMA floodplain, along their existing paths. Flows generated at this location are 147.7 and 1286.1 cfs. This design point corresponds to Design Point WU in the HEC models.

Developed Drainage Analysis

The proposed site was studied in the Falcon Basin DBPS. Efforts have been made to comply with the recommendations set forth in the approved DBPS. The flows in the commercial development will combine with the outlet flows of Detention Pond WU and continue under Highway 24 through the existing box culverts. Figure 6: Developed Drainage Plan illustrates the basin boundaries used for the rational hydrologic model.

Basins D-1 and D-4 through D-7 do not have any changes from the corresponding, existing basins (E-1 and E-4 through E-7), as they have already been developed and the drainage structures have been designed. Basin E-2, a proposed commercial site (Meridian Crossing, whose preliminary plan has been approved by the Board of County Commissioners (BOCC)), the proposed site and adjacent roadways, has been divided into five new developed basins. Changes to Basins D-3 and D-8, is the assumption that these basins will be developed in the future as commercial use. The description of these basins follows.

- Basin D-2 (5.14 acres) consists of approximately the south half of the Meridian Crossing commercial development. It is anticipated for this basin to drain towards the south, where it will be intercepted by a proposed water quality facility (Porous Landscape Detention - PLD). This storm system will release flows into a temporary drainage swale through Basin D-8. This drainage pattern is consistent with the approved Master Drainage Development Plan Amendment to Falcon Highlands, which shows these flows reaching the existing box culvert under Highway 24 at design point 8. This basin generates 23.4 cfs and 43.9 cfs for the 5-year and 100-year storm events.
- Basin D-3 (11.49 acres) consists of an area northeast of Old Meridian Road and McLaughlin Road in the "Town of Falcon". It is assumed that this area will be developed as commercial use in the future. The flow from this basin will be directed towards the intersection of Highway 24 and Meridian Road, where it is conveyed under a proposed culvert under Old Meridian Road. The flow is directed towards the existing structure at DP-6. The basin generates 34.7 and 65.1 cfs for the 5 and 100-year events.

intercepted by the temporary grated lid on the proposed manhole at DP-Z. This flow will ultimately reach Highway 24. Flows at this location are 4.7 and 8.9 cfs.

- Design Point X is the released flow from the East PLD. Flow from this area combines with a storm system in Old Meridian Road via a 30" rcp. Flows generated in this location are 16.9 cfs and 31.8 cfs.
- Design Point Z is the flow from DP-B, DP-X intercepted flow from inlet 1 and the flow-by from inlet 1 combined with the released flow from the West PLD (Basin D-2). A 36" rcp connects and conveys this flow to a temporary culvert under Old Meridian Road which will release flows into a temporary ditch. Flows at this junction are 44.6 cfs and 83.8 cfs.
- Design Point Y is a proposed 54" rcp which releases flows across Old Meridian Road. The proposed pipe will replace an existing culvert, which is currently undersized, and intercepts flows from D-3. This design point has a flow of 34.7 cfs and 65.1 cfs. There is no corresponding design point in the Market Place Filing No. 1 drainage report.
- Design Point 3 is an existing 20' sump inlet that intercepts the street flow in Meridian Road from Basin D-4. The inlet currently combines with DP-Z and flows into an existing temporary roadside ditch along Meridian Road to Design Point 6. Flows at this location are 9.3 and 17.5 cfs. This design point corresponds to Design Point 13 in the Market Place FDR.
- Design Point E is the combination of D-3 and DP-Z. Flows are released into a temporary channel which conveys flows to a roadside ditch along Meridian Road. This flow is conveyed all the way to Design Point DP-8 at Highway 24 where flows are released from the Falcon Highlands site. Flows intercepted at this location are 46.938.3 cfs and 58.2 cfs. The Market Place Filing No. 1 report does not have any corresponding design points.
- Design Point 4 is an existing 25' sump inlet used to intercept the west side of Meridian Road, north of Highway 24 (Basin D-6). This flow enters the existing storm system and is conveyed to Design Point 7. This design point has flows of 11.6 and 21.7 cfs. This design point corresponds to Design Point 16 in the Market Place FDR. There is no difference in the drainage flows.
- Design Point 5 is an existing 20' sump inlet in Meridian Road opposite Design Point 4. This inlet intercepts street flow from Basin D-7 and combines with flows in the storm system under Meridian Road. Flows are released at Design Point 7. The design point generates flows of 10.5 and 19.7 cfs. This location corresponds to Design Point 15 in the Market Place FDR. There are no changes in the flows.
- Design Point 6 combines flow from Basin D-8 with DP-E and DP-Y. Two 12' (W) x 3' (H) reinforced concrete box culverts (RCBC's) convey the flow under Meridian Road to Design Point 7. Flows generated at this design point are 127.7 and 239.9 cfs. This location corresponds to Design Point 17 in the Market Place FDR. This report calculated flows to be 157.9 and 300.6 cfs.

DRAINAGE FACILITY DESIGN

General Concept

Meridian Crossing is located completely within the West Tributary of the Falcon Drainage Basin. The site drains towards the southwest where it is directed towards an existing drainage structure under Highway 24. This structure has been analyzed to ensure it still properly functions with the developed flow released here. The flow from these structures will continue along an existing swale to the south. There are two water quality facilities proposed for the site, prior to flows exiting.

Storm Systems

There has been one storm system previously installed with the construction of Meridian Road. This system was designed in the Market Place Filing No. 1 FDR. One new culvert and a temporary culvert have been proposed with the development of this site. StormCAD and CulvertMaster calculations have been included at the end of the report analyzing all of these facilities to ensure they are still adequate for the developed flow associated with this development.

The first system is an existing system located at the intersection of Meridian Road and Highway 24. This system was initially designed in the Market Place Filing No. 1 FDR. The system has been analyzed to ensure it will still function properly with the development of The Shoppes at Falcon. A 20-foot sump inlet is located at DP-5 in Meridian Road. This inlet intercepts 10 cfs and 19 cfs. A 25-foot sump inlet is located on the other side of Meridian Road at DP-4. This inlet intercepts 12 and 22 cfs. Both of these inlets connect to an existing 12'(W) x 3' (H) box culvert under Meridian Road via 24-inch rcp's. This structure intercepts a total flow of 127.7 and 239.9 cfs. This system releases flows into an existing channel parallel to Highway 24 at DP-7. Flows at this location are 140.2 cfs and 264.8 cfs. The channel conveys this flow to DP-8 at Highway 24, where the flow exits Falcon Highlands and continues on its existing path to the south.

Channel Improvements

The temporary channel from DP-Z has a 100-year flow of 73.3 cfs from the proposed storm system. The channel will be shaped similarly to the roadside ditch along the southeast side of Meridian Road, which it connects to. Velocity in this channel is 3.2 ft/s with a flow depth of 1.8 feet. A temporary drainage easement will be recorded on the final plat to accommodate this channel.

The existing roadside ditch along Basin D-7 is located east of Meridian Road from the right-in access point south to Highway 24. The ditch will carry the 100-year storm (88.2 cfs) at a depth of 1.8 feet to DP-6. The velocity in this channel is 5.5 fps. This channel will also be removed upon development of Basin D-8 and the construction of an internal storm drain system.

There is a series of onsite temporary swales in lots 3, 4 and 5. These swales will be utilized to ensure flows are conveyed to the west PLD. Once these lots develop, the swales will no longer be necessary and will be removed. Also, located outside of the Meridian Crossing right-of-way

along Old Meridian Road are 3 temporary swales, which convey flows to storm inlets. These swales will be removed upon the construction of Old Meridian Road.

Detention Pond WU

Based on the current configuration of the basins, Pond WU does work as intended. The 5-year release rate is less than the existing flow rate. Refer to the table earlier in the report for flow rates at major design points. Based on the current analysis of the hydrology for the area no modifications will be necessary to the outlet structure of the detention pond as previously assumed. The 100-year storm also functions properly and has a release rate lower than the existing flows.

Proposed Water Quality Pond

Based on the City of Colorado Springs/El Paso County DCM Volume 2, a water quality pond is needed, as the development area is greater than 1.0 acre. There will be two water quality capture ponds (WQCP), which will be porous landscape detention (PLD). Both ponds structures will be located between the northern right of way of McLaughlin road and the proposed curb and gutter for lots 5 and 6. This will enable the ponds to be used for final construction of each of the building sites. The east and west pond combine for a total 8200 square feet.

Ultimate Design

Currently, there is evidence that Old Meridian Road will be improved. If this situation does not happen, there is an "ultimate design" scenario to account for this. Meridian Crossing will be responsible for installing curb and gutter and sidewalk for the portion of Old Meridian Road which fronts their property. The rcp stub behind inlet DP-1 will be extended via 18"rcp to the existing culvert under Old Meridian Road. A 5' type R inlet will be installed to catch the flows of Old Meridian Road (see appendix item I for StormCAD calculations). A 5' manhole will be installed to connect the new and existing pipes. The existing culvert will continue to convey the flow through an existing swale, which releases flows into the roadside swale along Meridian Road. This flow still reaches an ultimate location of DP-8, where all flows leave the Falcon Highlands development.

Downstream Facilities

Falcon West Tributary

Detention Pond WU discharges below the historical rate as described in the Falcon Highlands Filing No. 1 PDR and the Falcon Basin DBPS. Just downstream of Pond WU outlet works is an existing bridge at SH 24. At Highway 24 near Pond WU, triple 12' x 6' RCBC's were installed in 1999. This facility conveys the 1239 cfs 100-year design flow. An analysis of these structures is included in the appendix. The DBPS recommended installing a lined channel with geotextile fabric and grade control drop structures. Currently, this area has no real definable channels, but flows are allowed to spread once they are released through the structure at SH 24. This area is within a FEMA designated floodplain. Historic flows as stated in the DBPS are 1518 cfs.

Downstream of SH 24, flows follow a FEMA floodplain to Falcon Highway. At Falcon Highway there is a 36-inch cmp culvert that is inadequate to carry the 100-year design flow.

DRAINAGE FEES, COST ESTIMATE & MAINTENANCE

Maintenance

The streets and major improvements within this site will be maintained by the Meridian Crossing Property Owners Association (POA) for ownership and maintenance. This includes the roads, drainage facilities, and water quality ponds. The Falcon Highlands Metropolitan District will own and operate water and wastewater systems. The remaining utilities (gas, phone, electric, cable, etc) will be owned and maintained by their respective companies. Easements will be issued to ensure each entity is able to access and maintain their facilities.

Drainage Fees

The proposed development is located within the Falcon Basin. The proposed commercial site encompasses approximately 9.5 acres. Fees will be based on 9.0 acres (95% imperviousness due to commercial development).

Drainage fees in the Falcon Basin are \$6,925 and bridge fees are \$2,659. Based on these numbers and an impervious area of 9.0 acres fees for this development are \$62,325 for drainage and \$25,261 for bridge fees. This gives a total fee of \$87,586.

Proposed Facilities Estimate

ITEM	UNITS	UNIT COST	QUANTITY	ITEM COST
DRAINAGE				
5' STORM MANHOLE	EA	2,800	1	2,800
30" RCP	LF	55	435	23,925
36" RCP	LF	65	60	3,900
42" RCP	LF	80	105	8,400
RIPRAP	CY	45	30	1,350
SUBTOTAL DRAINAGE				\$40,375
GRADING AND EROSION CONTROL				
CLEARING AND GRUBBING	AC	\$800	9.5	\$7,600
EARTHWORK	CY	3.50	13300	46,550
WATER QUALITY PONDS	EA	3,000	2	6,000
CURB BACKFILL	LF	2.50	3200	8,000
MISC SEEDING AND MULCH	AC	3,500	6	21,000
HAY BALE CHECKS	EA	10	37	370
INLET PROTECTORS	EA	200	4	800
VEHICLE TRACKING CONTROL	EA	1,500	1	1,500
SILT FENCING	LF	5	1800	9,000
SUBTOTAL GRADING & EROSION CONTROL				\$100,770
ULTIMATE DRAINAGE				
5' STORM MANHOLE	EA	2,800	1	2,800
30" RCP	LF	40	259	10,360
5' TYPE R INLET	EA	3,500	1	3,500
SUBTOTAL ULTIMATE DRAINAGE				\$16,660
SUBTOTAL DRAINAGE & EROSION CONTROL				\$157,805
Engineering (10%)				\$15,781

Contingency (10%)				\$15,781
TOTAL				\$189,367

EROSION CONTROL

General Concept

During construction, best management practices for erosion control will be employed based on El Paso County criteria and the erosion control plan.

Ditches will be designed to meet El Paso County criteria for slope and velocity, keeping velocities below scouring levels.

During construction, best management practices (BMP) for erosion control will be employed based on El Paso County Criteria. BMP's will be utilized as deemed necessary by the contractor and/or engineer and are not limited to measures shown on the construction drawing set. The contractor shall minimize the amount of area disturbed during all construction activities.

In general the following shall be applied in developing the sequence of major activities:

- Install downslope and sideslope perimeter BMP's before land disturbing activity occurs.
- Do not disturb an area until it is necessary for construction activity to proceed.
- Cover or stabilize as soon as possible.
- Time the construction activities to reduce the impacts from seasonal climatic changes or weather events.
- The construction of filtration BMP's should wait until the end of the construction project when upstream drainage areas have been stabilized.
- Do not remove temporary perimeter controls until after all upstream areas are stabilized.

Silt Fence

Silt fence will be placed along downstream limits of disturbed areas. This will prevent suspended sediment from leaving the site during infrastructure construction. Silt fencing is to remain in place until vegetation is reestablished.

Erosion Bales

Erosion bales will be placed ten (10) feet from the inlet of all culverts and inlets during construction to prevent culverts from filling with sediment. Erosion bales will remain in place until vegetation is reestablished in graded roadside ditches and channels. Erosion bale ditch checks will be used on slopes greater than 1% to reduce flow velocities until vegetation is reestablished.

Vehicle Tracking Control

This BMP is used to stabilize construction entrances, roads, parking areas and staging areas to prevent the tracking of sediment from the construction site. A vehicle tracking control (VIC) is to be used at all locations where vehicles exit the construction site onto public roads, loading and unloading areas, storage and staging areas, where construction trailers are to be located, any construction area that receives high vehicular traffic, construction roads and parking areas. VTC's should not be installed in areas where soils erode easily or are wet.

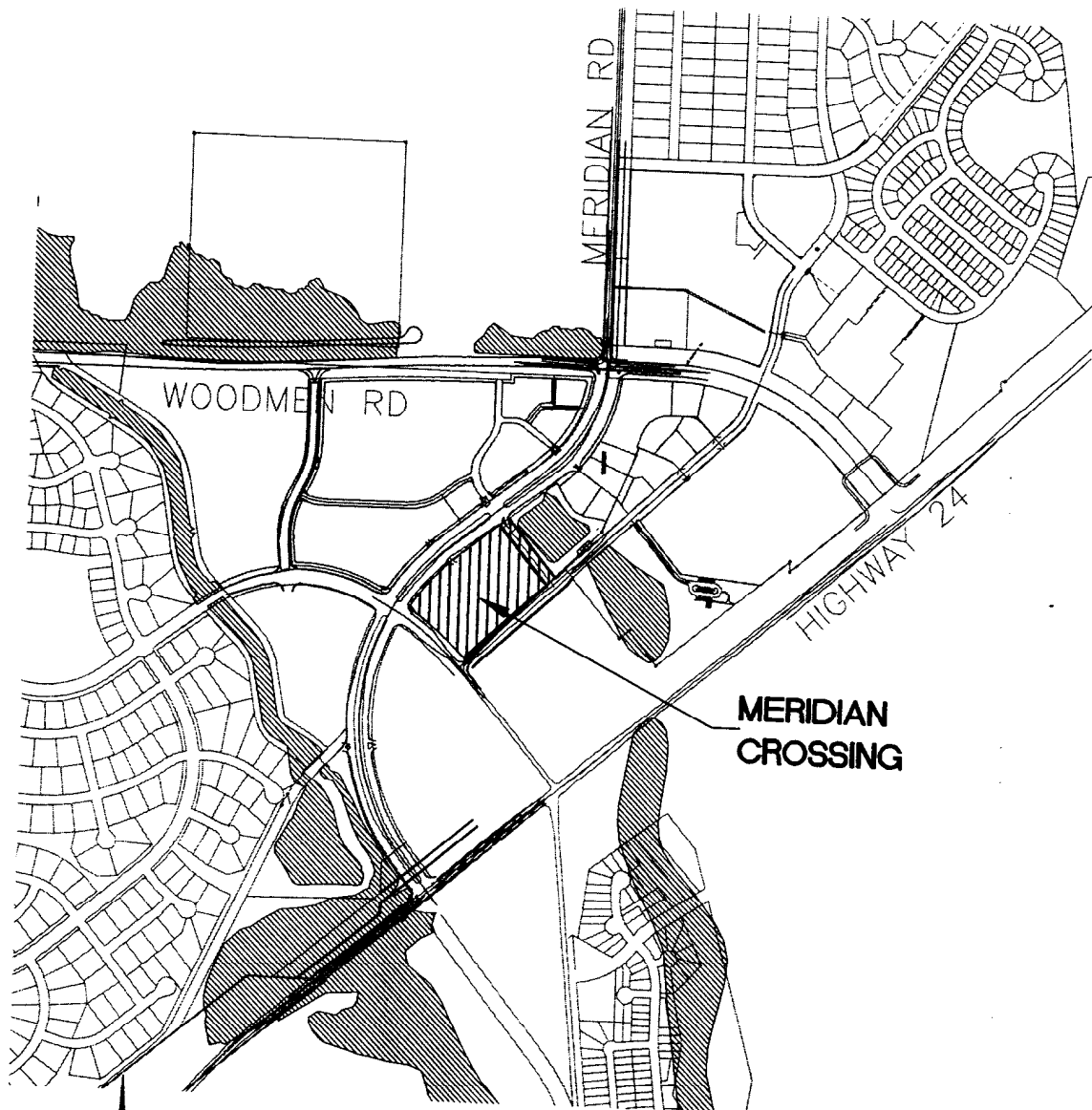
Sedimentation Pond

This BMP is used to detain runoff which has become laden with sediment long enough to allow the sediment to settle out. As the construction area is larger than 1 acre, a temporary sediment basin is required per Volume 2 of the Drainage Criteria Manual. The basin will be located in the area of the proposed water quality pond, as this area will need to be excavated and an embankment built. A temporary 8" pvc underdrain will be installed to drain this basin during construction.

REFERENCE MATERIALS

1. "City of Colorado Springs/El Paso County Drainage Criteria Manual" September 1987, Revised November 1991, Revised October 1994.
2. "City of Colorado Springs/El Paso County Drainage Criteria Manual, Volume 2: Stormwater Quality Policies, Procedures and Best Management Practices" November 1, 2002.
3. Soils Survey of El Paso County Area, Natural Resources Conservation Services of Colorado.
4. Flood Insurance Rate Study for El Paso County, Colorado and Incorporated Areas. Federal Emergency Management Agency, Revised March 17, 1997.
5. Falcon Area Drainage Basin Planning Study Preliminary Design Report, December 2000. Prepared by URS Corp.
6. Master Development Drainage Plan, and Preliminary Drainage Report and Final Drainage Report for Falcon Highland Filing No. 1, October 2004. Prepared by URS Corp.
7. Floodplain Modification Study and Application for Conditional Letter of Map Revision for the Middle Tributary of the Falcon Basin-Regency Center, January 2005. Prepared by URS Corp.
8. Amendment to Falcon Highlands Master Drainage Development Plan, September 2005. Prepared by URS Corp.
9. Falcon Highlands Market Place Filing No. 1 Preliminary and Final Drainage Report, December 22, 2005. Prepared by URS Corp.

Figure 3: FEMA Floodplain Map



MERIDIAN CROSSING

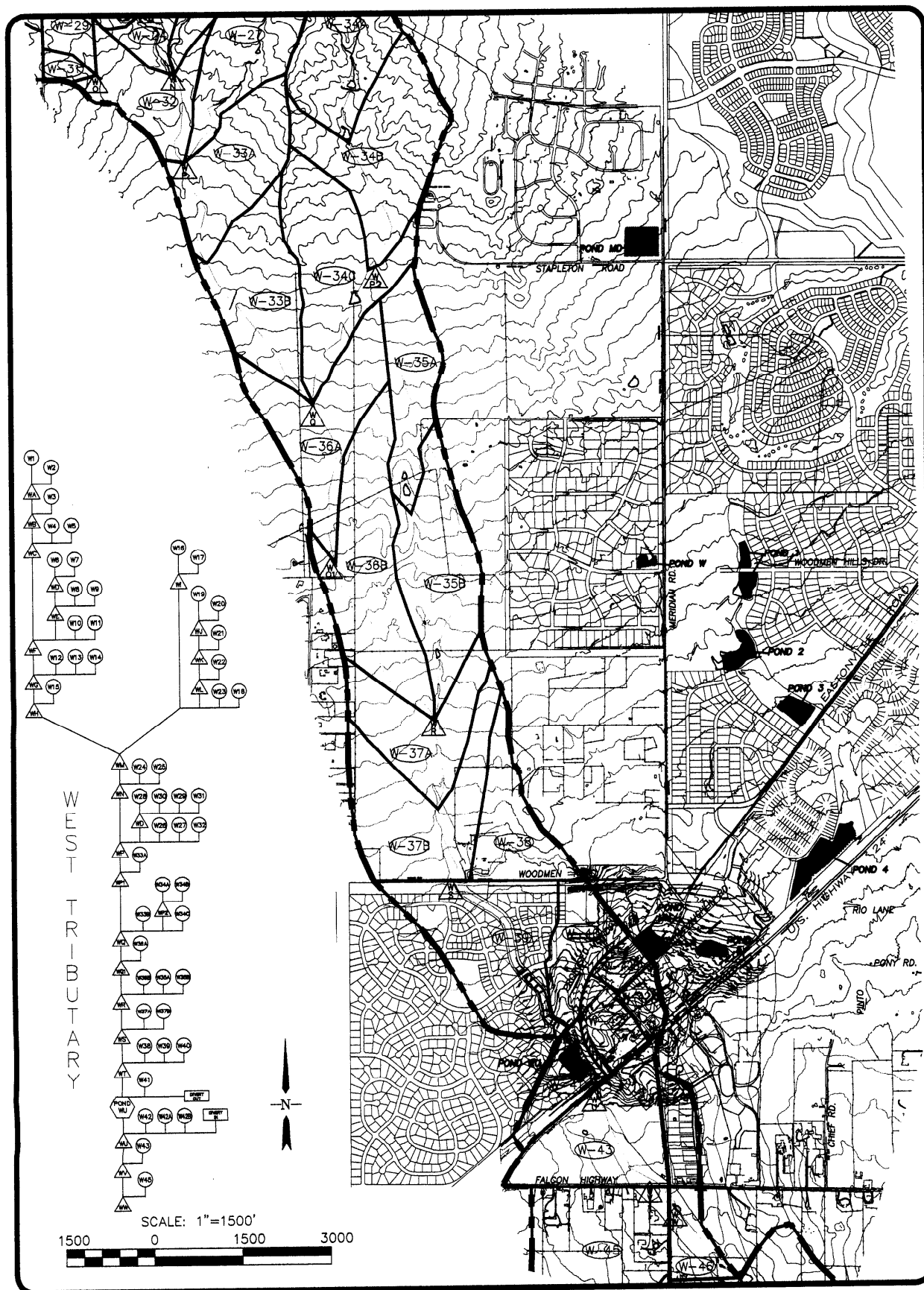
FIRM MAP 08041CO575 REV 11/26/03

SE *Springs*
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, CO 80903
TEL: (719) 227-7388
FAX: (719) 227-7392

FIGURE 3

PROJECT NO. 057-07-032



MERIDIAN CROSSING

HEC-1 HYDROLOGIC MODEL

SE Springs
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, COLORADO 80903
TEL: (719) 227-7388 FAX: (719) 227-7392

FIGURE 4

PROJECT NO. 06-0033

Appendix A: Existing HEC-1 Calculations

```

1*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 28SEP07 TIME 11:57:06 *
*****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

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X X XXXXXXX XXXXX X
X X X X X XX
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XXXXXX XXXX X XXXX X
X X X X X
X X X X X
X X XXXXXXX XXXXX XXX

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

LINE	ID	1	2	3	4	5	6	7	8	9	10
1	ID	FALCON BASIN 5-YR/ 24-HOUR FLOOD/ EXISTING CONDITIONS									
2	ID	UPPER EAST TRIBUTARY (WOODMEN HILLS) BASED ON CLOMR APPROVED 2/2/99									
3	ID	INCLUDING 2 EXISTING SCS STOCK PONDS, WEST WOODMEN HILLS POND									
4	ID	NOTE: M1-M4 (PAINT BRUSH HILLS) MODELED AS HISTORIC TO ACCOUNT FOR									
5	ID	DETENTION POND AT MC									
6	ID	NOTE: NO CULVERT AT STAPLETON & MERIDIAN, TEMP CULVERTS AT MERIDIAN									
7	ID	DOWNSTREAM OF WOODMEN HILLS DRIVE (DIVERSION)									
8	IT	5	14JUL99	800	300						
9	IO	5									
10	KK	W1									
11	KM										
12	BA	.0479									
13	PB	2.6									
14	IN	15									
15	PC	.0005	.0015	.0030	.0045	.0060	.0080	.0100	.0120	.0143	.0165
16	PC	.0188	.0210	.0233	.0255	.0278	.0320	.0390	.0460	.0530	.0600
17	PC	.0750	.1000	.4000	.7000	.7250	.7500	.7650	.7800	.7900	.8000
18	PC	.8100	.8200	.8250	.8300	.8350	.8400	.8450	.8500	.8550	.8600
19	PC	.8638	.8675	.8713	.8750	.8788	.8825	.8863	.8900	.8938	.8975
20	PC	.9013	.9050	.9083	.9115	.9148	.9180	.9210	.9240	.9270	.9300
21	PC	.9325	.9350	.9375	.9400	.9425	.9450	.9475	.9500	.9525	.9550
22	PC	.9575	.9600	.9625	.9650	.9675	.9700	.9725	.9750	.9775	.9800
23	PC	.9813	.9825	.9838	.9850	.9863	.9875	.9888	.9900	.9913	.9925
24	PC	.9938	.9950	.9963	.9975	.9988	1.000				
25	LS	60									
26	UD	.097									
27	KK										
28	KM										
29	RK	1519	.0263	.035		TRAP	5	4			
30	KK	W2									
31	KM										
32	BA	.0278									
33	LS	60									
34	UD	.160									
35	KK	WA									
36	KM										
37	HC	2									
38	KK										
39	KM										
40	RK	464	.0151	.035		TRAP	5	4			
41	KK	W3									
42	KM										
43	BA	.0498									
44	LS	61									
45	UD	.139									
46	KK	WB									
47	KM										
48	HC	2									
49	KK										
50	KM										
51	RK	823	.0279	.035		TRAP	5	4		54	
52	KK	W4									
53	KM										
54	BA	.0054									
55	LS	62									
56	UD	.044									
57	KK										
58	KM										
59	RK	1078	.0482	.035		TRAP	5	4			
60	KK	W5									
61	KM										
62	BA	.0159									
63	LS	60									
64	UD	.075									
65	KK	WC									
66	KM										
67	HC	3									
68	KK										
69	KM										
70	RK	557	.0449	.035		TRAP	10	4			
71	KK	W6									
72	KM										
73	BA	.0486									
74	LS	60									
75	UD	.085									

76	KK						
77	KM						
78	RK	592	.0372	.035	TRAP	5	4
79	KK	W7					
80	KM						
81	BA	.0217					
82	LS		60				
83	UD	.074					
84	KK						
85	KM						
86	RK	464	.1466	.035	TRAP	5	4
87	KK	WD					
88	KM						
89	HC	2					
90	KK	D-E					
91	KM						
92	RK	1044	.0479	.035	TRAP	5	4
93	KK	W8					
94	KM						
95	BA	.0286					
96	LS		60				
97	UD	.069					
98	KK						
99	KM						
100	RK	1449	.0504	.035	TRAP	5	4
101	KK	W9					
102	KM						
103	BA	.0402					
104	LS		61				
105	UD	.097					
106	KK	WE					
107	KM						
108	HC	3					
109	KK	E-F					
110	KM						
111	RK	789	.0038	.035	TRAP	5	4
112	KK	W10					
113	KM						
114	BA	.0431					
115	LS		61				
116	UD	.096					
117	KK						
118	KM						
119	RK	824	.0388	.035	TRAP	5	4
120	KK	W11					
121	KM						
122	BA	.0314					
123	LS		60				
124	UD	.077					
125	KK	WF					
126	KM						
127	HC	4					
128	KK	F-G					
129	KM						
130	RK	2319	.0211	.035	TRAP	10	4
131	KK	W12					
132	KM						
133	BA	.0398					
134	LS		60				
135	UD	.095					
136	KK						
137	KM						
138	RK	2478	.0307	.035	TRAP	5	4
139	KK	W14					
140	KM						
141	BA	.0473					
142	LS		61				
143	UD	.135					
144	KK						
145	KM						
146	RK	81	0.0001	.035	TRAP	5	4
147	KK	W13					
148	KM						
149	BA	.1123					
150	LS		61				

151	UD	.182					
152	KK	WG					
153	KM						
154	HC	4					
155	KK	G-H					
156	KM						
157	RK	2632	.0217	.035	TRAP	15	4
158	KK						
159	KM						
160	RK	2447	.0372	.035	TRAP	5	4
161	KK	W15					
162	KM						
163	BA	.0881					
164	LS		61				
165	UD	.141					
166	KK						
167	KM						
168	RK	1763	.0289	.035	TRAP	5	4
169	KK	WH					
170	KM						
171	HC	2					
172	KK	W16					
173	KM						
174	BA	.0292					
175	LS		61				
176	UD	.092					
177	KK						
178	KM						
179	RK	1345	.0260	.035	TRAP	5	4
180	KK	W17					
181	KM						
182	BA	.0184					
183	LS		60				
184	UD	.085					
185	KK	WI					
186	KM						
187	HC	2					
188	KK	I-M					
189	KM						
190	RK	2650	.0370	.035	TRAP	15	4
191	KK	W19					
192	KM						
193	BA	.0428					
194	LS		61				
195	UD	.083					
196	KK						
197	KM						
198	RK	881	.0329	.035	TRAP	5	4
199	KK	W20					
200	KM						
201	BA	.0315					
202	LS		61				
203	UD	.071					
204	KK	WJ					
205	KM						
206	HC	2					
207	KK						
208	KM						
209	RK	3061	.0235	.035	TRAP	5	4
210	KK	W21					
211	KM						
212	BA	.1347					
213	LS		60				
214	UD	.156					
215	KK	WK					
216	KM						
217	HC	2					
218	KK						
219	KM						
220	RK	487	.0246	.035	TRAP	5	4
221	KK	W22					
222	KM						
223	BA	.0086					
224	LS		63				
225	UD	.055					

226	KK	WL						
227	KM							
228	HC	2						
229	KK							
230	KM							
231	RK	1786	.0297	.035	TRAP	5	4	
232	KK	W23						
233	KM							
234	BA	.0244						
235	LS		60					
236	UD	.112						
237	KK	W18						
238	KM							
239	BA	.1251						
240	LS		60					
241	UD	.189						
242	KK	WM						
243	KM							
244	HC	5						
245	KK	M-N						
246	KM							
247	RK	1345	.0149	.035	TRAP	20	4	
248	KK	W24						
249	KM							
250	BA	.0442						
251	LS		60					
252	UD	.140						
253	KK	W25						
254	KM							
255	BA	.0957						
256	LS		61					
257	UD	.197						
258	KK	WN						
259	KM							
260	HC	3						
261	KK	N-P						
262	KM							
263	RK	1589	.017	.035	TRAP	20	4	
264	KK	W28						
265	KM							
266	BA	.0397						
267	LS		63					
268	UD	.128						
269	KK							
270	KM							
271	RK	1345	.0208	.035	TRAP	5	4	
272	KK	W30						
273	KM							
274	BA	.0509						
275	LS		63					
276	UD	.123						
277	KK							
278	KM							
279	RK	1078	.0074	.035	TRAP	5	4	
280	KK	W29						
281	KM							
282	BA	.0409						
283	LS		63					
284	UD	.145						
285	KK	W31						
286	KM							
287	BA	.0123						
288	LS		63					
289	UD	.073						
290	KK	WO						
291	KM							
292	HC	4						
293	KK	O-P						
294	KM							
295	RK	2169	.0226	.035	TRAP	5	4	
296	KK	W26						
297	KM							
298	BA	.0301						
299	LS		63					
300	UD	.062						

301	KK							
302	KM							
303	RK	4662	.0225	.035	TRAP	5	4	
304	KK	W27						
305	KM							
306	BA	.1633						
307	LS		60					
308	UD	.253						
309	KK	W32						
310	KM							
311	BA	.0890						
312	LS		60					
313	UD	.170						
314	KK	WP						
315	KM							
316	HC	5						
317	KK	P-Q						
318	KM							
319	RK	1925	.0182	.035	TRAP	25	4	
320	KK	W33A						
321	KM							
322	BA	.1261						
323	LS		60					
324	UD	.186						
325	KK	WP1						
326	KM							
327	HC	2						
328	KK	P1-Q						
329	KM							
330	RK	3000	.020	.035	TRAP	25	4	
331	KK	W33B						
332	KM							
333	BA	.1360						
334	LS		60					
335	UD	.225						
336	KK	W34A						
337	KM							
338	BA	.1261						
339	LS		60					
340	UD	.173						
341	KK	34A-P2						
342	KM							
343	RK	2550	.0176	.035	TRAP	25	4	
344	KK	W34B						
345	KM							
346	BA	.1766						
347	LS		60					
348	UD	.224						
349	KK	WP2						
350	KM							
351	HC	2						
352	KK	P2-Q						
353	KM							
354	RK	2640	.021	.035	TRAP	25	4	
355	KK	W34C						
356	KM							
357	BA	.1625						
358	LS		60					
359	UD	.244						
360	KK	WQ						
361	KM							
362	HC	4						
363	KK	Q-Q1						
364	KM							
365	RK	2940	.022	.035	TRAP	25	4	
366	KK	W36A						
367	KM							
368	BA	.1429						
369	LS		60					
370	UD	.234						
371	KK	WQ1						
372	KM							
373	HC	2						
374	KK	Q1-R						
375	KM							
376	RK	3400	.022	.035	TRAP	25	4	

377	KK	W36B						
378	KM							
379	BA	.1918						
380	LS		60					
381	UD	.306						
382	KK	W35A						
383	KM							
384	BA	.0958						
385	LS		60					
386	UD	.187						
387	KK	35A-WR						
388	KM							
389	RK	3715	.023	.035	TRAP	25	4	
390	KK	W35B						
391	KM							
392	BA	.1507						
393	LS	0	60					
394	UD	.259						
395	KK	WR						
396	KM							
397	HC	4						
398	KK	WR-S						
399	KM							
400	RK	2922	.0168	.035	TRAP	25	4	
401	KK	W37A						
402	KM							
403	BA	.1138						
404	LS		60					
405	UD	.185						
406	KK	37A-S						
407	KM							
408	RK	1430	.014	.035	TRAP	25	4	
409	KK	W37B						
410	KM							
411	BA	.1636						
412	LS		61					
413	UD	.218						
414	KK	WS						
415	KM							
416	HC	3						
417	KK	S-T						
418	KM							
419	RK	3653	.0164	.035	TRAP	25	4	
420	KK	W38						
421	KM							
422	BA	.0907						
423	LS		62					
424	UD	.190						
425	KK							
426	KM							
427	RK	2922	.0171	.035	TRAP	5	4	
428	KK	W39						
429	KM							
430	BA	.1833						
431	LS		60					
432	UD	.251						
433	KK	W40						
434	KM							
435	BA	.0964						
436	LS		60					
437	UD	.165						
438	KK	WT						
439	KM							
440	HC	4						
441	KK	T-U						
442	KM							
443	RK	1125	.0098	.035	TRAP	25	4	
444	KK	W41						
445	KM							
446	BA	.0601						
447	LS		60					
448	UD	.117						
449	KK	W42						
450	KM							
451	BA	.0581						
452	LS		81					

453	UD	.127					
454	KK	U-V					
455	KM						
456	RK	2656	.0184	.035	TRAP	5	4
457	KK	WU					
458	KM						
459	HC	3					
460	KK						
461	KM						
462	RK	2215	.0181	.035	TRAP	25	4
463	KK	W43					
464	KM						
465	BA	.1457					
466	LS		61				
467	UD	.169					
468	KK	WV					
469	KM						
470	HC	2					
471	KK	V-W					
472	KM						
473	RK	487	.0103	.035	TRAP	25	4
474	KK	W45					
475	KM						
476	BA	.1931					
477	LS		61				
478	UD	.189					
479	KK	WW					
480	KM						
481	HC	2					
482	KK	W-X					
483	KM						
484	RK	1542	.0149	.035	TRAP	5	4
485	KK	M1					
486	KM						
487	BA	.0665					
488	LS		60				
489	UD	.108					
490	KK						
491	KM						
492	RK	650	.0308	.035	TRAP	5	4
493	KK	M2					
494	KM						
495	BA	.0273					
496	LS		60				
497	UD	.114					
498	KK	MB					
499	KM						
500	HC	2					
501	KK						
502	KM						
503	RK	928	.0302	.035	TRAP	5	4
504	KK	M4					
505	KM						
506	BA	.0346					
507	LS		60				
508	UD	.121					
509	KK						
510	KM						
511	RK	406	.0197	.02	TRAP	40	0
512	KK	M3					
513	KM						
514	BA	.0149					
515	LS		60				
516	UD	.076					
517	KK	MC					
518	KM						
519	HC	3					
520	KK						
521	KM						
522	RK	1902	.0231	.035	TRAP	5	4
523	KK	M5					
524	KM						
525	BA	.0176					
526	LS		69				
527	UD	.108					

528	KK						
529	KM						
530	RK	1717	.0186	.02	TRAP	40	0
531	KK	M6					
532	KM						
533	BA	.0637					
534	LS		65				
535	UD	.233					
536	KK	MD					
537	KM						
538	HC	3					
539	KK						
540	KM						
541	RK	2841	.019	.035	TRAP	5	4
542	KK	M7					
543	KM						
544	BA	.0524					
545	LS		69				
546	UD	.170					
547	KK						
548	KM						
549	RK	1044	.0268	.02	TRAP	40	0
550	KK	M8					
551	KM						
552	BA	.0370					
553	LS		61				
554	UD	.126					
555	KK	ME					
556	KM						
557	HC	2					
558	KK						
559	KM						
560	RK	2992	.0187	.035	TRAP	5	4
561	KK	M9					
562	KM						
563	BA	.0169					
564	LS		69				
565	UD	.087					
566	KK						
567	KM						
568	RK	3433	.0253	.03	TRAP	5	4
569	KK	M12A					
570	KM						
571	BA	.0658					
572	LS		60				
573	UD	.159					
574	KK	M12B					
575	KM						
576	BA	.1481					
577	LS		60				
578	UD	.219					
579	KK	MF					
580	KM						
581	HC	5					
582	KK						
583	KM						
584	RK	2586	.0224	.035	TRAP	10	4
585	KK	M13					
586	KM						
587	BA	.0614					
588	LS		64				
589	UD	.165					
590	KK						
591	KM						
592	RK	1700	.01	.035	TRAP	6	4
593	KK	M14					
594	KM						
595	BA	.1624					
596	LS		64				
597	UD	.228					
598	KK	MG					
599	KM						
600	HC	2					
601	KK	PONDW					
602	KM	WOODMEN HILLS DETENTION POND WEST (FROM FDR WH FLG F4)					

603	SV	0	.68	1.5	235	3.6	4.9	6.3	7.34	7.34
604	SE	968	969	970	971	972	973	974	975	976
605	SQ	0	8	15.5	41	84.4	110	138	152	205
606	RS	1	ELEV	968						
607	KK	MH								
608	KM									
609	HC	2								
610	KK									
611	KM									
612	RK	1276	.0212	.035		TRAP	15		4	
613	KK	MH-P2								
614	KM	DIVERT FLOW TO POND 2 VIA TWIN 23x47 ARCH CMPS UNDER MERIDIAN								
615	DT	DIVRT1	90							
616	DI	0	39	72	152	263	318	377	442	591
617	DQ	0	39	70	80	80	80	85	85	90
618	KK	M15								
619	KM									
620	BA	.1242								
621	LS		64							
622	UD	.203								
623	KK	MI								
624	KM									
625	HC	2								
626	KK									
627	KM									
628	RK	1995	.0165	.035		TRAP	15		4	
629	KK	M19								
630	KM									
631	BA	.0499								
632	LS		61							
633	UD	.159								
634	KK	MJ								
635	KM									
636	HC	2								
637	KK									
638	KM									
639	RK	2215	.0158	.035		TRAP	15		4	
640	KK	M10								
641	KM									
642	BA	.0581								
643	LS		62							
644	UD	.102								
645	KK	M10-K								
646	KM									
647	RK	3150	.0255	.03		TRAP	5		4	
648	KK	M11A								
649	KM									
650	BA	.1067								
651	LS		61							
652	UD	.231								
653	KK	MK								
654	KM									
655	HC	2								
656	KK	MK-K1								
657	KM									
658	RK	2300	.260	.03		TRAP	5		4	
659	KK	M11B								
660	KM									
661	BA	.0879								
662	LS		60							
663	UD	.150								
664	KK	11B-K1								
665	KM									
666	RK	2400	.025	.03		TRAP	5		4	
667	KK	M11C								
668	KM									
669	BA	.0933								
670	LS		60							
671	UD	.160								
672	KK	MK1								
673	KM									
674	HC	3								
675	KK	K1-ML								
676	KM									
677	RK	1821	.028	.035		TRAP	5		4	

678	KK	M16						
679	KM							
680	BA	.042						
681	LS		60					
682	UD	.139						
683	KK	ML						
684	KM							
685	HC	2						
686	KK							
687	KM							
688	RK	2099	.02	.035	TRAP	5	4	
689	KK	M17						
690	KM							
691	BA	.0765						
692	LS		61					
693	UD	.133						
694	KK	MM						
695	KM							
696	HC	2						
697	KK							
698	KM							
699	RK	2320	.0121	.035	TRAP	10	4	
700	KK	M18						
701	KM							
702	BA	.061						
703	LS		61					
704	UD	.142						
705	KK							
706	KM							
707	RK	2122	.017	.035	TRAP	5	4	
708	KK	M20						
709	KM							
710	BA	.1341						
711	LS		61					
712	UD	.211						
713	KK	MN						
714	KM							
715	HC	4						
716	KK							
717	KM							
718	RK	1531	.0202	.035	TRAP	25	4	
719	KK	M21						
720	KM							
721	BA	.0241						
722	LS		61					
723	UD	.125						
724	KK							
725	KM							
726	RK	1322	.0212	.035	TRAP	5	4	
727	KK	M23						
728	KM							
729	BA	.0461						
730	LS		60					
731	UD	.120						
732	KK	MO						
733	KM							
734	HC	3						
735	KK							
736	KM							
737	RK	974	.0133	.035	TRAP	25	4	
738	KK	M24						
739	KM							
740	BA	.0776						
741	LS		60					
742	UD	.125						
743	KK	MP						
744	KM							
745	HC	2						
746	KK							
747	KM							
748	RK	290	.0138	.035	TRAP	25	4	
749	KK	M25						
750	KM							
751	BA	.0105						
752	LS		60					
753	UD	.130						

754	KK	MQ						
755	KM							
756	HC	2						
757	KK							
758	KM							
759	RK	3305	.0136	.035	TRAP	25	4	
760	KK	M26						
761	KM							
762	BA	.1779						
763	LS		65					
764	UD	.250						
765	KK	MR						
766	KM							
767	HC	2						
768	KK	W44						
769	KM							
770	BA	.0384						
771	LS		60					
772	UD	.141						
773	KK							
774	KM							
775	RK	2029	.0148	.035	TRAP	5	4	
776	KK	W47						
777	KM							
778	BA	.0541						
779	LS		60					
780	UD	.148						
781	KK							
782	KM							
783	RK	1438	.0223	.035	TRAP	5	4	
784	KK	W46						
785	KM							
786	BA	.0418						
787	LS		61					
788	UD	.154						
789	KK	M27						
790	KM							
791	BA	.0528						
792	LS		60					
793	UD	.132						
794	KK	WX						
795	KM							
796	HC	6						
797	KK							
798	KM							
799	RK	2563	.0125	.035	TRAP	40	4	
800	KK	W48						
801	KM							
802	BA	.1179						
803	LS		61					
804	UD	.091						
805	KK							
806	KM							
807	RK	2400	.0188	.035	TRAP	5	4	
808	KK	W49						
809	KM							
810	BA	.2651						
811	LS		61					
812	UD	.181						
813	KK	WZ						
814	KM							
815	HC	3						
816	KK							
817	KM							
818	RK	800	.0125	.035	TRAP	40	4	
819	KK	W50						
820	KM							
821	BA	.1061						
822	LS		61					
823	UD	.145						
824	KK	WAB						
825	KM							
826	HC	2						
827	KK							
828	KM							

829	RK	742	.0108	.035	TRAP	40	4
830	KK	W51					
831	KM						
832	BA	.0546					
833	LS		63				
834	UD	.172					
835	KK	WAC					
836	KM						
837	HC	2					
838	KK						
839	KM						
840	RK	638	.0345	.035	TRAP	40	4
841	KK	W52					
842	KM						
843	BA	.0499					
844	LS		63				
845	UD	.109					
846	KK						
847	KM						
848	RK	1171	.0205	.035	TRAP	5	4
849	KK	W53					
850	KM						
851	BA	.0531					
852	LS		63				
853	UD	.156					
854	KK	WAD					
855	KM						
856	HC	2					
857	KK						
858	KM						
859	RK	290	.0310	.035	TRAP	10	4
860	KK	W54					
861	KM						
862	BA	.0078					
863	LS		60				
864	UD	.050					
865	KK	WAE					
866	KM						
867	HC	3					
868	KK						
869	KM						
870	RK	1925	.0052	.035	TRAP	40	4
871	KK	W56					
872	KM						
873	BA	.1831					
874	LS		60				
875	UD	.191					
876	KK	WAF					
877	KM						
878	HC	2					
879	KK						
880	KM						
881	RK	1032	.0155	.035	TRAP	40	4
882	KK	W62					
883	KM						
884	BA	.0750					
885	LS		60				
886	UD	.090					
887	KK						
888	KM						
889	RK	2169	.0203	.035	TRAP	5	4
890	KK	W63					
891	KM						
892	BA	.047					
893	LS		60				
894	UD	.109					
895	KK						
896	KM						
897	RK	1450	.0131	.035	TRAP	5	4
898	KK	W61					
899	KM						
900	BA	.192					
901	LS		60				
902	UD	.251					
903	KK	WAH					

904	KM																			
905	HC	3																		
906	KK																			
907	KM																			
908	RK	1241	.0153	.035		TRAP	5	4												
909	KK	W57																		
910	KM																			
911	BA	.0732																		
912	LS		60																	
913	UD	.140																		
914	KK																			
915	KM																			
916	RK	5903	.0254	.035		TRAP	5	4												
917	KK	W58																		
918	KM																			
919	BA	.2296																		
920	LS		60																	
921	UD	.251																		
922	KK	WAI																		
923	KM																			
924	HC	3																		
925	KK																			
926	KM																			
927	RK	232	.0086	.035		TRAP	15	4												
928	KK	E1A																		
929	KM																			
930	BA	.1151																		
931	LS	0	60																	
932	UD	.234																		
933	KK	E1A-EA																		
934	KM																			
935	RK	4000	.022	.035		TRAP	5	4												
936	KK	E1B																		
937	KM																			
938	BA	.1665																		
939	LS	0	60																	
940	UD	.233																		
941	KK	EA																		
942	KM																			
943	HC	2																		
944	KK	EA-EB																		
945	KM																			
946	RK	1900	.022	.035		TRAP	5	4												
947	KK	E2																		
948	KM																			
949	BA	.104																		
950	LS	0	60																	
951	UD	.149																		
952	KK	EB																		
953	KM																			
954	HC	2																		
955	KK	POND1																		
956	KM																			
957	SV	0	.01	.28	1.12	2.70	5.18	6.00	6.94											
958	SE	945.5	946	948	950	952	954	954.5	955											
959	SQ	0	0	0	0	0	48.5	176.4	351.4											
960	RS	1	ELEV	945.5																
961	KK																			
962	KM																			
963	RK	1300	.0192	.035		TRAP	5	4												
964	KK	E3																		
965	KM																			
966	BA	.090																		
967	LS		60																	
968	UD	.128																		
969	KK	MH-P2																		
970	KM																			
971	DR	DIVRT1																		
972	KK	EC																		
973	KM																			
974	HC	3																		
975	KK	POND2																		
976	KM																			
977	SV	0	.21	1.11	3.19	6.89	9.52	11.08	12.82	14.72	16.70									
978	SE	920	922	924	926	928	929	929.5	930	930.5	931									
979	SQ	0	0	0	0	0	0	25	86.5	186.2	308.4									

980	RS	1	ELEV	920			
981	KK						
982	KM						
983	RK	1700	.0141	.035	TRAP	5	4
984	KK	E1C					
985	KM						
986	BA	.0845					
987	LS		60				
988	UD	.200					
989	KK	1C-ED1					
990	KM						
991	RK	3450	.022	.035	TRAP	5	4
992	KK	E4					
993	KM						
994	BA	.127					
995	LS		60				
996	UD	.200					
997	KK	ED1					
998	KM						
999	HC	2					
1000	KK	ED1-ED					
1001	KM						
1002	RK	450	.0178	.03	TRAP	5	4
1003	KK	E5					
1004	KM						
1005	BA	.094					
1006	LS		60				
1007	UD	.160					
1008	KK	ED					
1009	KM						
1010	HC	3					
1011	KK						
1012	KM						
1013	RK	950	.0211	.035	TRAP	10	4
1014	KK	E8					
1015	KM						
1016	BA	.0446					
1017	LS		60				
1018	UD	.139					
1019	KK	EE					
1020	KM						
1021	HC	2					
1022	KK						
1023	KM						
1024	RK	1500	.0127	.035	TRAP	10	4
1025	KK	E10					
1026	KM						
1027	BA	.029					
1028	LS		60				
1029	UD	.158					
1030	KK	EF					
1031	KM						
1032	HC	2					
1033	KK	F-G					
1034	KM						
1035	RK	950	.0074	.035	TRAP	15	4
1036	KK	E6					
1037	KM						
1038	BA	.119					
1039	LS		60				
1040	UD	.228					
1041	KK	E7					
1042	KM						
1043	BA	.031					
1044	LS		60				
1045	UD	.082					
1046	KK						
1047	KM						
1048	RK	1100	.0100	.035	TRAP	5	4
1049	KK	EG1					
1050	KM						
1051	HC	2					
1052	KK	G1-G					
1053	KM						
1054	RK	1650	.0176	.035	TRAP	5	4

1055	KK	E9						
1056	KM							
1057	BA	.077						
1058	LS		60					
1059	UD	.207						
1060	KK							
1061	KM							
1062	RK	1500	.0080	.03	TRAP	5	4	
1063	KK	E11						
1064	KM							
1065	BA	.045						
1066	LS		60					
1067	UD	.195						
1068	KK	E12						
1069	KM							
1070	BA	.092						
1071	LS		60					
1072	UD	.156						
1073	KK	EG						
1074	KM							
1075	HC	5						
1076	KK	E13						
1077	KM							
1078	BA	.0165						
1079	LS		60					
1080	UD	.252						
1081	KK	E14						
1082	KM							
1083	BA	.0051						
1084	LS		60					
1085	UD	.153						
1086	KK							
1087	KM							
1088	RK	279	.0108	.03	TRAP	5	4	
1089	KK	EH						
1090	KM							
1091	HC	3						
1092	KK							
1093	KM							
1094	RK	2400	.0204	.035	TRAP	10	4	
1095	KK	E19						
1096	KM							
1097	BA	.0406						
1098	LS		62					
1099	UD	.127						
1100	KK	EJ1						
1101	KM							
1102	HC	2						
1103	KK	J1-K						
1104	KM							
1105	RK	4013	.013	.035	TRAP	10	4	
1106	KK	E15						
1107	KM							
1108	BA	.0355						
1109	LS		63					
1110	UD	.097						
1111	KK							
1112	KM							
1113	RK	951	.0189	.035	TRAP	5	4	
1114	KK	E16						
1115	KM							
1116	BA	.0307						
1117	LS		63					
1118	UD	.100						
1119	KK	E1						
1120	KM							
1121	HC	2						
1122	KK							
1123	KM							
1124	RK	1334	.0105	.035	TRAP	5	4	
1125	KK	E17						
1126	KM							
1127	BA	.0312						
1128	LS		63					
1129	UD	.097						

1130	KK						
1131	KM						
1132	RK	1728	.0145	.035	TRAP	5	4
1133	KK	E18					
1134	KM						
1135	BA	.0488					
1136	LS		63				
1137	UD	.180					
1138	KK	EJ2					
1139	KM						
1140	HC	3					
1141	KK						
1142	KM						
1143	RK	4221	.0123	.035	TRAP	20	4
1144	KK	E23					
1145	KM						
1146	BA	.1683					
1147	LS		62				
1148	UD	.250					
1149	KK	E24					
1150	KM						
1151	BA	.140					
1152	LS		63				
1153	UD	.371					
1154	KK	EK					
1155	KM						
1156	HC	4					
1157	KK						
1158	KM						
1159	RK	2817	.0149	.035	TRAP	25	4
1160	KK	E21					
1161	KM						
1162	BA	.0873					
1163	LS		60				
1164	UD	.183					
1165	KK						
1166	KM						
1167	RK	1647	.0121	.035	TRAP	5	4
1168	KK	E20					
1169	KM						
1170	BA	.0771					
1171	LS		62				
1172	UD	.219					
1173	KK						
1174	KM						
1175	RK	569	.0141	.035	TRAP	5	4
1176	KK	E22					
1177	KM						
1178	BA	.0677					
1179	LS		61				
1180	UD	.240					
1181	KK	EL					
1182	KM						
1183	HC	3					
1184	KK						
1185	KM						
1186	RK	2041	.0162	.035	TRAP	25	4
1187	KK	E25					
1188	KM						
1189	BA	.1665					
1190	LS		61				
1191	UD	.176					
1192	KK	EM					
1193	KM						
1194	HC	3					
1195	KK						
1196	KM						
1197	RK	928	.0108	.035	TRAP	40	4
1198	KK	E26					
1199	KM						
1200	BA	.0361					
1201	LS		63				
1202	UD	.096					
1203	KK	EN					
1204	KM						
1205	HC	2					

1206	KK						
1207	KM						
1208	RK	1832	.0126	.035	TRAP	40	4
1209	KK	E27					
1210	KM						
1211	BA	.1236					
1212	LS		63				
1213	UD	.172					
1214	KK	EO					
1215	KM						
1216	HC	2					
1217	KK						
1218	KM						
1219	RK	1625	.0133	.035	TRAP	5	3
1220	KK	W55					
1221	KM						
1222	BA	.0452					
1223	LS		60				
1224	UD	.093					
1225	KK	WAG					
1226	KM						
1227	HC	2					
1228	KK						
1229	KM						
1230	RK	2025	.0109	.035	TRAP	5	4
1231	KK	W59					
1232	KM						
1233	BA	.0705					
1234	LS		60				
1235	UD	.200					
1236	KK	WAJ					
1237	KM						
1238	HC	4					
1239	KK						
1240	KM						
1241	RK	1450	.0124	.035	TRAP	40	4
1242	KK	E28					
1243	KM						
1244	BA	.0718					
1245	LS		61				
1246	UD	.223					
1247	KK						
1248	KM						
1249	RK	2064	.0165	.035	TRAP	40	4
1250	KK	E29					
1251	KM						
1252	BA	.0465					
1253	LS		61				
1254	UD	.166					
1255	KK	EZZ					
1256	KM	COMBINE E29 & E30 AT DP ZZ					
1257	HC	2					
1258	KK	W60					
1259	KM						
1260	BA	.0711					
1261	LS		60				
1262	UD	.182					
1263	KK	ZZ					
1264	KM	COMBINE ALL AT DP ZZ					
1265	HC	3					
1266	ZZ						

136	.	V		
	.	V		
139	.	.	W14	
	.	.	V	
144	.	.	V	
	.	.	.	
147	.	.	.	W13

152	WG	.....	.	.
	V		.	.
	V		.	.
155	G-H		.	.
	V		.	.
	V		.	.
158	.		.	.
	.		.	.
161	.	W15	.	.
	.	V	.	.
	.	V	.	.
166	.	.	.	.

169	WH	.....	.	.
	.		.	.
172	.	W16	.	.
	.	V	.	.
	.	V	.	.
177	.	.	.	.

180	.	.	W17	.

185	.	WI	.....	.
	.	V		.
	.	V		.
188	.	I-M		.

191	.	.	W19	.
	.	.	V	.
	.	.	V	.
196	.	.	.	.

199	.	.	.	W20

204	.	.	WJ	.....
	.	.	V	
	.	.	V	
207	.	.	.	.

210	.	.	.	W21

215	.	.	WK	.....
	.	.	V	
	.	.	V	
218	.	.	.	.

221	.	.	.	W22

226	.	.	WL	.....
	.	.	V	
	.	.	V	
229	.	.	.	.

232	.	.	.	W23

237	.	.	.	W18

242	WM	.....	.	.
	V		.	.
	V		.	.
245	M-N		.	.
	.		.	.
248	.	W24	.	.

377	.	W36B	.
	.	.	.
382	.	.	W35A
	.	.	V
387	.	.	V
	.	.	35A-WR
	.	.	.
390	.	.	W35B
	.	.	.
395	WR	.....
	V		
	V		
398	WR-S		
	.		
401	.	W37A	.
	.	V	.
	.	V	.
406	.	37A-S	.
	.	.	.
409	.	.	W37B
	.	.	.
414	WS	.....
	V		
	V		
417	S-T		
	.		
420	.	W38	.
	.	V	.
	.	V	.
425	.	.	.
	.	.	.
428	.	.	W39
	.	.	.
433	.	.	W40
	.	.	.
438	WT	.....
	V		
	V		
441	T-U		
	.		
444	.	W41	.
	.	.	.
449	.	.	W42
	.	.	V
	.	.	V
454	.	.	U-V
	.	.	.
457	WU	.....
	V		
	V		
460	.		
	.		
463	.	W43	.
	.	.	.
468	WV	.....
	V		
	V		
471	V-W		
	.		
474	.	W45	.
	.	.	.
479	WW	.....
	V		
	V		
482	W-X		
	.		
485	.	M1	.
	.	V	.
	.	V	.
490	.	.	.
	.	.	.
493	.	.	M2
	.	.	.
498	.	MB	.....

501	.	V			
	.	V			
504	.	.	M4		
	.	.	V		
509	.	.	V		
	.	.	.		
512	.	.	.	M3	
	
517	.	MC	-----	.	
	.	V			
520	.	V			
	.	.	.		
523	.	.	M5		
	.	.	V		
528	.	.	V		
	.	.	.		
531	.	.	.	M6	
	
536	.	MD	-----	.	
	.	V			
539	.	V			
	.	.	.		
542	.	.	M7		
	.	.	V		
547	.	.	V		
	.	.	.		
550	.	.	.	M8	
	
555	.	.	ME	-----	
	.	.	V		
558	.	.	V		
	.	.	.		
561	.	.	.	M9	
	.	.	V		
566	.	.	V		
	.	.	.		
569	.	.	.	M12A	
	
574	.	.	.	.	M12B

579	.	MF	-----	.	
	.	V			
582	.	V			
	.	.	.		
585	.	.	M13		
	.	.	V		
590	.	.	V		
	.	.	.		
593	.	.	.	M14	
	
598	.	.	MG	-----	
	.	.	V		
601	.	.	V		
	.	.	PONDW		
607	.	.	.		
	.	MH	-----	.	
610	.	V			
	.	V			
615	.	.	----->	DIVRT1	
613	.	MH-P2			
	.	.	.		
618	.	.	M15		
	.	.	.		

623	.	MI	.	.
	.	V	.	.
626	.	V	.	.

629	.	.	M19	.

634	.	MJ	.	.
	.	V	.	.
637	.	V	.	.

640	.	.	M10	.
	.	.	V	.
	.	.	V	.
645	.	.	M10-K	.

648	.	.	.	M11A

653	.	.	MK	.
	.	.	V	.
	.	.	V	.
656	.	.	MK-K1	.

659	.	.	.	M11B
	.	.	.	V
	.	.	.	V
664	.	.	.	11B-K1

667	.	.	.	.
	.	.	.	M11C

672	.	.	MK1	.
	.	.	V	.
	.	.	V	.
675	.	.	K1-ML	.

678	.	.	.	M16

683	.	.	ML	.
	.	.	V	.
	.	.	V	.
686	.	.	.	.

689	.	.	.	M17

694	.	.	MM	.
	.	.	V	.
	.	.	V	.
697	.	.	.	.

700	.	.	.	M18
	.	.	.	V
	.	.	.	V
705	.	.	.	.

708	.	.	.	.
	.	.	.	M20

713	.	.	MN	.
	.	.	V	.
	.	.	V	.
716	.	.	.	.

719	.	.	.	M21
	.	.	.	V
	.	.	.	V
724	.	.	.	.

727	.	.	.	M23

732	.	.	.	.
	.	.	MO	.
	.	.	V	.
	.	.	V	.
735	.	.	.	.

738	.	.	.	M24

860	.	.	W54	
	.	.	.	
865	WAE	.....	.
	V		.	
	V		.	
868	.			
	.			
871	.	W56	.	
	.	.	.	
876	WAF	.....	.
	V		.	
	V		.	
879	.			
	.			
882	.	W62	.	
	.	V	.	
	.	V	.	
887	.	.		
	.	.		
890	.	W63	.	
	.	V	.	
	.	V	.	
895	.	.	.	
	.	.	.	
898	.	.	W61	
	.	.	.	
	.	.	.	
903	WAH	.....	.
	V		.	
	V		.	
906	.			
	.			
909	.	W57	.	
	.	V	.	
	.	V	.	
914	.	.	.	
	.	.	.	
917	.	.	W58	
	.	.	.	
	.	.	.	
922	WAI	.....	.
	V		.	
	V		.	
925	.	.		
	.	.		
928	.	E1A	.	
	.	V	.	
	.	V	.	
933	.	E1A-EA	.	
	.	.	.	
	.	.	.	
936	.	.	E1B	
	.	.	.	
	.	.	.	
941	.	EA	.....
	.	V	.	
	.	V	.	
944	.	EA-EB	.	
	.	.	.	
	.	.	.	
947	.	.	E2	
	.	.	.	
	.	.	.	
952	.	EB	.....
	.	V	.	
	.	V	.	
955	.	POND1	.	
	.	V	.	
	.	V	.	
961	.	.	.	
	.	.	.	
964	.	.	E3	
	.	.	.	
	.	.	.	
971	.	.	.	
969	.	.	MH-P2	<----- DIVRT1
	.	.	.	
	.	.	.	
972	.	EC	.....
	.	V	.	
	.	V	.	
975	.	POND2	.	
	.	V	.	
	.	V	.	
981	.	.	.	

984	.	.	E1C	.
	.	.	V	.
	.	.	V	.
989	.	.	1C-ED1	.

992	.	.	.	E4

997	.	.	ED1.....	.
	.	.	V	.
	.	.	V	.
1000	.	.	ED1-ED	.

1003	.	.	.	E5

1008	.	.	ED.....	.
	.	.	V	.
	.	.	V	.
1011	.	.	.	.

1014	.	.	E8	.

1019	.	.	EE.....	.
	.	.	V	.
	.	.	V	.
1022	.	.	.	.

1025	.	.	E10	.

1030	.	.	EF.....	.
	.	.	V	.
	.	.	V	.
1033	.	.	F-G	.

1036	.	.	E6	.

1041	.	.	.	E7
	.	.	.	V
	.	.	.	V
1046	.	.	.	.

1049	.	.	EG1.....	.
	.	.	V	.
	.	.	V	.
1052	.	.	G1-G	.

1055	.	.	.	E9
	.	.	.	V
	.	.	.	V
1060	.	.	.	.

1063	.	.	.	E11

1068	.	.	.	E12

1073	.	.	EG.....	.

1076	.	.	E13	.

1081	.	.	.	E14
	.	.	.	V
	.	.	.	V
1086	.	.	.	.

1089	.	.	EH.....	.
	.	.	V	.
	.	.	V	.
1092	.	.	.	.

1095	.	.	E19	.

1100	.	.	EJ1.....	.
	.	.	V	.
	.	.	V	.

1103	.	.	J1-K	.	.
1106	.	.	.	E15	.
1111	.	.	.	V	.
1114	.	.	.	V	E16
1119	.	.	.	.	.
1122	.	.	.	E1	.
1125	.	.	.	V	.
1130	.	.	.	V	.
1133	.	.	.	.	E18
1138	.	.	.	.	.
1141	.	.	.	EJ2	.
1144	.	.	.	V	.
1149	.	.	.	V	.
1154	.	.	.	.	E24
1157	.	.	.	.	.
1160	.	.	.	EK	.
1165	.	.	.	V	.
1168	.	.	.	V	.
1173	.	.	.	.	E21
1176	.	.	.	.	V
1181	.	.	.	.	V
1184	.	.	.	.	.
1187	.	.	.	.	E20
1192	.	.	.	.	V
1195	.	.	.	.	V
1198	.	.	.	.	.
1203	.	.	.	.	E22
1206	.	.	.	.	.
1209	.	.	.	.	E26
1214	.	.	.	.	.
1217	.	.	.	.	E27
1220	.	.	.	.	.
	.	.	.	EO	.
	.	.	.	V	.
	.	.	.	V	.
	.	.	.	.	W55

1225	.	.	WAG.....
	.	.	V
1228	.	.	V
	.	.	.
1231	.	.	W59
	.	.	.
1236	WAJ.....	.	.
	V	.	.
1239	V	.	.
	.	.	.
1242	.	E28	.
	.	V	.
1247	.	V	.
	.	.	.
1250	.	.	E29
	.	.	.
1255	.	EZZ.....	.
	.	.	.
1258	.	.	W60
	.	.	.
1263	ZZ.....	.	.

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 28SEP07 TIME 11:57:06 *
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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

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FALCON BASIN 5-YR/ 24-HOUR FLOOD/ EXISTING CONDITIONS
 UPPER EAST TRIBUTARY (WOODMEN HILLS) BASED ON CLOMR APPROVED 2/2/99
 INCLUDING 2 EXISTING SCS STOCK PONDS, WEST WOODMEN HILLS POND
 NOTE: M1-M4 (PAINT BRUSH HILLS) MODELED AS HISTORIC TO ACCOUNT FOR
 DETENTION POND AT MC
 NOTE: NO CULVERT AT STAPLETON & MERIDIAN, TEMP CULVERTS AT MERIDIAN
 DOWNSTREAM OF WOODMEN HILLS DRIVE (DIVERSION)

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9 IO      OUTPUT CONTROL VARIABLES
          IPRNT      5  PRINT CONTROL
          IPLOT      0  PLOT CONTROL
          QSCAL      0.  HYDROGRAPH PLOT SCALE

IT        HYDROGRAPH TIME DATA
          NMIN       5  MINUTES IN COMPUTATION INTERVAL
          IDATE      14JUL99  STARTING DATE
          ITIME      0800  STARTING TIME
          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     15JUL99  ENDING DATE
          NDTIME     0855  ENDING TIME
          ICENT      19  CENTURY MARK

          COMPUTATION INTERVAL .08 HOURS
          TOTAL TIME BASE 24.92 HOURS

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ENGLISH UNITS
DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW               CUBIC FEET PER SECOND
STORAGE VOLUME     ACRE-Feet
SURFACE AREA       ACRES
TEMPERATURE        DEGREES FAHRENHEIT

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1

RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	W1	5.	5.83	1.	0.	0.	.05		
ROUTED TO		4.	5.92	1.	0.	0.	.05		
HYDROGRAPH AT	W2	2.	5.83	0.	0.	0.	.03		
2 COMBINED AT	WA	6.	5.92	1.	0.	0.	.08		
ROUTED TO		6.	5.92	1.	0.	0.	.08		
HYDROGRAPH AT	W3	5.	5.83	1.	0.	0.	.05		
2 COMBINED AT	WB	11.	5.92	2.	1.	1.	.13		
ROUTED TO		10.	5.92	2.	1.	1.	.13		
HYDROGRAPH AT	W4	1.	5.75	0.	0.	0.	.01		
ROUTED TO		1.	5.83	0.	0.	0.	.01		
HYDROGRAPH AT	W5	2.	5.75	0.	0.	0.	.02		
3 COMBINED AT	WC	11.	5.92	2.	1.	1.	.15		
ROUTED TO									

+			11.	5.92	2.	1.	1.	.15
+	HYDROGRAPH AT							
+		W6	5.	5.83	1.	0.	0.	.05
+	ROUTED TO		5.	5.83	1.	0.	0.	.05
+	HYDROGRAPH AT							
+		W7	2.	5.75	0.	0.	0.	.02
+	ROUTED TO		2.	5.83	0.	0.	0.	.02
+	2 COMBINED AT							
+		WD	7.	5.83	1.	0.	0.	.07
+	ROUTED TO							
+		D-E	6.	5.83	1.	0.	0.	.07
+	HYDROGRAPH AT							
+		W8	3.	5.75	0.	0.	0.	.03
+	ROUTED TO		3.	5.83	0.	0.	0.	.03
+	HYDROGRAPH AT							
+		W9	5.	5.83	1.	0.	0.	.04
+	3 COMBINED AT							
+		WE	14.	5.83	2.	1.	1.	.14
+	ROUTED TO							
+		E-F	13.	5.92	2.	1.	1.	.14
+	HYDROGRAPH AT							
+		W10	5.	5.83	1.	0.	0.	.04
+	ROUTED TO		5.	5.83	1.	0.	0.	.04
+	HYDROGRAPH AT							
+		W11	3.	5.75	0.	0.	0.	.03
+	4 COMBINED AT							
+		WF	29.	5.92	5.	2.	2.	.36
+	ROUTED TO							
+		F-G	28.	6.00	5.	2.	2.	.36
+	HYDROGRAPH AT							
+		W12	4.	5.83	1.	0.	0.	.04
+	ROUTED TO		4.	5.92	1.	0.	0.	.04
+	HYDROGRAPH AT							
+		W14	5.	5.83	1.	0.	0.	.05
+	ROUTED TO		5.	5.92	1.	0.	0.	.05
+	HYDROGRAPH AT							
+		W13	10.	5.92	2.	1.	1.	.11
+	4 COMBINED AT							
+		WG	43.	6.00	8.	3.	3.	.56
+	ROUTED TO							
+		G-H	41.	6.08	8.	3.	3.	.56
+	ROUTED TO		39.	6.17	8.	3.	3.	.56
+	HYDROGRAPH AT							
+		W15	10.	5.83	1.	1.	1.	.09
+	ROUTED TO		9.	5.92	1.	1.	1.	.09
+	2 COMBINED AT							
+		WH	43.	6.17	9.	4.	4.	.65
+	HYDROGRAPH AT							
+		W16	4.	5.83	0.	0.	0.	.03
+	ROUTED TO		3.	5.92	0.	0.	0.	.03
+	HYDROGRAPH AT							
+		W17	2.	5.83	0.	0.	0.	.02
+	2 COMBINED AT							
+		WI	5.	5.83	1.	0.	0.	.05

+	ROUTED TO	I-M	5.	6.00	1.	0.	0.	.05
+	HYDROGRAPH AT	W19	5.	5.75	1.	0.	0.	.04
+	ROUTED TO		5.	5.83	1.	0.	0.	.04
+	HYDROGRAPH AT	W20	5.	5.75	0.	0.	0.	.03
+	2 COMBINED AT	WJ	9.	5.83	1.	0.	0.	.07
+	ROUTED TO		9.	6.00	1.	0.	0.	.07
+	HYDROGRAPH AT	W21	11.	5.83	2.	1.	1.	.13
+	2 COMBINED AT	WK	18.	5.92	3.	1.	1.	.21
+	ROUTED TO		16.	5.92	3.	1.	1.	.21
+	HYDROGRAPH AT	W22	2.	5.75	0.	0.	0.	.01
+	2 COMBINED AT	WL	17.	5.92	3.	1.	1.	.22
+	ROUTED TO		17.	6.00	3.	1.	1.	.22
+	HYDROGRAPH AT	W23	2.	5.83	0.	0.	0.	.02
+	HYDROGRAPH AT	W18	9.	5.92	2.	1.	1.	.13
+	5 COMBINED AT	WM	66.	6.08	15.	6.	6.	1.06
+	ROUTED TO	M-N	65.	6.17	15.	6.	6.	1.06
+	HYDROGRAPH AT	W24	4.	5.83	1.	0.	0.	.04
+	HYDROGRAPH AT	W25	8.	5.92	1.	1.	1.	.10
+	3 COMBINED AT	WN	70.	6.17	17.	7.	7.	1.20
+	ROUTED TO	N-P	67.	6.25	16.	7.	7.	1.20
+	HYDROGRAPH AT	W28	7.	5.83	1.	0.	0.	.04
+	ROUTED TO		6.	5.92	1.	0.	0.	.04
+	HYDROGRAPH AT	W30	9.	5.83	1.	0.	0.	.05
+	ROUTED TO		8.	5.92	1.	0.	0.	.05
+	HYDROGRAPH AT	W29	6.	5.83	1.	0.	0.	.04
+	HYDROGRAPH AT	W31	3.	5.75	0.	0.	0.	.01
+	4 COMBINED AT	WO	20.	5.92	3.	1.	1.	.14
+	ROUTED TO	O-P	20.	6.00	3.	1.	1.	.14
+	HYDROGRAPH AT	W26	7.	5.75	1.	0.	0.	.03
+	ROUTED TO		6.	6.08	1.	0.	0.	.03
+	HYDROGRAPH AT	W27	10.	6.00	2.	1.	1.	.16
+	HYDROGRAPH AT	W32	7.	5.92	1.	0.	0.	.09

+	5 COMBINED AT	WP	88.	6.17	23.	10.	9.	1.63
+	ROUTED TO	P-Q	87.	6.25	23.	10.	9.	1.63
+	HYDROGRAPH AT	W33A	9.	5.92	2.	1.	1.	.13
+	2 COMBINED AT	WP1	91.	6.25	24.	10.	10.	1.75
+	ROUTED TO	P1-Q	90.	6.33	24.	10.	10.	1.75
+	HYDROGRAPH AT	W33B	9.	5.92	2.	1.	1.	.14
+	HYDROGRAPH AT	W34A	9.	5.92	2.	1.	1.	.13
+	ROUTED TO	34A-P2	9.	6.08	2.	1.	1.	.13
+	HYDROGRAPH AT	W34B	11.	5.92	2.	1.	1.	.18
+	2 COMBINED AT	WP2	18.	6.00	4.	2.	2.	.30
+	ROUTED TO	P2-Q	18.	6.17	4.	2.	2.	.30
+	HYDROGRAPH AT	W34C	10.	6.00	2.	1.	1.	.16
+	4 COMBINED AT	WQ	114.	6.25	32.	13.	13.	2.36
+	ROUTED TO	Q-Q1	113.	6.33	32.	13.	13.	2.36
+	HYDROGRAPH AT	W36A	9.	5.92	2.	1.	1.	.14
+	2 COMBINED AT	WQ1	118.	6.33	33.	14.	14.	2.50
+	ROUTED TO	Q1-R	117.	6.42	33.	14.	14.	2.50
+	HYDROGRAPH AT	W36B	10.	6.00	2.	1.	1.	.19
+	HYDROGRAPH AT	W35A	7.	5.92	1.	1.	1.	.10
+	ROUTED TO	35A-WR	6.	6.25	1.	1.	1.	.10
+	HYDROGRAPH AT	W35B	9.	6.00	2.	1.	1.	.15
+	4 COMBINED AT	WR	131.	6.42	38.	17.	16.	2.94
+	ROUTED TO	WR-S	130.	6.50	38.	16.	16.	2.94
+	HYDROGRAPH AT	W37A	8.	5.92	1.	1.	1.	.11
+	ROUTED TO	37A-S	8.	6.00	1.	1.	1.	.11
+	HYDROGRAPH AT	W37B	13.	5.92	2.	1.	1.	.16
+	3 COMBINED AT	WS	137.	6.50	42.	18.	17.	3.21
+	ROUTED TO	S-T	134.	6.67	42.	18.	17.	3.21
+	HYDROGRAPH AT	W38	10.	5.92	2.	1.	1.	.09
+	ROUTED TO		9.	6.08	2.	1.	1.	.09
+	HYDROGRAPH AT	W39	11.	6.00	2.	1.	1.	.18
	HYDROGRAPH AT							

+		W40	7.	5.83	1.	1.	1.	.10
+	4 COMBINED AT	WT	143.	6.58	46.	20.	19.	3.59
+	ROUTED TO	T-U	142.	6.67	46.	20.	19.	3.59
+	HYDROGRAPH AT	W41	6.	5.83	1.	0.	0.	.06
+	HYDROGRAPH AT	W42	50.	5.75	5.	2.	2.	.06
+	ROUTED TO	U-V	49.	5.83	5.	2.	2.	.06
+	3 COMBINED AT	WU	148.	6.67	51.	22.	21.	3.70
+	ROUTED TO		146.	6.75	51.	22.	21.	3.70
+	HYDROGRAPH AT	W43	13.	5.83	2.	1.	1.	.15
+	2 COMBINED AT	WV	149.	6.75	53.	23.	22.	3.85
+	ROUTED TO	V-W	148.	6.75	53.	23.	22.	3.85
+	HYDROGRAPH AT	W45	17.	5.92	3.	1.	1.	.19
+	2 COMBINED AT	WW	152.	6.75	56.	24.	23.	4.04
+	ROUTED TO	W-X	149.	6.83	55.	24.	23.	4.04
+	HYDROGRAPH AT	M1	7.	5.83	1.	0.	0.	.07
+	ROUTED TO		6.	5.83	1.	0.	0.	.07
+	HYDROGRAPH AT	M2	3.	5.83	0.	0.	0.	.03
+	2 COMBINED AT	MB	9.	5.83	1.	1.	0.	.09
+	ROUTED TO		8.	5.92	1.	1.	0.	.09
+	HYDROGRAPH AT	M4	3.	5.83	0.	0.	0.	.03
+	ROUTED TO		3.	5.83	0.	0.	0.	.03
+	HYDROGRAPH AT	M3	2.	5.75	0.	0.	0.	.01
+	3 COMBINED AT	MC	11.	5.83	2.	1.	1.	.14
+	ROUTED TO		11.	6.00	2.	1.	1.	.14
+	HYDROGRAPH AT	M5	6.	5.75	1.	0.	0.	.02
+	ROUTED TO		6.	5.92	1.	0.	0.	.02
+	HYDROGRAPH AT	M6	10.	5.92	2.	1.	1.	.06
+	3 COMBINED AT	MD	26.	5.92	4.	2.	2.	.22
+	ROUTED TO		25.	6.08	4.	2.	2.	.22
+	HYDROGRAPH AT	M7	16.	5.83	2.	1.	1.	.05
+	ROUTED TO		15.	5.92	2.	1.	1.	.05
+	HYDROGRAPH AT	M8	4.	5.83	1.	0.	0.	.04

+	2 COMBINED AT	ME	18.	5.83	2.	1.	1.	.09		
+	ROUTED TO		18.	6.00	2.	1.	1.	.09		
+	HYDROGRAPH AT	M9	7.	5.75	1.	0.	0.	.02		
+	ROUTED TO		6.	5.92	1.	0.	0.	.02		
+	HYDROGRAPH AT	M12A	5.	5.83	1.	0.	0.	.07		
+	HYDROGRAPH AT	M12B	10.	5.92	2.	1.	1.	.15		
+	5 COMBINED AT	MF	59.	6.00	10.	4.	4.	.54		
+	ROUTED TO		57.	6.08	10.	4.	4.	.54		
+	HYDROGRAPH AT	M13	10.	5.83	1.	1.	0.	.06		
+	ROUTED TO		9.	6.00	1.	1.	0.	.06		
+	HYDROGRAPH AT	M14	22.	5.92	4.	1.	1.	.16		
+	2 COMBINED AT	MG	30.	5.92	5.	2.	2.	.22		
+	ROUTED TO	PONDW	9.	6.50	5.	2.	2.	.22	969.11	6.50
+	2 COMBINED AT	MH	64.	6.08	14.	6.	5.	.77		
+	ROUTED TO		62.	6.17	14.	6.	5.	.77		
+	DIVERSION TO	DIVRT1	61.	6.17	14.	6.	5.	.77		
+	HYDROGRAPH AT	MH-P2	1.	6.17	0.	0.	0.	.77		
+	HYDROGRAPH AT	M15	18.	5.92	3.	1.	1.	.12		
+	2 COMBINED AT	MI	18.	5.92	3.	1.	1.	.89		
+	ROUTED TO		17.	6.00	3.	1.	1.	.89		
+	HYDROGRAPH AT	M19	5.	5.83	1.	0.	0.	.05		
+	2 COMBINED AT	MJ	20.	6.00	3.	1.	1.	.94		
+	ROUTED TO		20.	6.08	3.	1.	1.	.94		
+	HYDROGRAPH AT	M10	8.	5.83	1.	0.	0.	.06		
+	ROUTED TO	M10-K	8.	5.92	1.	0.	0.	.06		
+	HYDROGRAPH AT	M11A	8.	5.92	2.	1.	1.	.11		
+	2 COMBINED AT	MK	16.	5.92	3.	1.	1.	.16		
+	ROUTED TO	MK-K1	16.	6.00	3.	1.	1.	.16		
+	HYDROGRAPH AT	M11B	7.	5.83	1.	0.	0.	.09		
+	ROUTED TO	11B-K1	7.	6.00	1.	0.	0.	.09		
+	HYDROGRAPH AT	M11C	7.	5.83	1.	1.	0.	.09		
	3 COMBINED AT									

+		MK1	27.	6.00	5.	2.	2.	.35
+	ROUTED TO							
+		K1-ML	26.	6.00	5.	2.	2.	.35
+	HYDROGRAPH AT							
+		M16	4.	5.83	1.	0.	0.	.04
+	2 COMBINED AT							
+		ML	28.	6.00	5.	2.	2.	.39
+	ROUTED TO							
+			28.	6.08	5.	2.	2.	.39
+	HYDROGRAPH AT							
+		M17	9.	5.83	1.	0.	0.	.08
+	2 COMBINED AT							
+		MM	31.	6.08	7.	3.	3.	.46
+	ROUTED TO							
+			29.	6.17	7.	3.	3.	.46
+	HYDROGRAPH AT							
+		M18	7.	5.83	1.	0.	0.	.06
+	ROUTED TO							
+			6.	6.00	1.	0.	0.	.06
+	HYDROGRAPH AT							
+		M20	11.	5.92	2.	1.	1.	.13
+	4 COMBINED AT							
+		MN	57.	6.17	13.	5.	5.	1.60
+	ROUTED TO							
+			55.	6.25	13.	5.	5.	1.60
+	HYDROGRAPH AT							
+		M21	3.	5.83	0.	0.	0.	.02
+	ROUTED TO							
+			3.	5.92	0.	0.	0.	.02
+	HYDROGRAPH AT							
+		M23	4.	5.83	1.	0.	0.	.05
+	3 COMBINED AT							
+		MO	57.	6.25	14.	6.	5.	1.67
+	ROUTED TO							
+			56.	6.25	14.	6.	5.	1.67
+	HYDROGRAPH AT							
+		M24	7.	5.83	1.	0.	0.	.08
+	2 COMBINED AT							
+		MP	58.	6.25	15.	6.	6.	1.75
+	ROUTED TO							
+			57.	6.25	15.	6.	6.	1.75
+	HYDROGRAPH AT							
+		M25	1.	5.83	0.	0.	0.	.01
+	2 COMBINED AT							
+		MQ	58.	6.25	15.	6.	6.	1.76
+	ROUTED TO							
+			57.	6.42	15.	6.	6.	1.76
+	HYDROGRAPH AT							
+		M26	26.	5.92	4.	2.	2.	.18
+	2 COMBINED AT							
+		MR	66.	6.42	18.	8.	7.	1.94
+	HYDROGRAPH AT							
+		W44	3.	5.83	1.	0.	0.	.04
+	ROUTED TO							
+			3.	6.00	1.	0.	0.	.04
+	HYDROGRAPH AT							
+		W47	4.	5.83	1.	0.	0.	.05
+	ROUTED TO							
+			4.	5.92	1.	0.	0.	.05
+	HYDROGRAPH AT							
+		W46	4.	5.83	1.	0.	0.	.04
+	HYDROGRAPH AT							
+		M27	5.	5.83	1.	0.	0.	.05

+	6 COMBINED AT	WX	192.	6.75	76.	33.	31.	6.17
	ROUTED TO		191.	6.83	76.	32.	31.	6.17
+	HYDROGRAPH AT	W48	14.	5.83	2.	1.	1.	.12
	ROUTED TO		14.	5.92	2.	1.	1.	.12
+	HYDROGRAPH AT	W49	24.	5.92	4.	2.	2.	.27
+	3 COMBINED AT	WZ	199.	6.83	81.	35.	34.	6.55
	ROUTED TO		196.	6.92	81.	35.	34.	6.55
+	HYDROGRAPH AT	W50	11.	5.83	2.	1.	1.	.11
+	2 COMBINED AT	WAB	198.	6.92	83.	35.	34.	6.66
	ROUTED TO		198.	6.92	83.	35.	34.	6.66
+	HYDROGRAPH AT	W51	7.	5.83	1.	0.	0.	.05
+	2 COMBINED AT	WAC	199.	6.92	83.	36.	34.	6.71
	ROUTED TO		198.	6.92	83.	36.	34.	6.71
+	HYDROGRAPH AT	W52	9.	5.83	1.	0.	0.	.05
	ROUTED TO		8.	5.83	1.	0.	0.	.05
+	HYDROGRAPH AT	W53	8.	5.83	1.	0.	0.	.05
+	2 COMBINED AT	WAD	16.	5.83	2.	1.	1.	.10
	ROUTED TO		14.	5.83	2.	1.	1.	.10
+	HYDROGRAPH AT	W54	1.	5.75	0.	0.	0.	.01
+	3 COMBINED AT	WAE	200.	6.92	85.	37.	35.	6.82
	ROUTED TO		199.	7.00	85.	36.	35.	6.82
+	HYDROGRAPH AT	W56	13.	5.92	2.	1.	1.	.18
+	2 COMBINED AT	WAF	202.	7.00	87.	37.	36.	7.01
	ROUTED TO		200.	7.00	87.	37.	36.	7.01
+	HYDROGRAPH AT	W62	7.	5.83	1.	0.	0.	.08
	ROUTED TO		7.	5.92	1.	0.	0.	.08
+	HYDROGRAPH AT	W63	5.	5.83	1.	0.	0.	.05
	ROUTED TO		4.	5.92	1.	0.	0.	.05
+	HYDROGRAPH AT	W61	11.	6.00	3.	1.	1.	.19
+	3 COMBINED AT	WAH	22.	5.92	4.	2.	2.	.31
	ROUTED TO		21.	6.00	4.	2.	2.	.31
+	HYDROGRAPH AT	W57	6.	5.83	1.	0.	0.	.07

+	ROUTED TO		6.	6.25	1.	0.	0.	.07		
+	HYDROGRAPH AT	W58	13.	6.00	3.	1.	1.	.23		
+	3 COMBINED AT	WAI	35.	6.00	8.	3.	3.	.62		
+	ROUTED TO		34.	6.00	8.	3.	3.	.62		
+	HYDROGRAPH AT	E1A	7.	5.92	2.	1.	1.	.12		
+	ROUTED TO	E1A-EA	7.	6.17	1.	1.	1.	.12		
+	HYDROGRAPH AT	E1B	10.	5.92	2.	1.	1.	.17		
+	2 COMBINED AT	EA	13.	6.17	4.	2.	1.	.28		
+	ROUTED TO	EA-EB	13.	6.25	4.	2.	1.	.28		
+	HYDROGRAPH AT	E2	9.	5.83	1.	1.	1.	.10		
+	2 COMBINED AT	EB	16.	6.25	5.	2.	2.	.39		
+	ROUTED TO	POND1	2.	14.92	2.	1.	1.	.39	952.08	14.92
+	ROUTED TO		2.	15.00	2.	1.	1.	.39		
+	HYDROGRAPH AT	E3	8.	5.83	1.	0.	0.	.09		
+	HYDROGRAPH AT	MH-P2	61.	6.17	14.	6.	5.	.00		
+	3 COMBINED AT	EC	64.	6.17	15.	7.	7.	.48		
+	ROUTED TO	POND2	6.	19.83	6.	2.	2.	.48	929.13	19.83
+	ROUTED TO		6.	20.00	6.	2.	2.	.48		
+	HYDROGRAPH AT	E1C	6.	5.92	1.	0.	0.	.08		
+	ROUTED TO	1C-ED1	5.	6.17	1.	0.	0.	.08		
+	HYDROGRAPH AT	E4	9.	5.92	2.	1.	1.	.13		
+	2 COMBINED AT	ED1	10.	6.17	3.	1.	1.	.21		
+	ROUTED TO	ED1-ED	10.	6.17	3.	1.	1.	.21		
+	HYDROGRAPH AT	E5	7.	5.83	1.	1.	0.	.09		
+	3 COMBINED AT	ED	15.	5.92	7.	4.	3.	.78		
+	ROUTED TO		14.	5.92	7.	4.	3.	.78		
+	HYDROGRAPH AT	E8	4.	5.83	1.	0.	0.	.04		
+	2 COMBINED AT	EE	18.	5.92	7.	4.	4.	.83		
+	ROUTED TO		17.	6.00	7.	4.	4.	.83		
+	HYDROGRAPH AT	E10	2.	5.83	0.	0.	0.	.03		
+	2 COMBINED AT	EF	19.	6.00	7.	4.	4.	.85		

+	ROUTED TO	F-G	18.	6.08	7.	4.	4.	.85
+	HYDROGRAPH AT	E6	7.	5.92	2.	1.	1.	.12
+	HYDROGRAPH AT	E7	3.	5.75	0.	0.	0.	.03
+	ROUTED TO		3.	5.92	0.	0.	0.	.03
+	2 COMBINED AT	EG1	10.	5.92	2.	1.	1.	.15
+	ROUTED TO	G1-G	10.	6.00	2.	1.	1.	.15
+	HYDROGRAPH AT	E9	5.	5.92	1.	0.	0.	.08
+	ROUTED TO		5.	6.00	1.	0.	0.	.08
+	HYDROGRAPH AT	E11	3.	5.92	1.	0.	0.	.05
+	HYDROGRAPH AT	E12	7.	5.83	1.	1.	0.	.09
+	5 COMBINED AT	EG	37.	6.08	10.	6.	6.	1.22
+	HYDROGRAPH AT	E13	1.	6.00	0.	0.	0.	.02
+	HYDROGRAPH AT	E14	0.	5.83	0.	0.	0.	.01
+	ROUTED TO		0.	5.92	0.	0.	0.	.01
+	3 COMBINED AT	EH	39.	6.00	10.	6.	6.	1.24
+	ROUTED TO		38.	6.17	10.	6.	6.	1.24
+	HYDROGRAPH AT	E19	6.	5.83	1.	0.	0.	.04
+	2 COMBINED AT	EJ1	39.	6.17	10.	6.	6.	1.28
+	ROUTED TO	J1-K	39.	6.25	10.	6.	6.	1.28
+	HYDROGRAPH AT	E15	6.	5.83	1.	0.	0.	.04
+	ROUTED TO		6.	5.83	1.	0.	0.	.04
+	HYDROGRAPH AT	E16	5.	5.83	1.	0.	0.	.03
+	2 COMBINED AT	EI	11.	5.83	1.	0.	0.	.07
+	ROUTED TO		10.	5.92	1.	0.	0.	.07
+	HYDROGRAPH AT	E17	5.	5.83	1.	0.	0.	.03
+	ROUTED TO		5.	5.92	1.	0.	0.	.03
+	HYDROGRAPH AT	E18	6.	5.92	1.	0.	0.	.05
+	3 COMBINED AT	EJ2	22.	5.92	3.	1.	1.	.15
+	ROUTED TO		19.	6.25	3.	1.	1.	.15
+	HYDROGRAPH AT	E23	15.	5.92	3.	1.	1.	.17
+	HYDROGRAPH AT	E24	11.	6.08	3.	1.	1.	.14
	4 COMBINED AT							

+		EK	76.	6.25	18.	10.	9.	1.74
	ROUTED TO		69.	6.42	18.	9.	9.	1.74
+	HYDROGRAPH AT	E21	6.	5.92	1.	0.	0.	.09
	ROUTED TO		6.	6.00	1.	0.	0.	.09
+	HYDROGRAPH AT	E20	8.	5.92	1.	1.	1.	.08
	ROUTED TO		7.	6.00	1.	1.	1.	.08
+	HYDROGRAPH AT	E22	5.	5.92	1.	0.	0.	.07
	3 COMBINED AT	EL	18.	6.00	3.	1.	1.	.23
	ROUTED TO		17.	6.08	3.	1.	1.	.23
+	HYDROGRAPH AT	E25	15.	5.92	3.	1.	1.	.17
	3 COMBINED AT	EM	85.	6.33	24.	12.	11.	2.13
	ROUTED TO		84.	6.42	24.	12.	11.	2.13
+	HYDROGRAPH AT	E26	6.	5.83	1.	0.	0.	.04
	2 COMBINED AT	EN	85.	6.42	25.	12.	12.	2.17
	ROUTED TO		84.	6.50	24.	12.	12.	2.17
+	HYDROGRAPH AT	E27	17.	5.83	2.	1.	1.	.12
	2 COMBINED AT	EO	87.	6.50	26.	13.	13.	2.29
	ROUTED TO		84.	6.58	26.	13.	12.	2.29
+	HYDROGRAPH AT	W55	5.	5.83	1.	0.	0.	.05
	2 COMBINED AT	WAG	85.	6.58	27.	13.	13.	2.34
	ROUTED TO		84.	6.58	27.	13.	13.	2.34
+	HYDROGRAPH AT	W59	5.	5.92	1.	0.	0.	.07
	4 COMBINED AT	WAJ	269.	7.00	122.	54.	52.	10.03
	ROUTED TO		267.	7.00	122.	54.	52.	10.03
+	HYDROGRAPH AT	E28	6.	5.92	1.	0.	0.	.07
	ROUTED TO		6.	6.17	1.	0.	0.	.07
+	HYDROGRAPH AT	E29	4.	5.83	1.	0.	0.	.05
	2 COMBINED AT	EZZ	7.	6.17	2.	1.	1.	.12
+	HYDROGRAPH AT	W60	5.	5.92	1.	0.	0.	.07
	3 COMBINED AT	ZZ	271.	7.00	125.	55.	53.	10.22

*** NORMAL END OF HEC-1 ***

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* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
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* RUN DATE 28SEP07 TIME 11:49:21
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1	ID	FALCON BASIN 100-YR/ 24-HOUR FLOOD/ EXISTING CONDITIONS										
2	ID	UPPER EAST TRIBUTARY (WOODMEN HILLS) BASED ON CLOMR APPROVED 2/2/99										
3	ID	INCLUDING 2 EXISTING SCS STOCK PONDS, WEST WOODMEN HILLS POND										
4	ID	NOTE: M1-M4 (PAINT BRUSH HILLS) MODELED AS HISTORIC TO ACCOUNT FOR										
5	ID	DETENTION POND AT MC										
6	ID	NOTE: NO CULVERT AT STAPLETON & MERIDIAN, TEMP CULVERTS AT MERIDIAN										
7	ID	DOWNSTREAM OF WOODMEN HILLS DRIVE (DIVERSION)										
8	*DIAGRAM											
9	IT	5	14JUL99	800	300							
10	IO	5										
11	KK	W1										
12	KM											
13	BA	.0479										
14	PB	4.4										
15	IN	15										
16	PC	.0005	.0015	.0030	.0045	.0060	.0080	.0100	.0120	.0143	.0165	
17	PC	.0188	.0210	.0233	.0255	.0278	.0320	.0390	.0460	.0530	.0600	
18	PC	.0750	.1000	.4000	.7000	.7250	.7500	.7650	.7800	.7900	.8000	
19	PC	.8100	.8200	.8250	.8300	.8350	.8400	.8450	.8500	.8550	.8600	
20	PC	.8638	.8675	.8713	.8750	.8788	.8825	.8863	.8900	.8938	.8975	
21	PC	.9013	.9050	.9083	.9115	.9148	.9180	.9210	.9240	.9270	.9300	
22	PC	.9325	.9350	.9375	.9400	.9425	.9450	.9475	.9500	.9525	.9550	
23	PC	.9575	.9600	.9625	.9650	.9675	.9700	.9725	.9750	.9775	.9800	
24	PC	.9813	.9825	.9838	.9850	.9863	.9875	.9888	.9900	.9913	.9925	
25	PC	.9938	.9950	.9963	.9975	.9988	1.000					
26	LS	60										
27	UD	.097										
28	KK											
29	KM											
30	RK	1519	.0263	.035		TRAP	5	4				
31	KK	W2										
32	KM											
33	BA	.0278										
34	LS	60										
35	UD	.160										
36	KK	WA										
37	KM											
38	HC	2										
39	KK											
40	KM											
41	RK	464	.0151	.035		TRAP	5	4				
42	KK	W3										
43	KM											
44	BA	.0498										
45	LS	61										
46	UD	.139										
47	KK	WB										
48	KM											
49	HC	2										
50	KK											
51	KM											
52	RK	823	.0279	.035		TRAP	5	4	54			
53	KK	W4										
54	KM											
55	BA	.0054										
56	LS	62										
57	UD	.044										
58	KK											
59	KM											
60	RK	1078	.0482	.035		TRAP	5	4				
61	KK	W5										
62	KM											
63	BA	.0159										
64	LS	60										
65	UD	.075										
66	KK	WC										
67	KM											
68	HC	3										
69	KK											
70	KM											
71	RK	557	.0449	.035		TRAP	10	4				
72	KK	W6										
73	KM											
74	BA	.0486										
75	LS	60										
76	UD	.085										
77	KK											
78	KM											
79	RK	592	.0372	.035		TRAP	5	4				

79	KK	W7					
80	KM						
81	BA	.0217					
82	LS		60				
83	UD	.074					
84	KK						
85	KM						
86	RK	464	.1466	.035	TRAP	5	4
87	KK	WD					
88	KM						
89	HC	2					
90	KK	D-E					
91	KM						
92	RK	1044	.0479	.035	TRAP	5	4
93	KK	W8					
94	KM						
95	BA	.0286					
96	LS		60				
97	UD	.069					
98	KK						
99	KM						
100	RK	1449	.0504	.035	TRAP	5	4
101	KK	W9					
102	KM						
103	BA	.0402					
104	LS		61				
105	UD	.097					
106	KK	WE					
107	KM						
108	HC	3					
109	KK	E-F					
110	KM						
111	RK	789	.0038	.035	TRAP	5	4
112	KK	W10					
113	KM						
114	BA	.0431					
115	LS		61				
116	UD	.096					
117	KK						
118	KM						
119	RK	824	.0388	.035	TRAP	5	4
120	KK	W11					
121	KM						
122	BA	.0314					
123	LS		60				
124	UD	.077					
125	KK	WF					
126	KM						
127	HC	4					
128	KK	F-G					
129	KM						
130	RK	2319	.0211	.035	TRAP	10	4
131	KK	W12					
132	KM						
133	BA	.0398					
134	LS		60				
135	UD	.095					
136	KK						
137	KM						
138	RK	2478	.0307	.035	TRAP	5	4
139	KK	W14					
140	KM						
141	BA	.0473					
142	LS		61				
143	UD	.135					
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145	KM						
146	RK	81	0.0001	.035	TRAP	5	4
147	KK	W13					
148	KM						
149	BA	.1123					
150	LS		61				
151	UD	.182					
152	KK	WG					
153	KM						
154	HC	4					

155	KK	G-H					
156	KM						
157	RK	2632	.0217	.035	TRAP	15	4
158	KK						
159	KM						
160	RK	2447	.0372	.035	TRAP	5	4
161	KK	W15					
162	KM						
163	BA	.0881					
164	LS		61				
165	UD	.141					
166	KK						
167	KM						
168	RK	1763	.0289	.035	TRAP	5	4
169	KK	WH					
170	KM						
171	HC	2					
172	KK	W16					
173	KM						
174	BA	.0292					
175	LS		61				
176	UD	.092					
177	KK						
178	KM						
179	RK	1345	.0260	.035	TRAP	5	4
180	KK	W17					
181	KM						
182	BA	.0184					
183	LS		60				
184	UD	.085					
185	KK	WI					
186	KM						
187	HC	2					
188	KK	I-M					
189	KM						
190	RK	2650	.0370	.035	TRAP	15	4
191	KK	W19					
192	KM						
193	BA	.0428					
194	LS		61				
195	UD	.083					
196	KK						
197	KM						
198	RK	881	.0329	.035	TRAP	5	4
199	KK	W20					
200	KM						
201	BA	.0315					
202	LS		61				
203	UD	.071					
204	KK	WJ					
205	KM						
206	HC	2					
207	KK						
208	KM						
209	RK	3061	.0235	.035	TRAP	5	4
210	KK	W21					
211	KM						
212	BA	.1347					
213	LS		60				
214	UD	.156					
215	KK	WK					
216	KM						
217	HC	2					
218	KK						
219	KM						
220	RK	487	.0246	.035	TRAP	5	4
221	KK	W22					
222	KM						
223	BA	.0086					
224	LS		63				
225	UD	.055					
226	KK	WL					
227	KM						
228	HC	2					

229	KK						
230	KM						
231	RK	1786	.0297	.035	TRAP	5	4
232	KK	W23					
233	KM						
234	BA	.0244					
235	LS		60				
236	UD	.112					
237	KK	W18					
238	KM						
239	BA	.1251					
240	LS		60				
241	UD	.189					
242	KK	WM					
243	KM						
244	HC	5					
245	KK	M-N					
246	KM						
247	RK	1345	.0149	.035	TRAP	20	4
248	KK	W24					
249	KM						
250	BA	.0442					
251	LS		60				
252	UD	.140					
253	KK	W25					
254	KM						
255	BA	.0957					
256	LS		61				
257	UD	.197					
258	KK	WN					
259	KM						
260	HC	3					
261	KK	N-P					
262	KM						
263	RK	1589	.017	.035	TRAP	20	4
264	KK	W28					
265	KM						
266	BA	.0397					
267	LS		63				
268	UD	.128					
269	KK						
270	KM						
271	RK	1345	.0208	.035	TRAP	5	4
272	KK	W30					
273	KM						
274	BA	.0509					
275	LS		63				
276	UD	.123					
277	KK						
278	KM						
279	RK	1078	.0074	.035	TRAP	5	4
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281	KM						
282	BA	.0409					
283	LS		63				
284	UD	.145					
285	KK	W31					
286	KM						
287	BA	.0123					
288	LS		63				
289	UD	.073					
290	KK	WO					
291	KM						
292	HC	4					
293	KK	O-P					
294	KM						
295	RK	2169	.0226	.035	TRAP	5	4
296	KK	W26					
297	KM						
298	BA	.0301					
299	LS		63				
300	UD	.062					
301	KK						
302	KM						
303	RK	4662	.0225	.035	TRAP	5	4
304	KK	W27					

305	KM						
306	BA	.1633					
307	LS		60				
308	UD	.253					
309	KK	W32					
310	KM						
311	BA	.0890					
312	LS		60				
313	UD	.170					
314	KK	WP					
315	KM						
316	HC	5					
317	KK	P-Q					
318	KM						
319	RK	1925	.0182	.035	TRAP	25	4
320	KK	W33A					
321	KM						
322	BA	.1261					
323	LS		60				
324	UD	.186					
325	KK	WP1					
326	KM						
327	HC	2					
328	KK	P1-Q					
329	KM						
330	RK	3000	.020	.035	TRAP	25	4
331	KK	W33B					
332	KM						
333	BA	.1360					
334	LS		60				
335	UD	.225					
336	KK	W34A					
337	KM						
338	BA	.1261					
339	LS		60				
340	UD	.173					
341	KK	34A-P2					
342	KM						
343	RK	2550	.0176	.035	TRAP	25	4
344	KK	W34B					
345	KM						
346	BA	.1766					
347	LS		60				
348	UD	.224					
349	KK	WP2					
350	KM						
351	HC	2					
352	KK	P2-Q					
353	KM						
354	RK	2640	.021	.035	TRAP	25	4
355	KK	W34C					
356	KM						
357	BA	.1625					
358	LS		60				
359	UD	.244					
360	KK	WQ					
361	KM						
362	HC	4					
363	KK	Q-Q1					
364	KM						
365	RK	2940	.022	.035	TRAP	25	4
366	KK	W36A					
367	KM						
368	BA	.1429					
369	LS		60				
370	UD	.234					
371	KK	WQ1					
372	KM						
373	HC	2					
374	KK	Q1-R					
375	KM						
376	RK	3400	.022	.035	TRAP	25	4
377	KK	W36B					
378	KM						
379	BA	.1918					
380	LS		60				

381	UD	.306					
382	KK	W35A					
383	KM						
384	BA	.0958					
385	LS		60				
386	UD	.187					
387	KK	35A-WR					
388	KM						
389	RK	3715	.023	.035	TRAP	25	4
390	KK	W35B					
391	KM						
392	BA	.1507					
393	LS	0	60				
394	UD	.259					
395	KK	WR					
396	KM						
397	HC	4					
398	KK	WR-S					
399	KM						
400	RK	2922	.0168	.035	TRAP	25	4
401	KK	W37A					
402	KM						
403	BA	.1138					
404	LS		60				
405	UD	.185					
406	KK	37A-S					
407	KM						
408	RK	1430	.014	.035	TRAP	25	4
409	KK	W37B					
410	KM						
411	BA	.1636					
412	LS		61				
413	UD	.218					
414	KK	WS					
415	KM						
416	HC	3					
417	KK	S-T					
418	KM						
419	RK	3653	.0164	.035	TRAP	25	4
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421	KM						
422	BA	.0907					
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426	KM						
427	RK	2922	.0171	.035	TRAP	5	4
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430	BA	.1833					
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432	UD	.251					
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435	BA	.0964					
436	LS		60				
437	UD	.165					
438	KK	WT					
439	KM						
440	HC	4					
441	KK	T-U					
442	KM						
443	RK	1125	.0098	.035	TRAP	25	4
444	KK	W41					
445	KM						
446	BA	.0601					
447	LS		60				
448	UD	.117					
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450	KM						
451	BA	.0581					
452	LS		81				
453	UD	.127					
454	KK	U-V					
455	KM						
456	RK	2656	.0184	.035	TRAP	5	4

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458	KM							
459	HC	3						
460	KK							
461	KM							
462	RK	2215	.0181	.035	TRAP	25	4	
463	KK	W43						
464	KM							
465	BA	.1457						
466	LS		61					
467	UD	.169						
468	KK	WV						
469	KM							
470	HC	2						
471	KK	V-W						
472	KM							
473	RK	487	.0103	.035	TRAP	25	4	
474	KK	W45						
475	KM							
476	BA	.1931						
477	LS		61					
478	UD	.189						
479	KK	WW						
480	KM							
481	HC	2						
482	KK	W-X						
483	KM							
484	RK	1542	.0149	.035	TRAP	5	4	
485	KK	M1						
486	KM							
487	BA	.0665						
488	LS		60					
489	UD	.108						
490	KK							
491	KM							
492	RK	650	.0308	.035	TRAP	5	4	
493	KK	M2						
494	KM							
495	BA	.0273						
496	LS		60					
497	UD	.114						

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498	KK	MB						
499	KM							
500	HC	2						
501	KK							
502	KM							
503	RK	928	.0302	.035	TRAP	5	4	
504	KK	M4						
505	KM							
506	BA	.0346						
507	LS		60					
508	UD	.121						
509	KK							
510	KM							
511	RK	406	.0197	.02	TRAP	40	0	
512	KK	M3						
513	KM							
514	BA	.0149						
515	LS		60					
516	UD	.076						
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518	KM							
519	HC	3						
520	KK							
521	KM							
522	RK	1902	.0231	.035	TRAP	5	4	
523	KK	M5						
524	KM							
525	BA	.0176						
526	LS		69					
527	UD	.108						

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529	KM							
530	RK	1717	.0186	.02	TRAP	40	0	
531	KK	M6						
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533	BA	.0637						
534	LS		65					
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538	HC	3						
539	KK							
540	KM							
541	RK	2841	.019	.035	TRAP	5	4	
542	KK	M7						
543	KM							
544	BA	.0524						
545	LS		69					
546	UD	.170						
547	KK							
548	KM							
549	RK	1044	.0268	.02	TRAP	40	0	
550	KK	M8						
551	KM							
552	BA	.0370						
553	LS		61					
554	UD	.126						
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556	KM							
557	HC	2						
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559	KM							
560	RK	2992	.0187	.035	TRAP	5	4	
561	KK	M9						
562	KM							
563	BA	.0169						
564	LS		69					
565	UD	.087						
566	KK							
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568	RK	3433	.0253	.03	TRAP	5	4	
569	KK	M12A						
570	KM							
571	BA	.0658						
572	LS		60					
573	UD	.159						
574	KK	M12B						
575	KM							
576	BA	.1481						
577	LS		60					
579	KK	MF						
580	KM							
581	HC	5						
582	KK							
583	KM							
584	RK	2586	.0224	.035	TRAP	10	4	
585	KK	M13						
586	KM							
587	BA	.0614						
588	LS		64					
589	UD	.165						
590	KK							
591	KM							
592	RK	1700	.01	.035	TRAP	6	4	
593	KK	M14						
594	KM							
595	BA	.1624						
596	LS		64					
597	UD	.228						
598	KK	MG						
599	KM							
600	HC	2						
601	KK	PONDW						
602	KM	WOODMEN HILLS DETENTION POND WEST (FROM FDR WH FLG F4)						
603	SV	0	.68	1.5	235	3.6	4.9	6.3
604	SE	968	969	970	971	972	973	974
								975
								976

680	BA	.042					
681	LS		60				
682	UD	.139					
683	KK	ML					
684	KM						
685	HC	2					
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687	KM						
688	RK	2099	.02	.035	TRAP	5	4
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690	KM						
691	BA	.0765					
692	LS		61				
693	UD	.133					
694	KK	MM					
695	KM						
696	HC	2					
697	KK						
698	KM						
699	RK	2320	.0121	.035	TRAP	10	4
700	KK	M18					
701	KM						
702	BA	.061					
703	LS		61				
704	UD	.142					
705	KK						
706	KM						
707	RK	2122	.017	.035	TRAP	5	4
708	KK	M20					
709	KM						
710	BA	.1341					
711	LS		61				
712	UD	.211					
713	KK	MN					
714	KM						
715	HC	4					
716	KK						
717	KM						
718	RK	1531	.0202	.035	TRAP	25	4
719	KK	M21					
720	KM						
721	BA	.0241					
722	LS		61				
723	UD	.125					
724	KK						
725	KM						
726	RK	1322	.0212	.035	TRAP	5	4
727	KK	M23					
728	KM						
729	BA	.0461					
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733	KM						
734	HC	3					
735	KK						
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738	KK	M24					
739	KM						
740	BA	.0776					
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742	UD	.125					
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744	KM						
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746	KK						
747	KM						
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750	KM						
751	BA	.0105					
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753	UD	.130					
754	KK	MQ					

755	KM						
756	HC	2					
757	KK						
758	KM						
759	RK	3305	.0136	.035	TRAP	25	4
760	KK	M26					
761	KM						
762	BA	.1779					
763	LS		65				
764	UD	.250					
765	KK	MR					
766	KM						
767	HC	2					
768	KK	W44					
769	KM						
770	BA	.0384					
771	LS		60				
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773	KK						
774	KM						
775	RK	2029	.0148	.035	TRAP	5	4
776	KK	W47					
777	KM						
778	BA	.0541					
779	LS		60				
780	UD	.148					
781	KK						
782	KM						
783	RK	1438	.0223	.035	TRAP	5	4
784	KK	W46					
785	KM						
786	BA	.0418					
787	LS		61				
788	UD	.154					
789	KK	M27					
790	KM						
791	BA	.0528					
792	LS		60				
793	UD	.132					
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795	KM						
796	HC	6					
797	KK						
798	KM						
799	RK	2563	.0125	.035	TRAP	40	4
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801	KM						
802	BA	.1179					
803	LS		61				
804	UD	.091					
805	KK						
806	KM						
807	RK	2400	.0188	.035	TRAP	5	4
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809	KM						
810	BA	.2651					
811	LS		61				
812	UD	.181					
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814	KM						
815	HC	3					
816	KK						
817	KM						
818	RK	800	.0125	.035	TRAP	40	4
819	KK	W50					
820	KM						
821	BA	.1061					
822	LS		61				
823	UD	.145					
824	KK	WAB					
825	KM						
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827	KK						
828	KM						
829	RK	742	.0108	.035	TRAP	40	4

830	KK	W51					
831	KM						
832	BA	.0546					
833	LS		63				
834	UD	.172					
835	KK	WAC					
836	KM						
837	HC	2					
838	KK						
839	KM						
840	RK	638	.0345	.035	TRAP	40	4
841	KK	W52					
842	KM						
843	BA	.0499					
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846	KK						
847	KM						
848	RK	1171	.0205	.035	TRAP	5	4
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850	KM						
851	BA	.0531					
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853	UD	.156					
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855	KM						
856	HC	2					
857	KK						
858	KM						
859	RK	290	.0310	.035	TRAP	10	4
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861	KM						
862	BA	.0078					
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866	KM						
867	HC	3					
868	KK						
869	KM						
870	RK	1925	.0052	.035	TRAP	40	4
871	KK	W56					
872	KM						
873	BA	.1831					
874	LS		60				
875	UD	.191					
876	KK	WAF					
877	KM						
878	HC	2					
879	KK						
880	KM						
881	RK	1032	.0155	.035	TRAP	40	4
882	KK	W62					
883	KM						
884	BA	.0750					
885	LS		60				
886	UD	.090					
887	KK						
888	KM						
889	RK	2169	.0203	.035	TRAP	5	4
890	KK	W63					
891	KM						
892	BA	.047					
893	LS		60				
894	UD	.109					
895	KK						
896	KM						
897	RK	1450	.0131	.035	TRAP	5	4
898	KK	W61					
899	KM						
900	BA	.192					
901	LS		60				
902	UD	.251					
903	KK	WAH					
904	KM						
905	HC	3					

906	KK							
907	KM							
908	RK	1241	.0153	.035	TRAP	5	4	
909	KK	W57						
910	KM							
911	BA	.0732						
912	LS		60					
913	UD	.140						
914	KK							
915	KM							
916	RK	5903	.0254	.035	TRAP	5	4	
917	KK	W58						
918	KM							
919	BA	.2296						
920	LS		60					
921	UD	.251						
922	KK	WAI						
923	KM							
924	HC	3						
925	KK							
926	KM							
927	RK	232	.0086	.035	TRAP	15	4	
928	KK	E1A						
929	KM							
930	BA	.1151						
931	LS	0	60					
932	UD	.234						
933	KK	E1A-EA						
934	KM							
935	RK	4000	.022	.035	TRAP	5	4	
936	KK	E1B						
937	KM							
938	BA	.1665						
939	LS	0	60					
940	UD	.233						
941	KK	EA						
942	KM							
943	HC	2						
944	KK	EA-EB						
945	KM							
946	RK	1900	.022	.035	TRAP	5	4	

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947	KK	E2							
948	KM								
949	BA	.104							
950	LS	0	60						
951	UD	.149							
952	KK	EB							
953	KM								
954	HC	2							
955	KK	POND1							
956	KM	ROUTE FLOW THROUGH SCS POND 1							
957	SV	0	.01	.28	1.12	2.70	5.18	6.00	6.94
958	SE	945.5	946	948	950	952	954	954.5	955
959	SQ	0	0	0	0	0	48.5	176.4	351.4
960	RS	1	ELEV	945.5					
961	KK								
962	KM								
963	RK	1300	.0192	.035	TRAP	5	4		
964	KK	E3							
965	KM								
966	BA	.090							
967	LS		60						
968	UD	.128							
969	KK	MH-P2							
970	KM	RETRIEVE DIVERSION FROM W. MERIDIAN RD DITCH							
971	DR	DIVRT1							
972	KK	EC							
973	KM								
974	HC	3							
975	KK	POND2							
976	KM	ROUTE FLOW THROUGH SCS POND 2							
977	SV	0	.21	1.11	3.19	6.89	9.52	11.08	12.82 14.72 16.70

978	SE	920	922	924	926	928	929	929.5	930	930.5	931
979	SQ	0	0	0	0	0	0	25	86.5	186.2	308.4
980	RS	1	ELEV	920							
981	KK										
982	KM										
983	RK	1700	.0141	.035		TRAP	5	4			
984	KK	E1C									
985	KM										
986	BA	.0845									
987	LS		60								
988	UD	.200									
989	KK	1C-ED1									
990	KM										
991	RK	3450	.022	.035		TRAP	5	4			
992	KK	E4									
993	KM										
994	BA	.127									
995	LS		60								
996	UD	.200									
997	KK	ED1									
998	KM										
999	HC	2									
1000	KK	ED1-ED									
1001	KM										
1002	RK	450	.0178	.03		TRAP	5	4			
1003	KK	E5									
1004	KM										
1005	BA	.094									
1006	LS		60								
1007	UD	.160									
1008	KK	ED									
1009	KM										
1010	HC	3									
1011	KK										
1012	KM										
1013	RK	950	.0211	.035		TRAP	10	4			
1014	KK	E8									
1015	KM										
1016	BA	.0446									
1017	LS		60								
1018	UD	.139									
1019	KK	EE									
1020	KM										
1021	HC	2									
1022	KK										
1023	KM										
1024	RK	1500	.0127	.035		TRAP	10	4			
1025	KK	E10									
1026	KM										
1027	BA	.029									
1028	LS		60								
1029	UD	.158									
1030	KK	EF									
1031	KM										
1032	HC	2									
1033	KK	F-G									
1034	KM										
1035	RK	950	.0074	.035		TRAP	15	4			
1036	KK	E6									
1037	KM										
1038	BA	.119									
1039	LS		60								
1040	UD	.228									
1041	KK	E7									
1042	KM										
1043	BA	.031									
1044	LS		60								
1045	UD	.082									
1046	KK										
1047	KM										
1048	RK	1100	.0100	.035		TRAP	5	4			
1049	KK	EG1									
1050	KM										
1051	HC	2									
1052	KK	G1-G									

1204	KM						
1205	HC	2					
1206	KK						
1207	KM						
1208	RK	1832	.0126	.035	TRAP	40	4
1209	KK	E27					
1210	KM						
1211	BA	.1236					
1212	LS		63				
1213	UD	.172					
1214	KK	E0					
1215	KM						
1216	HC	2					
1217	KK						
1218	KM						
1219	RK	1625	.0133	.035	TRAP	5	3
1220	KK	W55					
1221	KM						
1222	BA	.0452					
1223	LS		60				
1224	UD	.093					
1225	KK	WAG					
1226	KM						
1227	HC	2					
1228	KK						
1229	KM						
1230	RK	2025	.0109	.035	TRAP	5	4
1231	KK	W59					
1232	KM						
1233	BA	.0705					
1234	LS		60				
1235	UD	.200					
1236	KK	W4J					
1237	KM						
1238	HC	4					
1239	KK						
1240	KM						
1241	RK	1450	.0124	.035	TRAP	40	4
1242	KK	E28					
1243	KM						
1244	BA	.0718					
1245	LS		61				
1246	UD	.223					
1247	KK						
1248	KM						
1249	RK	2064	.0165	.035	TRAP	40	4
1250	KK	E29					
1251	KM						
1252	BA	.0465					
1253	LS		61				
1254	UD	.166					
1255	KK	EZZ					
1256	KM	COMBINE E29 & E30 AT DP ZZ					
1257	HC	2					
1258	KK	W60					
1259	KM						
1260	BA	.0711					
1261	LS		60				
1262	UD	.182					
1263	KK	ZZ					
1264	KM	COMBINE ALL AT DP ZZ					
1265	HC	3					
1266	ZZ						

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
10	W1	
	V	
27	V	
	.	
30	.	W2
	.	
35	WA	
	V	
38	V	
	.	
41	.	W3
	.	
46	WB	
	V	
49	V	
	.	
52	.	W4
	V	
57	.	V
	.	
60	.	W5
	.	
65	WC	
	V	
68	V	
	.	
71	.	W6
	V	
76	.	V
	.	
79	.	W7
	.	V
84	.	V
	.	
87	WD	
	V	
90	V	
	D-E	
93	.	W8
	.	V
98	.	V
	.	
101	.	W9
	.	
106	WE	
	V	
109	V	
	E-F	
112	.	W10
	.	V
117	.	V
	.	
120	.	W11
	.	
125	WF	
	V	
128	V	
	F-G	
131	.	W12

501	.	V			
	.	V			
504	.	.	M4		
	.	.	V		
509	.	.	V		
512	.	.	.	M3	
	
517	.	MC	-----	.	
	.	V			
520	.	V			
523	.	.	M5		
	.	.	V		
528	.	.	V		
	.	.	.		
531	.	.	.	M6	
	
536	.	MD	-----	.	
	.	V			
539	.	V			
542	.	.	M7		
	.	.	V		
547	.	.	V		
	.	.	.		
550	.	.	.	M8	
	
555	.	.	ME	-----	
	.	.	V		
558	.	.	V		
	.	.	.		
561	.	.	.	M9	
	.	.	.	V	
566	.	.	.	V	
	
569	.	.	.	M12A	
	
574	.	.	.	.	M12B

579	.	MF	-----	.	
	.	V			
582	.	V			
585	.	.	M13		
	.	.	V		
590	.	.	V		
	.	.	.		
593	.	.	.	M14	
	
598	.	.	MG	-----	
	.	.	V		
	.	.	V		
601	.	.	PONDW		
	.	.	.		
607	.	MH	-----	.	
	.	V			
610	.	V			
	.	.	.		
615	.	.	----->	DIVRT1	
613	.	MH-P2			
	.	.	.		
618	.	.	M15		
	.	.	.		

623	.	MI	.....
	.	V		
626	.	V		
	.	.		
629	.	.	M19	
	.	.		
634	.	MJ	.....
	.	V		
637	.	V		
	.	.		
640	.	.	M10	
	.	.	V	
645	.	.	V	
	.	.	M10-K	
	.	.		
648	.	.	.	M11A
	.	.	.	
653	.	.	MK	.....
	.	.	V	
656	.	.	V	
	.	.	MK-K1	
	.	.	.	
659	.	.	.	M11B
	.	.	.	V
664	.	.	.	V
	.	.	.	11B-K1
	.	.	.	
667	.	.	.	.
	.	.	.	M11C
	.	.	.	
672	.	.	MK1	.....
	.	.	V	
675	.	.	V	
	.	.	K1-ML	
	.	.	.	
678	.	.	.	M16
	.	.	.	
683	.	.	.	
	.	.	ML	.....
	.	.	V	
686	.	.	V	
	.	.	.	
689	.	.	.	M17
	.	.	.	
694	.	.	.	
	.	.	MM	.....
	.	.	V	
697	.	.	V	
	.	.	.	
700	.	.	.	M18
	.	.	.	V
705	.	.	.	V
	.	.	.	
708	.	.	.	.
	.	.	.	M20
	.	.	.	
713	.	.	MN	.....
	.	.	V	
716	.	.	V	
	.	.	.	
719	.	.	.	M21
	.	.	.	V
724	.	.	.	V
	.	.	.	
727	.	.	.	.
	.	.	.	M23
	.	.	.	
732	.	.	MO	.....
	.	.	V	
735	.	.	V	
	.	.	.	
738	.	.	.	M24

860	.	.	W54	.

865	WAE.....	.	.	.
	V	.	.	.
	V	.	.	.
868	.	.	.	.

871	.	W56	.	.

876	WAF.....	.	.	.
	V	.	.	.
	V	.	.	.
879	.	.	.	.

882	.	W62	.	.
	.	V	.	.
	.	V	.	.
887	.	.	.	.

890	.	.	W63	.
	.	.	V	.
	.	.	V	.
895	.	.	.	.

898	.	.	.	W61

903	WAH.....	.	.	.
	V	.	.	.
	V	.	.	.
906	.	.	.	.

909	.	.	W57	.
	.	.	V	.
	.	.	V	.
914	.	.	.	.

917	.	.	.	W58

922	WAI.....	.	.	.
	V	.	.	.
	V	.	.	.
925	.	.	.	.

928	.	.	E1A	.
	.	.	V	.
	.	.	V	.
933	.	E1A-EA	.	.

936	.	.	.	E1B

941	.	.	EA.....	.
	.	.	V	.
	.	.	V	.
944	.	EA-EB	.	.

947	.	.	.	E2

952	.	.	EB.....	.
	.	.	V	.
	.	.	V	.
955	.	POND1	.	.
	.	V	.	.
	.	V	.	.
961	.	.	.	.

964	.	.	E3	.

971	.	.	.	----- DIVRT1
969	.	.	MH-P2	.

972	.	EC.....	.	.
	.	V	.	.
	.	V	.	.
975	.	POND2	.	.
	.	V	.	.
	.	V	.	.
981	.	.	.	.

1103	.	J1-K	.	.
1106	.	.	E15	.
	.	.	V	.
	.	.	V	.
1111	.	.	.	.

1114	.	.	.	E16

1119	.	.	EI	.....
	.	.	V	.
	.	.	V	.
1122	.	.	.	.

1125	.	.	.	E17
	.	.	.	V
	.	.	.	V
1130	.	.	.	.

1133	.	.	.	E18

1138	.	.	EJ2	.....
	.	.	V	.
	.	.	V	.
1141	.	.	.	.

1144	.	.	.	E23

1149	.	.	.	E24

1154	.	.	EK	.....
	.	.	V	.
	.	.	V	.
1157	.	.	.	.

1160	.	.	E21	.
	.	.	V	.
	.	.	V	.
1165	.	.	.	.

1168	.	.	.	E20
	.	.	.	V
	.	.	.	V
1173	.	.	.	.

1176	.	.	.	E22

1181	.	.	EL	.....
	.	.	V	.
	.	.	V	.
1184	.	.	.	.

1187	.	.	.	E25

1192	.	.	EM	.....
	.	.	V	.
	.	.	V	.
1195	.	.	.	.

1198	.	.	.	E26

1203	.	.	EN	.....
	.	.	V	.
	.	.	V	.
1206	.	.	.	.

1209	.	.	.	E27

1214	.	.	EO	.....
	.	.	V	.
	.	.	V	.
1217	.	.	.	.

1220	.	.	.	W55

1225	.	.	.	WAG.....
	.	.	.	V
	.	.	.	V
1228	.	.	.	
	.	.	.	
1231	.	.	.	W59
	.	.	.	
	.	.	.	
1236	WAG.....			
	V			
	V			
1239	.			
	.			
1242	.	E28		
	.	V		
	.	V		
1247	.	.		
	.	.		
1250	.	.	E29	
	.	.	.	
	.	.	.	
1255	.	EZZ.....		
	.	.		
	.	.		
1258	.	.	W60	
	.	.	.	
	.	.	.	
1263	ZZ.....			

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 28SEP07 TIME 11:49:21
*
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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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FALCON BASIN 100-YR/ 24-HOUR FLOOD/ EXISTING CONDITIONS
 UPPER EAST TRIBUTARY (WOODMEN HILLS) BASED ON CLOMR APPROVED 2/2/99
 INCLUDING 2 EXISTING SCS STOCK PONDS, WEST WOODMEN HILLS POND
 NOTE: M1-M4 (PAINT BRUSH HILLS) MODELED AS HISTORIC TO ACCOUNT FOR
 DETENTION POND AT MC
 NOTE: NO CULVERT AT STAPLETON & MERIDIAN, TEMP CULVERTS AT MERIDIAN
 DOWNSTREAM OF WOODMEN HILLS DRIVE (DIVERSION)

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9 IO      OUTPUT CONTROL VARIABLES
          IPRNT      5  PRINT CONTROL
          IPLOT      0  PLOT CONTROL
          QSCAL      0.  HYDROGRAPH PLOT SCALE

IT        HYDROGRAPH TIME DATA
          NMIN       5  MINUTES IN COMPUTATION INTERVAL
          IDATE      14JUL99  STARTING DATE
          ITIME      0800  STARTING TIME
          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     15JUL99  ENDING DATE
          NDTIME     0855  ENDING TIME
          ICENT      19  CENTURY MARK

          COMPUTATION INTERVAL .08 HOURS
          TOTAL TIME BASE 24.92 HOURS

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ENGLISH UNITS
DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW              CUBIC FEET PER SECOND
STORAGE VOLUME    ACRE-FEET
SURFACE AREA      ACRES
TEMPERATURE       DEGREES FAHRENHEIT

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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
					6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT	W1	40.	5.75	4.	1.	1.	.05		
+	ROUTED TO		37.	5.83	4.	1.	1.	.05		
+	HYDROGRAPH AT	W2	20.	5.83	2.	1.	1.	.03		
+	2 COMBINED AT	WA	57.	5.83	6.	2.	2.	.08		
+	ROUTED TO		55.	5.83	6.	2.	2.	.08		
+	HYDROGRAPH AT	W3	39.	5.83	4.	1.	1.	.05		
+	2 COMBINED AT	WB	95.	5.83	10.	3.	3.	.13		
+	ROUTED TO		91.	5.83	10.	3.	3.	.13		
+	HYDROGRAPH AT	W4	6.	5.75	0.	0.	0.	.01		
+	ROUTED TO		6.	5.75	0.	0.	0.	.01		
+	HYDROGRAPH AT	W5	15.	5.75	1.	0.	0.	.02		
+	3 COMBINED AT	WC	105.	5.83	11.	4.	4.	.15		
+	ROUTED TO		103.	5.83	11.	4.	4.	.15		
+	HYDROGRAPH AT	W6	43.	5.75	4.	1.	1.	.05		
+	ROUTED TO		40.	5.75	4.	1.	1.	.05		
+	HYDROGRAPH AT	W7	20.	5.75	2.	1.	1.	.02		
+	ROUTED TO		20.	5.75	2.	1.	1.	.02		
+	2 COMBINED AT	WD	60.	5.75	5.	2.	2.	.07		
+	ROUTED TO	D-E	55.	5.75	5.	2.	2.	.07		
+	HYDROGRAPH AT	W8	27.	5.75	2.	1.	1.	.03		
+	ROUTED TO		24.	5.75	2.	1.	1.	.03		
+	HYDROGRAPH AT	W9	36.	5.75	3.	1.	1.	.04		
+	3 COMBINED AT	WE	114.	5.75	11.	4.	4.	.14		
+	ROUTED TO	E-F	108.	5.83	11.	4.	4.	.14		
+	HYDROGRAPH AT	W10	39.	5.75	3.	1.	1.	.04		
+	ROUTED TO		36.	5.75	4.	1.	1.	.04		
+	HYDROGRAPH AT	W11	29.	5.75	2.	1.	1.	.03		
+	4 COMBINED AT	WF	265.	5.83	28.	10.	9.	.36		
	ROUTED TO									

+		F-G	255.	5.83	28.	10.	9.	.36
+	HYDROGRAPH AT	W12	33.	5.75	3.	1.	1.	.04
+	ROUTED TO		32.	5.83	3.	1.	1.	.04
+	HYDROGRAPH AT	W14	38.	5.83	4.	1.	1.	.05
+	ROUTED TO		37.	5.83	4.	1.	1.	.05
+	HYDROGRAPH AT	W13	80.	5.83	9.	3.	3.	.11
+	4 COMBINED AT	WG	403.	5.83	44.	15.	14.	.56
+	ROUTED TO	G-H	382.	5.92	44.	15.	14.	.56
+	ROUTED TO		368.	5.92	44.	15.	14.	.56
+	HYDROGRAPH AT	W15	70.	5.83	7.	2.	2.	.09
+	ROUTED TO		66.	5.83	7.	2.	2.	.09
+	2 COMBINED AT	WH	428.	5.92	51.	17.	17.	.65
+	HYDROGRAPH AT	W16	27.	5.75	2.	1.	1.	.03
+	ROUTED TO		24.	5.83	2.	1.	1.	.03
+	HYDROGRAPH AT	W17	16.	5.75	1.	0.	0.	.02
+	2 COMBINED AT	WI	38.	5.75	4.	1.	1.	.05
+	ROUTED TO	I-M	37.	5.83	4.	1.	1.	.05
+	HYDROGRAPH AT	W19	41.	5.75	3.	1.	1.	.04
+	ROUTED TO		37.	5.75	3.	1.	1.	.04
+	HYDROGRAPH AT	W20	32.	5.75	3.	1.	1.	.03
+	2 COMBINED AT	WJ	69.	5.75	6.	2.	2.	.07
+	ROUTED TO		65.	5.83	6.	2.	2.	.07
+	HYDROGRAPH AT	W21	96.	5.83	10.	3.	3.	.13
+	2 COMBINED AT	WK	161.	5.83	16.	6.	5.	.21
+	ROUTED TO		156.	5.83	16.	6.	5.	.21
+	HYDROGRAPH AT	W22	10.	5.75	1.	0.	0.	.01
+	2 COMBINED AT	WL	161.	5.83	17.	6.	6.	.22
+	ROUTED TO		147.	5.83	17.	6.	6.	.22
+	HYDROGRAPH AT	W23	19.	5.75	2.	1.	1.	.02
+	HYDROGRAPH AT	W18	80.	5.83	9.	3.	3.	.13
+	5 COMBINED AT	WM	690.	5.92	83.	28.	27.	1.06
+	ROUTED TO	M-N	673.	5.92	83.	28.	27.	1.06

+	HYDROGRAPH AT	W24	33.	5.83	3.	1.	1.	.04
+	HYDROGRAPH AT	W25	64.	5.83	8.	3.	3.	.10
+	3 COMBINED AT	WN	756.	5.92	94.	32.	31.	1.20
+	ROUTED TO	N-P	722.	5.92	94.	32.	31.	1.20
+	HYDROGRAPH AT	W28	36.	5.83	4.	1.	1.	.04
+	ROUTED TO		35.	5.83	4.	1.	1.	.04
+	HYDROGRAPH AT	W30	46.	5.83	5.	2.	2.	.05
+	ROUTED TO		46.	5.83	5.	2.	2.	.05
+	HYDROGRAPH AT	W29	37.	5.83	4.	1.	1.	.04
+	HYDROGRAPH AT	W31	14.	5.75	1.	0.	0.	.01
+	4 COMBINED AT	WO	127.	5.83	13.	4.	4.	.14
+	ROUTED TO	O-P	118.	5.83	13.	4.	4.	.14
+	HYDROGRAPH AT	W26	36.	5.75	3.	1.	1.	.03
+	ROUTED TO		35.	5.92	3.	1.	1.	.03
+	HYDROGRAPH AT	W27	89.	5.92	12.	4.	4.	.16
+	HYDROGRAPH AT	W32	61.	5.83	7.	2.	2.	.09
+	5 COMBINED AT	WP	1012.	5.92	128.	44.	43.	1.63
+	ROUTED TO	P-Q	950.	5.92	128.	44.	43.	1.63
+	HYDROGRAPH AT	W33A	82.	5.83	10.	3.	3.	.13
+	2 COMBINED AT	WP1	1023.	5.92	138.	47.	46.	1.75
+	ROUTED TO	P1-Q	1007.	6.00	137.	47.	46.	1.75
+	HYDROGRAPH AT	W33B	78.	5.92	10.	4.	3.	.14
+	HYDROGRAPH AT	W34A	86.	5.83	10.	3.	3.	.13
+	ROUTED TO	34A-P2	82.	5.92	9.	3.	3.	.13
+	HYDROGRAPH AT	W34B	101.	5.92	13.	5.	4.	.18
+	2 COMBINED AT	WP2	183.	5.92	23.	8.	8.	.30
+	ROUTED TO	P2-Q	175.	6.00	23.	8.	8.	.30
+	HYDROGRAPH AT	W34C	90.	5.92	12.	4.	4.	.16
+	4 COMBINED AT	WQ	1325.	6.00	181.	63.	61.	2.36
+	ROUTED TO	Q-Q1	1284.	6.00	181.	63.	60.	2.36
+	HYDROGRAPH AT	W36A	81.	5.92	11.	4.	4.	.14
+	2 COMBINED AT	WQ1	1352.	6.00	191.	66.	64.	2.50

+	ROUTED TO	Q1-R	1311.	6.08	190.	66.	64.	2.50
+	HYDROGRAPH AT	W36B	91.	6.00	14.	5.	5.	.19
+	HYDROGRAPH AT	W35A	62.	5.83	7.	2.	2.	.10
+	ROUTED TO	35A-WR	58.	6.00	7.	2.	2.	.10
+	HYDROGRAPH AT	W35B	81.	5.92	11.	4.	4.	.15
+	4 COMBINED AT	WR	1497.	6.08	222.	78.	75.	2.94
+	ROUTED TO	WR-S	1475.	6.08	222.	77.	75.	2.94
+	HYDROGRAPH AT	W37A	74.	5.83	9.	3.	3.	.11
+	ROUTED TO	37A-S	71.	5.92	9.	3.	3.	.11
+	HYDROGRAPH AT	W37B	102.	5.92	13.	5.	4.	.16
+	3 COMBINED AT	WS	1575.	6.08	242.	85.	82.	3.21
+	ROUTED TO	S-T	1522.	6.17	242.	85.	81.	3.21
+	HYDROGRAPH AT	W38	67.	5.83	8.	3.	3.	.09
+	ROUTED TO		66.	5.92	8.	3.	3.	.09
+	HYDROGRAPH AT	W39	100.	5.92	14.	5.	5.	.18
+	HYDROGRAPH AT	W40	67.	5.83	7.	3.	2.	.10
+	4 COMBINED AT	WT	1621.	6.17	269.	95.	91.	3.59
+	ROUTED TO	T-U	1613.	6.17	269.	95.	91.	3.59
+	HYDROGRAPH AT	W41	45.	5.83	5.	2.	2.	.06
+	HYDROGRAPH AT	W42	125.	5.75	13.	4.	4.	.06
+	ROUTED TO	U-V	122.	5.83	13.	4.	4.	.06
+	3 COMBINED AT	WU	1648.	6.17	285.	100.	96.	3.70
+	ROUTED TO		1612.	6.17	285.	100.	96.	3.70
+	HYDROGRAPH AT	W43	108.	5.83	12.	4.	4.	.15
+	2 COMBINED AT	WV	1640.	6.17	296.	104.	100.	3.85
+	ROUTED TO	V-W	1621.	6.17	296.	104.	100.	3.85
+	HYDROGRAPH AT	W45	134.	5.83	16.	5.	5.	.19
+	2 COMBINED AT	WW	1663.	6.17	311.	109.	105.	4.04
+	ROUTED TO	W-X	1621.	6.25	311.	109.	105.	4.04
+	HYDROGRAPH AT	M1	52.	5.75	5.	2.	2.	.07
+	ROUTED TO		50.	5.83	5.	2.	2.	.07
	HYDROGRAPH AT							

+		M2	21.	5.75	2.	1.	1.	.03		
+	2 COMBINED AT	MB	70.	5.83	7.	2.	2.	.09		
+	ROUTED TO		70.	5.83	7.	2.	2.	.09		
+	HYDROGRAPH AT	M4	26.	5.83	3.	1.	1.	.03		
+	ROUTED TO		26.	5.83	3.	1.	1.	.03		
+	HYDROGRAPH AT	M3	14.	5.75	1.	0.	0.	.01		
+	3 COMBINED AT	MC	105.	5.83	11.	4.	4.	.14		
+	ROUTED TO		102.	5.83	11.	4.	4.	.14		
+	HYDROGRAPH AT	M5	24.	5.75	2.	1.	1.	.02		
+	ROUTED TO		23.	5.83	2.	1.	1.	.02		
+	HYDROGRAPH AT	M6	51.	5.92	7.	2.	2.	.06		
+	3 COMBINED AT	MD	175.	5.83	20.	7.	6.	.22		
+	ROUTED TO		170.	5.92	20.	7.	6.	.22		
+	HYDROGRAPH AT	M7	63.	5.83	7.	2.	2.	.05		
+	ROUTED TO		61.	5.83	7.	2.	2.	.05		
+	HYDROGRAPH AT	M8	30.	5.83	3.	1.	1.	.04		
+	2 COMBINED AT	ME	91.	5.83	10.	3.	3.	.09		
+	ROUTED TO		89.	5.92	10.	3.	3.	.09		
+	HYDROGRAPH AT	M9	25.	5.75	2.	1.	1.	.02		
+	ROUTED TO		23.	5.83	2.	1.	1.	.02		
+	HYDROGRAPH AT	M12A	47.	5.83	5.	2.	2.	.07		
+	HYDROGRAPH AT	M12B	86.	5.92	11.	4.	4.	.15		
+	5 COMBINED AT	MF	401.	5.92	47.	16.	15.	.54		
+	ROUTED TO		388.	5.92	47.	16.	15.	.54		
+	HYDROGRAPH AT	M13	56.	5.83	6.	2.	2.	.06		
+	ROUTED TO		53.	5.92	6.	2.	2.	.06		
+	HYDROGRAPH AT	M14	122.	5.92	16.	5.	5.	.16		
+	2 COMBINED AT	MG	176.	5.92	22.	7.	7.	.22		
+	ROUTED TO	PONDW	16.	7.00	16.	7.	7.	.22	970.02	7.00
+	2 COMBINED AT	MH	403.	5.92	63.	23.	22.	.77		
+	ROUTED TO		385.	6.00	63.	23.	22.	.77		
+	DIVERSION TO	DIVRT1	85.	6.00	43.	18.	18.	.77		

+	HYDROGRAPH AT	MH-P2	300.	6.00	20.	5.	5.	.77
+	HYDROGRAPH AT	M15	101.	5.83	12.	4.	4.	.12
+	2 COMBINED AT	MI	388.	5.92	32.	9.	9.	.89
+	ROUTED TO		378.	6.00	32.	9.	9.	.89
+	HYDROGRAPH AT	M19	38.	5.83	4.	1.	1.	.05
+	2 COMBINED AT	MJ	397.	6.00	36.	10.	10.	.94
+	ROUTED TO		381.	6.00	36.	10.	10.	.94
+	HYDROGRAPH AT	M10	54.	5.75	5.	2.	2.	.06
+	ROUTED TO	M10-K	53.	5.83	5.	2.	2.	.06
+	HYDROGRAPH AT	M11A	65.	5.92	9.	3.	3.	.11
+	2 COMBINED AT	MK	115.	5.83	14.	5.	4.	.16
+	ROUTED TO	MK-K1	111.	5.92	14.	5.	4.	.16
+	HYDROGRAPH AT	M11B	64.	5.83	7.	2.	2.	.09
+	ROUTED TO	11B-K1	58.	5.92	7.	2.	2.	.09
+	HYDROGRAPH AT	M11C	66.	5.83	7.	2.	2.	.09
+	3 COMBINED AT	MK1	230.	5.83	27.	9.	9.	.35
+	ROUTED TO	K1-ML	225.	5.92	27.	9.	9.	.35
+	HYDROGRAPH AT	M16	31.	5.83	3.	1.	1.	.04
+	2 COMBINED AT	ML	247.	5.92	30.	10.	10.	.39
+	ROUTED TO		240.	5.92	30.	10.	10.	.39
+	HYDROGRAPH AT	M17	61.	5.83	6.	2.	2.	.08
+	2 COMBINED AT	MM	282.	5.92	36.	13.	12.	.46
+	ROUTED TO		268.	6.00	36.	12.	12.	.46
+	HYDROGRAPH AT	M18	48.	5.83	5.	2.	2.	.06
+	ROUTED TO		45.	5.92	5.	2.	2.	.06
+	HYDROGRAPH AT	M20	85.	5.83	11.	4.	4.	.13
+	4 COMBINED AT	MN	747.	6.00	88.	28.	27.	1.60
+	ROUTED TO		724.	6.00	88.	28.	27.	1.60
+	HYDROGRAPH AT	M21	19.	5.83	2.	1.	1.	.02
+	ROUTED TO		19.	5.83	2.	1.	1.	.02
+	HYDROGRAPH AT	M23	34.	5.83	3.	1.	1.	.05
	3 COMBINED AT							

+		MO	747.	6.00	93.	30.	29.	1.67
+	ROUTED TO		724.	6.00	93.	30.	29.	1.67
+	HYDROGRAPH AT	M24	58.	5.83	6.	2.	2.	.08
+	2 COMBINED AT	MP	744.	6.00	99.	32.	31.	1.75
+	ROUTED TO		736.	6.00	99.	32.	31.	1.75
+	HYDROGRAPH AT	M25	8.	5.83	1.	0.	0.	.01
+	2 COMBINED AT	MQ	739.	6.00	100.	32.	31.	1.76
+	ROUTED TO		734.	6.08	99.	32.	31.	1.76
+	HYDROGRAPH AT	M26	139.	5.92	18.	6.	6.	.18
+	2 COMBINED AT	MR	825.	6.08	117.	38.	37.	1.94
+	HYDROGRAPH AT	W44	28.	5.83	3.	1.	1.	.04
+	ROUTED TO		27.	5.92	3.	1.	1.	.04
+	HYDROGRAPH AT	W47	39.	5.83	4.	1.	1.	.05
+	ROUTED TO		36.	5.83	4.	1.	1.	.05
+	HYDROGRAPH AT	W46	32.	5.83	3.	1.	1.	.04
+	HYDROGRAPH AT	M27	39.	5.83	4.	1.	1.	.05
+	6 COMBINED AT	WX	2398.	6.17	442.	153.	147.	6.17
+	ROUTED TO		2323.	6.25	441.	152.	147.	6.17
+	HYDROGRAPH AT	W48	108.	5.75	10.	3.	3.	.12
+	ROUTED TO		102.	5.83	10.	3.	3.	.12
+	HYDROGRAPH AT	W49	189.	5.83	21.	7.	7.	.27
+	3 COMBINED AT	WZ	2392.	6.17	471.	163.	157.	6.55
+	ROUTED TO		2383.	6.25	471.	163.	157.	6.55
+	HYDROGRAPH AT	W50	83.	5.83	9.	3.	3.	.11
+	2 COMBINED AT	WAB	2399.	6.25	480.	166.	160.	6.66
+	ROUTED TO		2396.	6.25	480.	166.	160.	6.66
+	HYDROGRAPH AT	W51	46.	5.83	5.	2.	2.	.05
+	2 COMBINED AT	WAC	2406.	6.25	484.	168.	161.	6.71
+	ROUTED TO		2402.	6.25	485.	168.	161.	6.71
+	HYDROGRAPH AT	W52	48.	5.75	5.	2.	1.	.05
+	ROUTED TO		46.	5.83	5.	2.	1.	.05
+	HYDROGRAPH AT	W53	47.	5.83	5.	2.	2.	.05

+	2 COMBINED AT	WAD	92.	5.83	9.	3.	3.	.10		
+	ROUTED TO		92.	5.83	9.	3.	3.	.10		
+	HYDROGRAPH AT	W54	8.	5.75	1.	0.	0.	.01		
+	3 COMBINED AT	WAE	2419.	6.25	494.	171.	165.	6.82		
+	ROUTED TO		2396.	6.25	493.	171.	164.	6.82		
+	HYDROGRAPH AT	W56	116.	5.83	14.	5.	5.	.18		
+	2 COMBINED AT	WAF	2426.	6.25	506.	175.	169.	7.01		
+	ROUTED TO		2405.	6.25	506.	175.	169.	7.01		
+	HYDROGRAPH AT	W62	64.	5.75	6.	2.	2.	.08		
+	ROUTED TO		61.	5.83	6.	2.	2.	.08		
+	HYDROGRAPH AT	W63	36.	5.75	4.	1.	1.	.05		
+	ROUTED TO		36.	5.83	4.	1.	1.	.05		
+	HYDROGRAPH AT	W61	105.	5.92	14.	5.	5.	.19		
+	3 COMBINED AT	WAH	190.	5.83	24.	8.	8.	.31		
+	ROUTED TO		183.	5.92	24.	8.	8.	.31		
+	HYDROGRAPH AT	W57	54.	5.83	6.	2.	2.	.07		
+	ROUTED TO		51.	6.00	6.	2.	2.	.07		
+	HYDROGRAPH AT	W58	126.	5.92	17.	6.	6.	.23		
+	3 COMBINED AT	WAI	345.	5.92	46.	16.	15.	.62		
+	ROUTED TO		341.	5.92	47.	16.	15.	.62		
+	HYDROGRAPH AT	E1A	65.	5.92	9.	3.	3.	.12		
+	ROUTED TO	E1A-EA	64.	6.00	9.	3.	3.	.12		
+	HYDROGRAPH AT	E1B	94.	5.92	13.	4.	4.	.17		
+	2 COMBINED AT	EA	147.	5.92	21.	7.	7.	.28		
+	ROUTED TO	EA-EB	145.	6.00	21.	7.	7.	.28		
+	HYDROGRAPH AT	E2	75.	5.83	8.	3.	3.	.10		
+	2 COMBINED AT	EB	187.	5.92	29.	10.	10.	.39		
+	ROUTED TO	POND1	101.	6.25	23.	9.	8.	.39	954.20	6.25
+	ROUTED TO		95.	6.25	23.	9.	8.	.39		
+	HYDROGRAPH AT	E3	67.	5.83	7.	2.	2.	.09		
+	HYDROGRAPH AT	MH-P2	85.	5.92	43.	18.	18.	.00		
	3 COMBINED AT									

+		EC	187.	6.25	72.	29.	28.	.48		
+	ROUTED TO									
+		POND2	95.	7.17	55.	24.	23.	.48	930.04	7.17
+	ROUTED TO		94.	7.25	55.	24.	23.	.48		
+	HYDROGRAPH AT	E1C	52.	5.83	6.	2.	2.	.08		
+	ROUTED TO	1C-ED1	50.	6.00	6.	2.	2.	.08		
+	HYDROGRAPH AT	E4	78.	5.83	10.	3.	3.	.13		
+	2 COMBINED AT	ED1	123.	5.92	16.	5.	5.	.21		
+	ROUTED TO	ED1-ED	121.	5.92	16.	6.	5.	.21		
+	HYDROGRAPH AT	E5	66.	5.83	7.	2.	2.	.09		
+	3 COMBINED AT	ED	174.	5.92	72.	32.	31.	.78		
+	ROUTED TO		172.	5.92	72.	32.	31.	.78		
+	HYDROGRAPH AT	E8	33.	5.83	3.	1.	1.	.04		
+	2 COMBINED AT	EE	196.	5.92	75.	33.	32.	.83		
+	ROUTED TO		192.	5.92	75.	33.	32.	.83		
+	HYDROGRAPH AT	E10	21.	5.83	2.	1.	1.	.03		
+	2 COMBINED AT	EF	208.	5.92	77.	34.	33.	.85		
+	ROUTED TO	F-G	199.	5.92	77.	34.	33.	.85		
+	HYDROGRAPH AT	E6	68.	5.92	9.	3.	3.	.12		
+	HYDROGRAPH AT	E7	28.	5.75	2.	1.	1.	.03		
+	ROUTED TO		25.	5.83	2.	1.	1.	.03		
+	2 COMBINED AT	EG1	89.	5.83	11.	4.	4.	.15		
+	ROUTED TO	G1-G	87.	5.92	11.	4.	4.	.15		
+	HYDROGRAPH AT	E9	46.	5.83	6.	2.	2.	.08		
+	ROUTED TO		46.	5.92	6.	2.	2.	.08		
+	HYDROGRAPH AT	E11	28.	5.83	3.	1.	1.	.05		
+	HYDROGRAPH AT	E12	66.	5.83	7.	2.	2.	.09		
+	5 COMBINED AT	EG	409.	5.92	103.	43.	42.	1.22		
+	HYDROGRAPH AT	E13	9.	5.92	1.	0.	0.	.02		
+	HYDROGRAPH AT	E14	4.	5.83	0.	0.	0.	.01		
+	ROUTED TO		4.	5.83	0.	0.	0.	.01		
+	3 COMBINED AT	EH	421.	5.92	105.	44.	42.	1.24		
+	ROUTED TO		398.	5.92	105.	44.	42.	1.24		

+	HYDROGRAPH AT	E19	35.	5.83	4.	1.	1.	.04
+	2 COMBINED AT	EJ1	421.	5.92	108.	45.	43.	1.28
+	ROUTED TO	J1-K	411.	6.00	107.	45.	43.	1.28
+	HYDROGRAPH AT	E15	36.	5.75	3.	1.	1.	.04
+	ROUTED TO		33.	5.83	3.	1.	1.	.04
+	HYDROGRAPH AT	E16	31.	5.75	3.	1.	1.	.03
+	2 COMBINED AT	EI	63.	5.75	6.	2.	2.	.07
+	ROUTED TO		61.	5.83	6.	2.	2.	.07
+	HYDROGRAPH AT	E17	32.	5.75	3.	1.	1.	.03
+	ROUTED TO		31.	5.83	3.	1.	1.	.03
+	HYDROGRAPH AT	E18	40.	5.83	4.	2.	1.	.05
+	3 COMBINED AT	EJ2	132.	5.83	13.	4.	4.	.15
+	ROUTED TO		119.	6.00	13.	4.	4.	.15
+	HYDROGRAPH AT	E23	108.	5.92	14.	5.	5.	.17
+	HYDROGRAPH AT	E24	74.	6.00	13.	4.	4.	.14
+	4 COMBINED AT	EK	698.	6.00	147.	59.	56.	1.74
+	ROUTED TO		671.	6.08	146.	58.	56.	1.74
+	HYDROGRAPH AT	E21	57.	5.83	7.	2.	2.	.09
+	ROUTED TO		55.	5.92	7.	2.	2.	.09
+	HYDROGRAPH AT	E20	51.	5.92	7.	2.	2.	.08
+	ROUTED TO		51.	5.92	7.	2.	2.	.08
+	HYDROGRAPH AT	E22	41.	5.92	5.	2.	2.	.07
+	3 COMBINED AT	EL	147.	5.92	19.	6.	6.	.23
+	ROUTED TO		140.	6.00	19.	6.	6.	.23
+	HYDROGRAPH AT	E25	121.	5.83	13.	5.	4.	.17
+	3 COMBINED AT	EM	845.	6.00	177.	69.	67.	2.13
+	ROUTED TO		834.	6.08	177.	69.	67.	2.13
+	HYDROGRAPH AT	E26	37.	5.75	3.	1.	1.	.04
+	2 COMBINED AT	EN	840.	6.08	180.	70.	68.	2.17
+	ROUTED TO		826.	6.08	179.	70.	68.	2.17
+	HYDROGRAPH AT	E27	104.	5.83	11.	4.	4.	.12
	2 COMBINED AT							

+		EO	863.	6.08	189.	74.	71.	2.29
	ROUTED TO							
+			835.	6.08	189.	74.	71.	2.29
	HYDROGRAPH AT							
+		W55	38.	5.75	3.	1.	1.	.05
	2 COMBINED AT							
+		WAG	841.	6.08	192.	75.	72.	2.34
	ROUTED TO							
+			833.	6.17	192.	75.	72.	2.34
	HYDROGRAPH AT							
+		W59	43.	5.83	5.	2.	2.	.07
	4 COMBINED AT							
+		WAJ	3321.	6.25	749.	268.	259.	10.03
	ROUTED TO							
+			3310.	6.25	749.	268.	259.	10.03
	HYDROGRAPH AT							
+		E28	44.	5.92	6.	2.	2.	.07
	ROUTED TO							
+			44.	6.00	6.	2.	2.	.07
	HYDROGRAPH AT							
+		E29	35.	5.83	4.	1.	1.	.05
	2 COMBINED AT							
+		EZZ	69.	5.92	9.	3.	3.	.12
	HYDROGRAPH AT							
+		W60	47.	5.83	5.	2.	2.	.07
	3 COMBINED AT							
+		ZZ	3350.	6.25	763.	274.	263.	10.22
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*** NORMAL END OF HEC-1 ***

Appendix B: Proposed HEC-1 Calculations

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* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
* RUN DATE 20MAY08 TIME 08:48:57
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* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID FALCON HIGHLANDS PRELIMINARY DRAINAGE PLAN - BASED ON DBPS MODEL F100FNLQ
2 ID ** DETENTION POND AT WU (BETWEEN SH 24 AND TAMLIN RD)
3 ID ** 2 Year, 5 Year and 100 Year Storm Events (24hr Storm)
4 ID **Basins W40 & W42 revised due to Meridian Crossing development
5 *DIAGRAM
6 IT 5 25MAY05 800 300
7 IO 5
8 JR PREC 1 1.2381 2.0952
9
10 KK W1
11 KM
12 BA .0479
13 PB 2.1
14 IN 15
15 PC .0005 .0015 .0030 .0045 .0060 .0080 .0100 .0120 .0143 .0165
16 PC .0188 .0210 .0233 .0255 .0278 .0320 .0390 .0460 .0530 .0600
17 PC .0750 .1000 .4000 .7000 .7250 .7500 .7650 .7800 .7900 .8000
18 PC .8100 .8200 .8250 .8300 .8350 .8400 .8450 .8500 .8550 .8600
19 PC .8638 .8675 .8713 .8750 .8788 .8825 .8863 .8900 .8938 .8975
20 PC .9013 .9050 .9083 .9115 .9148 .9180 .9210 .9240 .9270 .9300
21 PC .9325 .9350 .9375 .9400 .9425 .9450 .9475 .9500 .9525 .9550
22 PC .9575 .9600 .9625 .9650 .9675 .9700 .9725 .9750 .9775 .9800
23 PC .9813 .9825 .9838 .9850 .9863 .9875 .9888 .9900 .9913 .9925
24 PC .9938 .9950 .9963 .9975 .9988 1.000
25 LS 60
26 UD .097
27
28 KK W2
29 KM
30 BA .0278
31 LS 60
32 UD .160
33
34 KK WA
35 KM 2
36 HC
37
38 KK W3
39 KM
40 RK 464 .0151 .035 TRAP 5 4
41 BA .0498
42 LS 61
43 UD .139

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1 HEC-1 INPUT PAGE 2

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
44 KK WB
45 KM

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46	HC	2							
47	KK								
48	KM								
49	RK	823	.0279	.035	TRAP	5	4	54	
50	KK	W4							
51	KM								
52	BA	.0054							
53	LS		62						
54	UD	.044							
55	KK								
56	KM								
57	RK	1078	.0482	.035	TRAP	5	4		
58	KK	W5							
59	KM								
60	BA	.0159							
61	LS		60						
62	UD	.075							
63	KK	WC							
64	KM								
65	HC	3							
66	KK								
67	KM								
68	RK	557	.0449	.035	TRAP	10	4		
69	KK	W6							
70	KM								
71	BA	.0486							
72	LS		60						
73	UD	.085							
74	KK								
75	KM								
76	RK	592	.0372	.035	TRAP	5	4		
77	KK	W7							
78	KM								
79	BA	.0217							
80	LS		60						
81	UD	.074							
82	KK								
83	KM								
84	RK	464	.1466	.035	TRAP	5	4		

1

HEC-1 INPUT

PAGE 3

LINE	ID	1	2	3	4	5	6	7	8	9	10
85	KK	WD									
86	KM										
87	HC	2									
88	KK	D-E									
89	KM										
90	RK	1044	.0479	.035	TRAP	5	4				
91	KK	W8									
92	KM										
93	BA	.0286									
94	LS		60								
95	UD	.069									
96	KK										
97	KM										
98	RK	1449	.0504	.035	TRAP	5	4				
99	KK	W9									
100	KM										
101	BA	.0402									
102	LS		61								
103	UD	.097									
104	KK	WE									
105	KM										
106	HC	3									
107	KK	E-F									
108	KM										
109	RK	789	.0038	.035	TRAP	5	4				
110	KK	W10									
111	KM										
112	BA	.0431									
113	LS		61								
114	UD	.096									
115	KK										
116	KM										
117	RK	824	.0388	.035	TRAP	5	4				

118 KK W11
119 KM
120 BA .0314
121 LS 60
122 UD .077

123 KK WF
124 KM
125 HC 4

HEC-1 INPUT

PAGE 4

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

126 KK F-G
127 KM
128 RK 2319 .0211 .035 TRAP 10 4

129 KK W12
130 KM
131 BA .0398
132 LS 60
133 UD .095

134 KK
135 KM
136 RK 2478 .0307 .035 TRAP 5 4

137 KK W14
138 KM
139 BA .0473
140 LS 61
141 UD .135

142 KK
143 KM
144 RK 81 0.0001 .035 TRAP 5 4

145 KK W13
146 KM
147 BA .1123
148 LS 61
149 UD .182

150 KK WG
151 KM
152 HC 4

153 KK G-H
154 KM
155 RK 2632 .0217 .035 TRAP 15 4

156 KK
157 KM
158 RK 2447 .0372 .035 TRAP 5 4

159 KK W15
160 KM
161 BA .0881
162 LS 61
163 UD .141

164 KK
165 KM
166 RK 1763 .0289 .035 TRAP 5 4

HEC-1 INPUT

PAGE 5

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

167 KK WH
168 KM
169 HC 2

170 KK W16
171 KM
172 BA .0292
173 LS 61
174 UD .092

175 KK
176 KM
177 RK 1345 .0260 .035 TRAP 5 4

178 KK W17
179 KM
180 BA .0184
181 LS 60
182 UD .085

183 KK WI
184 KM
185 HC 2

186	KK	I-M							
187	KM								
188	RK	2650	.0370	.035		TRAP	15	4	
189	KK	W19							
190	KM								
191	BA	.0428							
192	LS		61						
193	UD	.083							
194	KK								
195	KM								
196	RK	881	.0329	.035		TRAP	5	4	
197	KK	W20							
198	KM								
199	BA	.0315							
200	LS		61						
201	UD	.071							
202	KK	WJ							
203	KM								
204	HC	2							
205	KK								
206	KM								
207	RK	3061	.0235	.035		TRAP	5	4	

HEC-1 INPUT

PAGE 6

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

208	KK	W21							
209	KM								
210	BA	.1347							
211	LS		60						
212	UD	.156							
213	KK	WK							
214	KM								
215	HC	2							
216	KK								
217	KM								
218	RK	487	.0246	.035		TRAP	5	4	
219	KK	W22							
220	KM								
221	BA	.0086							
222	LS		63						
223	UD	.055							
224	KK	WL							
225	KM								
226	HC	2							
227	KK								
228	KM								
229	RK	1786	.0297	.035		TRAP	5	4	
230	KK	W23							
231	KM								
232	BA	.0244							
233	LS		60						
234	UD	.112							
235	KK	W18							
236	KM								
237	BA	.1251							
238	LS		60						
239	UD	.189							
240	KK	WM							
241	KM								
242	HC	5							
243	KK	M-N							
244	KM								
245	RK	1345	.0149	.035		TRAP	20	4	
246	KK	W24							
247	KM								
248	BA	.0442							
249	LS		60						
250	UD	.140							

HEC-1 INPUT

PAGE 7

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

251	KK	W25							
252	KM								
253	BA	.0957							
254	LS		61						
255	UD	.197							

256	KK	WN							
257	KM								
258	HC	3							
259	KK	N-P							
260	KM								
261	RK	1589	.017	.035	TRAP	20	4		
262	KK	W28							
263	KM								
264	BA	.0397							
265	LS		63						
266	UD	.128							
267	KK								
268	KM								
269	RK	1345	.0208	.035	TRAP	5	4		
270	KK	W30							
271	KM								
272	BA	.0509							
273	LS		63						
274	UD	.123							
275	KK								
276	KM								
277	RK	1078	.0074	.035	TRAP	5	4		
278	KK	W29							
279	KM								
280	BA	.0409							
281	LS		63						
282	UD	.145							
283	KK	W31							
284	KM								
285	BA	.0123							
286	LS		63						
287	UD	.073							
288	KK	WO							
289	KM								
290	HC	4							

1

HEC-1 INPUT

PAGE 8

LINE	ID	1	2	3	4	5	6	7	8	9	10
291	KK	O-P									
292	KM										
293	RK	2169	.0226	.035	TRAP	5	4				
294	KK	W26									
295	KM										
296	BA	.0301									
297	LS		63								
298	UD	.062									
299	KK										
300	KM										
301	RK	4662	.0225	.035	TRAP	5	4				
302	KK	W27									
303	KM										
304	BA	.1633									
305	LS		60								
306	UD	.253									
307	KK	W32									
308	KM										
309	BA	.0890									
310	LS		60								
311	UD	.170									
312	KK	WP									
313	KM										
314	HC	5									
315	KK	P-Q									
316	KM										
317	RK	1925	.0182	.035	TRAP	25	4				
318	KK	W33A									
319	KM										
320	BA	.1261									
321	LS		60								
322	UD	.186									
323	KK	WP1									
324	KM										
325	HC	2									
326	KK	P1-Q									
327	KM										

328	RK	3000	.020	.035	TRAP	25	4
329	KK	W33B					
330	KM						
331	BA	.1360					
332	LS		60				
333	UD	.225					

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PAGE 9

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

334	KK	W34A					
335	KM						
336	BA	.1418					
337	LS		60				
338	UD	.173					
339	KK	34A-P2					
340	KM						
341	RK	2550	.0176	.035	TRAP	25	4
342	KK	W34B					
343	KM						
344	BA	.1766					
345	LS		60				
346	UD	.224					
347	KK	WP2					
348	KM						
349	HC	2					
350	KK	P2-Q					
351	KM						
352	RK	2640	.021	.035	TRAP	25	4
353	KK	W34C					
354	KM						
355	BA	.1625					
356	LS		60				
357	UD	.244					
358	KK	WQ					
359	KM						
360	HC	4					
361	KK	Q-Q1					
362	KM						
363	RK	2940	.022	.035	TRAP	25	4
364	KK	W36A					
365	KM						
366	BA	.1429					
367	LS		60				
368	UD	.234					
369	KK	WQ1					
370	KM						
371	HC	2					
372	KK	Q1-R					
373	KM						
374	RK	3400	.022	.035	TRAP	25	4

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PAGE 10

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

375	KK	W36B					
376	KM						
377	BA	.1918					
378	LS		60				
379	UD	.306					
380	KK	W35A					
381	KM						
382	BA	.0958					
383	LS		60				
384	UD	.187					
385	KK	35A-WR					
386	KM						
387	RK	3715	.023	.035	TRAP	25	4
388	KK	W35B					
389	KM						
390	BA	.1507					
391	LS	0	60				
392	UD	.259					
393	KK	WR					
394	KM						
395	HC	4					
396	KK	WR-S					

397	KM						
398	RK	2922	.0168	.035	TRAP	25	4
399	KK	W37A					
400	KM						
401	BA	.1138					
402	LS		60				
403	UD	.185					
404	KK	37A-S					
405	KM						
406	RK	1430	.014	.035	TRAP	25	4
407	KK	W37B					
408	KM						
409	BA	.1636					
410	LS		90				
411	UD	.218					
412	KK	WS					
413	KM						
414	HC	3					

1

HEC-1 INPUT

PAGE 11

LINE	ID	1	2	3	4	5	6	7	8	9	10
------	----	---	---	---	---	---	---	---	---	---	----

415	KK	S-T									
416	KM										
417	RK	3653	.0164	.035	TRAP	25	4				
418	KK	W38									
419	KM										
420	BA	.0907									
421	LS		62								
422	UD	.190									
423	KK										
424	KM										
425	RK	2922	.0171	.035	TRAP	5	4				
426	KK	W39									
427	KM										
428	BA	.1833									
429	LS		76								
430	UD	.251									
431	KK	W40									
432	KM										
433	BA	.0706									
434	LS		92								
435	UD	.165									
436	KK	WT									
437	KM										
438	HC	4									
439	KK	T-U									
440	KM										
441	RK	1125	.0098	.035	TRAP	25	4				
442	KK	W41									
443	KM										
444	BA	.0601									
445	LS		83								
446	UD	.117									
447	KK	POND									
448	KM										
449	HC	2									
450	KK	DIVOUT									
451	KM	DIVERT 35.8 CFS (2-YR HISTORIC FLOW) FROM DETENTION POND									
452	DT	DIVERT 0 35.8									
453	DI	0 35.8									
454	DQ	0 35.8									

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HEC-1 INPUT

PAGE 12

LINE	ID	1	2	3	4	5	6	7	8	9	10
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455	KK	PONDWU									
456	KM	REGIONAL DETENTION POND Q5=94, Q100=1214									
457	SV	0.0 0.006 .09 .40 1.19 3.31 7.12 11.50 16.05									
458	SV	20.76 25.61 30.61 35.77 40.99									
459	SE	16.5 17 18 19 20 21 22 23 24									
460	SE	25 26 27 28 29									
461	SQ	0 0 27.40 46.66 67.77 81.84 249.51 544.89 923.33									
462	SQ	1090.5 1212.93 1323.91 1426.18 1521.53									
463	RS	1 ELEV 16.5									
464	KK	B-WU									
465	KM										
466	RK	2215	.0181	.035	TRAP	25	4				

467	KK	DIVIN						
468	KM	RETRIEVE 35.8 CFS DIVERTED IN CHANNEL						
469	DR	DIVERT						
470	KK	W42A						
471	KM							
472	BA	.0127						
473	LS		92					
474	UD	.180						
475	KK	42A-WU						
476	KM							
477	RK	1970 .0090 .013		TRAP	4	4		
478	KK	W42						
479	KM							
480	BA	.0519						
481	LS		92					
482	UD	.127						
483	KK	W42B						
484	KM							
485	BA	.0195						
486	LS		92					
487	UD	.180						
488	KK	42B-WU						
489	KM							
490	RK	2770 .0100 .013		TRAP	4	4		
491	KK	WU						
492	KM							
493	HC	5						
494	KK	U-V						
495	KM							
496	RK	2200 .0145 .035		TRAP	25	4		

1

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PAGE 13

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
497	KK W43
498	KM
499	BA .1457
500	LS 64
501	UD .169
502	KK WV
503	KM
504	HC 2
505	KK V-W
506	KM
507	RK 487 .0103 .035 TRAP 25 4
508	KK W45
509	KM
510	BA .1931
511	LS 61
512	UD .189
513	KK WW
514	KM
515	HC 2
516	ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
8	W1	
	V	
25	V	
	.	
28	.	W2
	.	
33	WA	
	V	
36	V	
	.	
39	.	W3
	.	
44	WB	
	V	
47	V	

50	.	W4	.
	.	V	.
55	.	V	.
	.	.	.
58	.	.	W5
	.	.	.
63	WC	.	.
	V	.	.
	V	.	.
66	.	.	.
	.	.	.
69	.	W6	.
	.	V	.
	.	V	.
74	.	.	.
	.	.	.
77	.	.	W7
	.	.	V
	.	.	V
82	.	.	.
	.	.	.
85	.	WD	.
	.	V	.
	.	V	.
88	.	D-E	.
	.	.	.
91	.	.	W8
	.	.	V
	.	.	V
96	.	.	.
	.	.	.
99	.	.	W9
	.	.	.
104	.	WE	.
	.	V	.
	.	V	.
107	.	E-F	.
	.	.	.
110	.	.	W10
	.	.	V
	.	.	V
115	.	.	.
	.	.	.
118	.	.	W11
	.	.	.
123	WF	.	.
	V	.	.
	V	.	.
126	F-G	.	.
	.	.	.
129	.	W12	.
	.	V	.
	.	V	.
134	.	.	.
	.	.	.
137	.	.	W14
	.	.	V
	.	.	V
142	.	.	.
	.	.	.
145	.	.	W13
	.	.	.
150	WG	.	.
	V	.	.
	V	.	.
153	G-H	.	.
	V	.	.
	V	.	.
156	.	.	.
	.	.	.
159	.	W15	.
	.	V	.
	.	V	.
164	.	.	.
	.	.	.
	.	.	.

167	WH	.....		
170	.		W16		
	.		V		
	.		V		
175	.				
178	.			W17	
	.				
183	.	WI	.....	
	.	V			
	.	V			
186	.	I-M			
	.				
189	.		W19		
	.		V		
	.		V		
194	.				
	.				
197	.			W20	
	.				
202	.		WJ	.....
	.		V		
	.		V		
205	.				
	.				
208	.			W21	
	.				
213	.		WK	.....
	.		V		
	.		V		
216	.				
	.				
219	.			W22	
	.				
224	.		WL	.....
	.		V		
	.		V		
227	.				
	.				
230	.			W23	
	.				
235	.				W18
	.				
240	WM	.....		
	V				
	V				
243	M-N				
	.				
246			W24		
	.				
251				W25	
	.				
256	WN	.....		
	V				
	V				
259	N-P				
	.				
262			W28		
	.		V		
	.		V		
267	.				
	.				
270	.		W30		
	.		V		
	.		V		
275	.				
	.				
278	.			W29	
	.				
283	.				W31
	.				
288	.				
	WO	.....		
	V				

291	.	V		
	.	O-P		
294	.	.	W26	
	.	.	V	
299	.	.	V	
	.	.	.	
302	.	.	.	W27

307	.	.	.	W32

312	WP	.....	.	.
	V		.	.
	V		.	.
315	P-Q		.	.
	.		.	.
318	.	W33A	.	.

323	WP1	.....	.	.
	V		.	.
	V		.	.
326	P1-Q		.	.
	.		.	.
329	.	W33B	.	.

334	.	.	W34A	
	.	.	V	
	.	.	V	
339	.	.	34A-P2	
	.	.	.	
342	.	.	.	W34B

347	.	.	WP2	.....
	.	.	V	
	.	.	V	
350	.	.	P2-Q	
	.	.	.	
353	.	.	.	W34C

358	WQ	.....	.	.
	V		.	.
	V		.	.
361	Q-Q1		.	.
	.		.	.
364	.	W36A	.	.

369	WQ1	.....	.	.
	V		.	.
	V		.	.
372	Q1-R		.	.
	.		.	.
375	.	W36B	.	.

380	.	.	W35A	
	.	.	V	
	.	.	V	
385	.	.	35A-WR	
	.	.	.	
388	.	.	.	W35B

393	WR	.....	.	.
	V		.	.
	V		.	.
396	WR-S		.	.
	.		.	.
399	.	W37A	.	.
	.	V	.	.
	.	V	.	.
404	.	37A-S	.	.

407	.	.	W37B	

412	WS	.....	.	.

```

V
V
415 S-T
.
.
418 . W38
. V
. V
423 .
.
426 . W39
.
.
431 . W40
.
436 WT .....
V
V
439 T-U
.
.
442 . W41
.
447 POND .....
.
452 -----> DIVERT
450 DIVOU
V
V
455 PONDWU
V
V
464 B-WU
.
.
469 . <----- DIVERT
467 . DIVIN
.
.
470 . W42A
. V
. V
475 . 42A-WU
.
.
478 . W42
.
.
483 . W42B
. V
. V
488 . 42B-WU
.
.
491 WU .....
V
V
494 U-V
.
.
497 . W43
.
.
502 WV .....
V
V
505 V-W
.
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508 . W45
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513 WW .....

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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 20MAY08 TIME 08:48:57 *
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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

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FALCON HIGHLANDS PRELIMINARY DRAINAGE PLAN - BASED ON DBPS MODEL F100FNLQ
 ** DETENTION POND AT WU (BETWEEN SH 24 AND TAMLIN RD)

** 2 Year, 5 Year and 100 Year Storm Events (24hr Storm)
 **Basins W40 & W42 revised due to Meridian Crossing development

6 IO OUTPUT CONTROL VARIABLES
 IPRNT 5 PRINT CONTROL
 IPLOT 0 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
 NMIN 5 MINUTES IN COMPUTATION INTERVAL
 IDATE 25MAY 5 STARTING DATE
 ITIME 0800 STARTING TIME
 NQ 300 NUMBER OF HYDROGRAPH ORDINATES
 NDDATE 26MAY 5 ENDING DATE
 NDTIME 0855 ENDING TIME
 ICENT 19 CENTURY MARK

 COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS
 DRAINAGE AREA SQUARE MILES
 PRECIPITATION DEPTH INCHES
 LENGTH, ELEVATION FEET
 FLOW CUBIC FEET PER SECOND
 STORAGE VOLUME ACRE-FEET
 SURFACE AREA ACRES
 TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 1.24 2.10

*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION= 1

*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION= 1

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION		
					RATIO 1 1.00	RATIO 2 1.24	RATIO 3 2.10
HYDROGRAPH AT							
+	W1	.05	1	FLOW	1.	5.	40.
				TIME	5.83	5.83	5.75
ROUTED TO							
+		.05	1	FLOW	0.	4.	37.
				TIME	6.00	5.92	5.83
HYDROGRAPH AT							
+	W2	.03	1	FLOW	0.	2.	20.
				TIME	5.92	5.83	5.83
2 COMBINED AT							
+	WA	.08	1	FLOW	1.	6.	57.
				TIME	6.00	5.92	5.83
ROUTED TO							
+		.08	1	FLOW	1.	6.	55.
				TIME	6.08	5.92	5.83
HYDROGRAPH AT							
+	W3	.05	1	FLOW	1.	5.	39.
				TIME	5.83	5.83	5.83
2 COMBINED AT							
+	WB	.13	1	FLOW	1.	11.	95.
				TIME	6.08	5.92	5.83
ROUTED TO							
+		.13	1	FLOW	1.	10.	91.
				TIME	6.17	5.92	5.83
HYDROGRAPH AT							
+	W4	.01	1	FLOW	0.	1.	6.
				TIME	5.75	5.75	5.75
ROUTED TO							
+		.01	1	FLOW	0.	1.	6.
				TIME	5.92	5.83	5.75

HYDROGRAPH AT							
+	W5	.02	1	FLOW	0.	2.	15.
				TIME	5.83	5.75	5.75
3 COMBINED AT							
+	WC	.15	1	FLOW	1.	11.	105.
				TIME	6.17	5.92	5.83
ROUTED TO							
+		.15	1	FLOW	1.	11.	103.
				TIME	6.25	5.92	5.83
HYDROGRAPH AT							
+	W6	.05	1	FLOW	1.	5.	43.
				TIME	5.83	5.83	5.75
ROUTED TO							
+		.05	1	FLOW	0.	5.	40.
				TIME	5.92	5.83	5.75
HYDROGRAPH AT							
+	W7	.02	1	FLOW	0.	2.	20.
				TIME	5.83	5.75	5.75
ROUTED TO							
+		.02	1	FLOW	0.	2.	20.
				TIME	5.83	5.83	5.75
2 COMBINED AT							
+	WD	.07	1	FLOW	1.	7.	60.
				TIME	5.83	5.83	5.75
ROUTED TO							
+	D-E	.07	1	FLOW	1.	6.	55.
				TIME	5.92	5.83	5.75
HYDROGRAPH AT							
+	W8	.03	1	FLOW	0.	3.	27.
				TIME	5.83	5.75	5.75
ROUTED TO							
+		.03	1	FLOW	0.	3.	24.
				TIME	5.92	5.83	5.75
HYDROGRAPH AT							
+	W9	.04	1	FLOW	1.	5.	36.
				TIME	5.83	5.83	5.75
3 COMBINED AT							
+	WE	.14	1	FLOW	1.	14.	114.
				TIME	5.92	5.83	5.75
ROUTED TO							
+	E-F	.14	1	FLOW	1.	13.	108.
				TIME	6.08	5.92	5.83
HYDROGRAPH AT							
+	W10	.04	1	FLOW	1.	5.	39.
				TIME	5.83	5.83	5.75
ROUTED TO							
+		.04	1	FLOW	1.	5.	36.
				TIME	5.92	5.83	5.75
HYDROGRAPH AT							
+	W11	.03	1	FLOW	0.	3.	29.
				TIME	5.83	5.75	5.75
4 COMBINED AT							
+	WF	.36	1	FLOW	3.	29.	265.
				TIME	6.08	5.92	5.83
ROUTED TO							
+	F-G	.36	1	FLOW	3.	28.	255.
				TIME	6.25	6.00	5.83
HYDROGRAPH AT							
+	W12	.04	1	FLOW	0.	4.	33.
				TIME	5.83	5.83	5.75
ROUTED TO							
+		.04	1	FLOW	0.	4.	32.
				TIME	6.17	5.92	5.83
HYDROGRAPH AT							
+	W14	.05	1	FLOW	1.	5.	38.
				TIME	5.83	5.83	5.83
ROUTED TO							
+		.05	1	FLOW	1.	5.	37.
				TIME	5.92	5.92	5.83
HYDROGRAPH AT							
+	W13	.11	1	FLOW	2.	10.	80.

HYDROGRAPH AT							
+	W33B	.14	1	FLOW TIME	1. 6.33	9. 5.92	78. 5.92
HYDROGRAPH AT							
+	W34A	.14	1	FLOW TIME	1. 6.33	10. 5.92	96. 5.83
ROUTED TO							
+	34A-P2	.14	1	FLOW TIME	1. 6.33	10. 6.08	93. 5.92
HYDROGRAPH AT							
+	W34B	.18	1	FLOW TIME	1. 6.33	11. 5.92	101. 5.92
2 COMBINED AT							
+	WP2	.32	1	FLOW TIME	2. 6.33	20. 6.00	195. 5.92
ROUTED TO							
+	P2-Q	.32	1	FLOW TIME	2. 6.75	19. 6.17	186. 6.00
HYDROGRAPH AT							
+	W34C	.16	1	FLOW TIME	1. 6.33	10. 6.00	90. 5.92
4 COMBINED AT							
+	WQ	2.37	1	FLOW TIME	19. 6.92	115. 6.25	1336. 6.00
ROUTED TO							
+	Q-Q1	2.37	1	FLOW TIME	19. 7.08	114. 6.33	1294. 6.00
HYDROGRAPH AT							
+	W36A	.14	1	FLOW TIME	1. 6.33	9. 5.92	81. 5.92
2 COMBINED AT							
+	WQ1	2.51	1	FLOW TIME	20. 7.08	118. 6.33	1363. 6.00
ROUTED TO							
+	Q1-R	2.51	1	FLOW TIME	20. 7.25	117. 6.42	1320. 6.08
HYDROGRAPH AT							
+	W36B	.19	1	FLOW TIME	1. 6.42	10. 6.00	91. 6.00
HYDROGRAPH AT							
+	W35A	.10	1	FLOW TIME	1. 6.33	7. 5.92	62. 5.83
ROUTED TO							
+	35A-WR	.10	1	FLOW TIME	1. 6.92	6. 6.25	58. 6.00
HYDROGRAPH AT							
+	W35B	.15	1	FLOW TIME	1. 6.42	9. 6.00	81. 5.92
4 COMBINED AT							
+	WR	2.95	1	FLOW TIME	22. 7.17	132. 6.42	1506. 6.08
ROUTED TO							
+	WR-S	2.95	1	FLOW TIME	22. 7.33	131. 6.50	1485. 6.08
HYDROGRAPH AT							
+	W37A	.11	1	FLOW TIME	1. 6.33	8. 5.92	74. 5.83
ROUTED TO							
+	37A-S	.11	1	FLOW TIME	1. 6.58	8. 6.00	71. 5.92
HYDROGRAPH AT							
+	W37B	.16	1	FLOW TIME	145. 5.83	201. 5.83	410. 5.83
3 COMBINED AT							
+	WS	3.23	1	FLOW TIME	145. 5.83	201. 5.83	1705. 6.08
ROUTED TO							
+	S-T	3.23	1	FLOW TIME	140. 5.92	197. 5.92	1632. 6.17
HYDROGRAPH AT							
+	W38	.09	1	FLOW TIME	2. 5.92	10. 5.92	67. 5.83

ROUTED TO							
+		.09	1	FLOW TIME	2. 6.25	9. 6.08	66. 5.92
HYDROGRAPH AT							
+	W39	.18	1	FLOW TIME	49. 5.92	85. 5.92	251. 5.92
HYDROGRAPH AT							
+	W40	.07	1	FLOW TIME	76. 5.75	102. 5.75	201. 5.75
4 COMBINED AT							
+	WT	3.57	1	FLOW TIME	244. 5.92	359. 5.83	1867. 6.08
ROUTED TO							
+	T-U	3.57	1	FLOW TIME	243. 5.92	358. 5.92	1821. 6.17
HYDROGRAPH AT							
+	W41	.06	1	FLOW TIME	40. 5.75	60. 5.75	142. 5.75
2 COMBINED AT							
+	POND	3.63	1	FLOW TIME	264. 5.92	392. 5.83	1839. 6.17
DIVERSION TO							
+	DIVERT	3.63	1	FLOW TIME	36. 5.58	36. 5.50	36. 5.42
HYDROGRAPH AT							
+	DIVOU	3.63	1	FLOW TIME	229. 5.92	356. 5.83	1804. 6.17
ROUTED TO							
+	PONDWU	3.63	1	FLOW TIME	118. 6.17	223. 6.08	1313. 6.33
** PEAK STAGES IN FEET **							
			1	STAGE TIME	20.68 5.92	7.42 6.08	26.90 6.33
ROUTED TO							
+	B-WU	3.63	1	FLOW TIME	116. 10.58	219. 9.92	1298. 8.75
HYDROGRAPH AT							
+	DIVIN	.00	1	FLOW TIME	36. 5.58	36. 5.50	36. 5.42
HYDROGRAPH AT							
+	W42A	.01	1	FLOW TIME	13. 5.83	18. 5.83	35. 5.75
ROUTED TO							
+	42A-WU	.01	1	FLOW TIME	13. 6.17	18. 6.17	35. 6.08
HYDROGRAPH AT							
+	W42	.05	1	FLOW TIME	60. 5.75	81. 5.75	156. 5.75
HYDROGRAPH AT							
+	W42B	.02	1	FLOW TIME	21. 5.83	28. 5.83	54. 5.75
ROUTED TO							
+	42B-WU	.02	1	FLOW TIME	20. 5.92	27. 5.92	54. 5.83
5 COMBINED AT							
+	WU	3.72	1	FLOW TIME	135. 10.58	256. 9.92	1339. 8.75
ROUTED TO							
+	U-V	3.72	1	FLOW TIME	135. 10.67	253. 10.00	1333. 8.75
HYDROGRAPH AT							
+	W43	.15	1	FLOW TIME	7. 5.92	24. 5.83	132. 5.83
2 COMBINED AT							
+	WV	3.86	1	FLOW TIME	135. 10.67	254. 10.00	1338. 8.75
ROUTED TO							
+	V-W	3.86	1	FLOW TIME	133. 10.75	249. 10.00	1334. 8.75
HYDROGRAPH AT							
+	W45	.19	1	FLOW	3.	17.	134.

MERIDIAN CROSSING FILING NO. 1 - FDR - EXISTING CONDITIONS

SURFACE ROUTING

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
1	E-1	1.96	2.07	6.4	4.8	8.5	9.4	17.6
		TRAVEL TIME						
		1.96	2.07	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					265	4.2	1.1	7.4
2	DP-1 E-2	1.96	2.07	7.4	4.6	8.1	22.9	48.7
		3.07	3.94	TRAVEL TIME				
		5.03	6.01	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					1500	4.7	5.3	12.7
3	E-4	1.94	2.04	6.3	4.8	8.5	9.3	17.5
		TRAVEL TIME						
		1.94	2.04	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					900	4.1	3.7	9.9
5	E-7	2.09	2.20	5.4	5.0	8.9	10.5	19.7
		TRAVEL TIME						
		2.09	2.20	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					347	2.0	2.9	8.3
4	E-6	2.36	2.49	5.8	4.9	8.7	11.6	21.7
		TRAVEL TIME						
		2.36	2.49	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					62	9.0	0.1	5.9
6	DP-2 DP-3 E-8 E-3	5.03	6.01	16.1	3.4	6.0	67.8	149.7
		1.94	2.04	TRAVEL TIME				
		8.36	10.75	TRAVEL TIME				
		4.89	6.28	TRAVEL TIME				
		20.21	25.09	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					36	1.5	0.4	16.5
7	DP-6 DP-5 (INLET) DP-4 (INLET)	20.21	25.09	16.5	3.3	5.9	67.0	148.5
		0.00	0.08	TRAVEL TIME				
		0.00	0.00	TRAVEL TIME				
		20.21	25.17	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					139	8.4	0.3	16.8
8	DP-7 POND WU* WEST TRIB CHAN.* E-5	20.21	25.17	16.8	3.3	5.9	147.7	1286.1
		19.44	188.25	TRAVEL TIME				
		1.96	2.07	TRAVEL TIME				
		3.29	4.23	TRAVEL TIME				
		44.91	219.72	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					83	5.8	0.2	17.0

* VALUES WERE OBTAINED FROM THE APPROVED MARKET PLACE FILING NO. 1 DRAINAGE REPORT

MERIDIAN CROSSING FILING NO. 1 - FDR - EXISTING CONDITIONS INLET CALCULATIONS

DP	Inlet size L(i)	INLET TYPE	CROSS SLOPE	STREET SLOPE	Q(5)	Q(100)	Q ₅						Q ₁₀₀					
							Qi	CA(eqv.)	FB	CA(eqv.)	DEPTH (max)	SPREAD	Qi	CA(eqv.)	FB	CA(eqv.)	DEPTH (max)	SPREAD
1	15	FLOW-BY	2.0%	1.0%	9	18	6.4	1.34	3	0.62	0.42	16.7	10.8	1.27	7	0.80	0.51	21.1
3	20	SUMP	2.0%	SAG	9	17	9.3	1.94	0	0.00	0.50		17.5	2.04	0	0.00	0.50	
4	25	SUMP	2.0%	SAG	12	22	11.6	2.36	0	0.00	0.50		21.7	2.49	0	0.00	0.50	
5	20	SUMP	2.0%	SAG	10	20	10.5	2.09	0	0.00	0.50		18.9	2.12	1	0.08	0.50	

Appendix D: Proposed Rational Calculations

Developed Rational Calcs

7/23/2008 3:41 PM

Tco = 1.87*(1.1-C5)*(L0.5)*(S*100)^0.33 (DCM page 5-11)
Vc = 20*\$0.5 (USDCM RO-4)
Tcc = 1/V*1/60
Is = (26.65*T.1.50)/(10+Tc)^0.76 (City Letter of 1/7/2003)
Ilnu = (26.65*2.67)/(10+Tc)^0.76 (City Letter of 1/7/2003)

MERIDIAN CROSSING - FDR - PROPOSED CONDITIONS

SURFACE ROUTING

DESIGN POINT	CONTRIBUTING BASINS	CA(equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
1	D-1	1.96	2.07	6.4	4.8	8.5	9.4	17.6
		TRAVEL TIME						
		1.96	2.07	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					250	4.2	1.0	7.4
J	D-10 D-11	0.38	0.40	5.0	5.1	9.1	3.7	7.0
		0.35	0.37	TRAVEL TIME				
		0.73	0.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Gutter	820	5.0	2.7	7.7
B	D-12 DP-J	0.43	0.45	10.1	4.1	7.3	4.7	8.9
		0.73	0.77	TRAVEL TIME				
		1.16	1.22	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Channel	40	1.8	0.4	10.5
X	D-9	3.31	3.50	5.0	5.1	9.1	16.9	31.8
		TRAVEL TIME						
		3.31	3.50	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Pipe	420	7.9	0.9	5.9
Z	D-2 DP-X Inlet 1 Flowby Inlet 1 DP-B	4.63	4.88	10.5	4.0	7.2	44.6	83.8
		3.31	3.50					
		0.62	0.80					
		1.34	1.27					
		1.16	1.22	TRAVEL TIME				
		11.06	11.67	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Channel	725	3.8	3.2	13.6
Y	D-3	10.34	10.92	16.1	3.4	6.0	34.7	65.1
		TRAVEL TIME						
		10.34	10.92	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Channel	895	2.4	6.2	22.3
3	D-4	1.94	2.04	6.3	4.8	8.5	9.3	17.5
		TRAVEL TIME						
		1.94	2.04	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
						0.0	0.0	6.3

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
E	DP-3 DP-Z	1.94	2.04	13.6	3.6	6.4	46.9	88.2
		11.06	11.67	TRAVEL TIME				
		12.99	13.71	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Channel	750	5.8	2.1	15.8
5	D-7	2.09	2.20	5.4	5.0	8.9	10.5	19.7
				TRAVEL TIME				
		2.09	2.20	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					150	2.0	1.3	6.6
4	D-6	2.36	2.49	5.8	4.9	8.7	11.6	21.7
				TRAVEL TIME				
		2.36	2.49	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					85	9.0	0.2	6.0
6	D-8 DP-E DP-Y	21.50	22.70	22.3	2.8	5.1	127.7	239.9
		12.99	13.71					
		10.34	10.92	TRAVEL TIME				
		44.83	47.33	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Pipe	36	10.0	0.1	22.4
7	DP-6 DP-5 (INLET) DP-4 (INLET)	44.83	47.33	22.4	2.8	5.1	140.2	264.8
		2.09	2.49					
		2.36	2.49	TRAVEL TIME				
		49.28	52.30	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				Channel	110	8.4	0.2	22.6
8	DP-7 POND WU* WEST TRIB CHAN.* D-5	49.28	52.30	22.6	2.8	5.0	209.4	1243.5
		19.44	188.25					
		1.96	2.07					
		3.29	4.23	TRAVEL TIME				
		73.98	246.86	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					83	5.8	0.2	22.8

* VALUES WERE OBTAINED FROM THE APPROVED MARKET PLACE FILING NO. 1 DRAINAGE REPORT

** VALUES WERE OBTAINED FROM LOWES DRAINAGE REPORT

MERIDIAN CROSSING - FDR - PROPOSED CONDITIONS INLET CALCULATIONS

DP	Inlet size L(i)	INLET TYPE	CROSS SLOPE	STREET SLOPE	Q(5)	Q(100)	Q ₅					Q ₁₀₀						
							Qi	CA(eqv.)	FB	CA(eqv.)	DEPTH (max)	SPREAD	Qi	CA(eqv.)	FB	CA(eqv.)	DEPTH (max)	SPREAD
1	15	FLOW-BY	2.0%	1.0%	9	18	6.4	1.34	3	0.62	0.42	16.7	10.8	1.27	7	0.80	0.51	21.1
3	20	SUMP	2.0%	SAG	9	17	9.3	1.94	0	0.00	0.50		17.5	2.04	0	0.00	0.50	
4	25	SUMP	2.0%	SAG	12	22	11.6	2.36	0	0.00	0.50		21.7	2.49	0	0.00	0.50	
5	20	SUMP	2.0%	SAG	10	20	10.5	2.09	0	0.00	0.50		18.9	2.12	0.7	0.08	0.50	

MERIDIAN CROSSING - FDR - PROPOSED CONDITIONS

PIPE ROUTING

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
1	INLET DP-1	1.34	1.27	6.4	4.8	8.5	6	11
		TRAVEL TIME						
		1.34	1.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				18" RCP	270	7.1	0.6	7.0
X	DP-X	3.31	3.50	5.0	5.1	9.1	17	32
		TRAVEL TIME						
		3.31	3.50	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				30" RCP	400	7.1	0.9	5.9
Z	DP-B	1.16	1.22	10.5	4.0	7.2	37	69
	DP-2	4.63	4.88					
	DP-X	3.31	3.50	TRAVEL TIME				
		9.10	9.60	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
				36" RCP	400	7.1	0.9	11.4

STREET CAPACITY

VERTICAL CURB

FOR 1/2 STREET SECTION

	Formula	Slope	Slope	n	Type	flow	Q _{max}	Q	Comments
Residential	Q=171.7 S ^{1/2}	0.5%	0.02	0.016	V	0.5	34	12.0	
		1.0%					34	17.0	
		1.5%					34	20.8	
		2.0%					34	24.1	
		2.5%					34	26.9	
		3.0%					34	29.5	
		3.5%					34	31.8	
		4.0%					34	34.0	
Collector/Arterial	Q=171.7 S ^{1/2}	0.5%	0.02	0.016	V	0.5	34	12.0	
		1.0%					34	17.0	
		1.5%					34	20.8	
		2.0%					34	24.1	
		2.5%					34	26.9	
		3.0%					34	29.5	
		3.5%					34	31.8	
		4.0%					34	34.0	

STREET CAPACITY

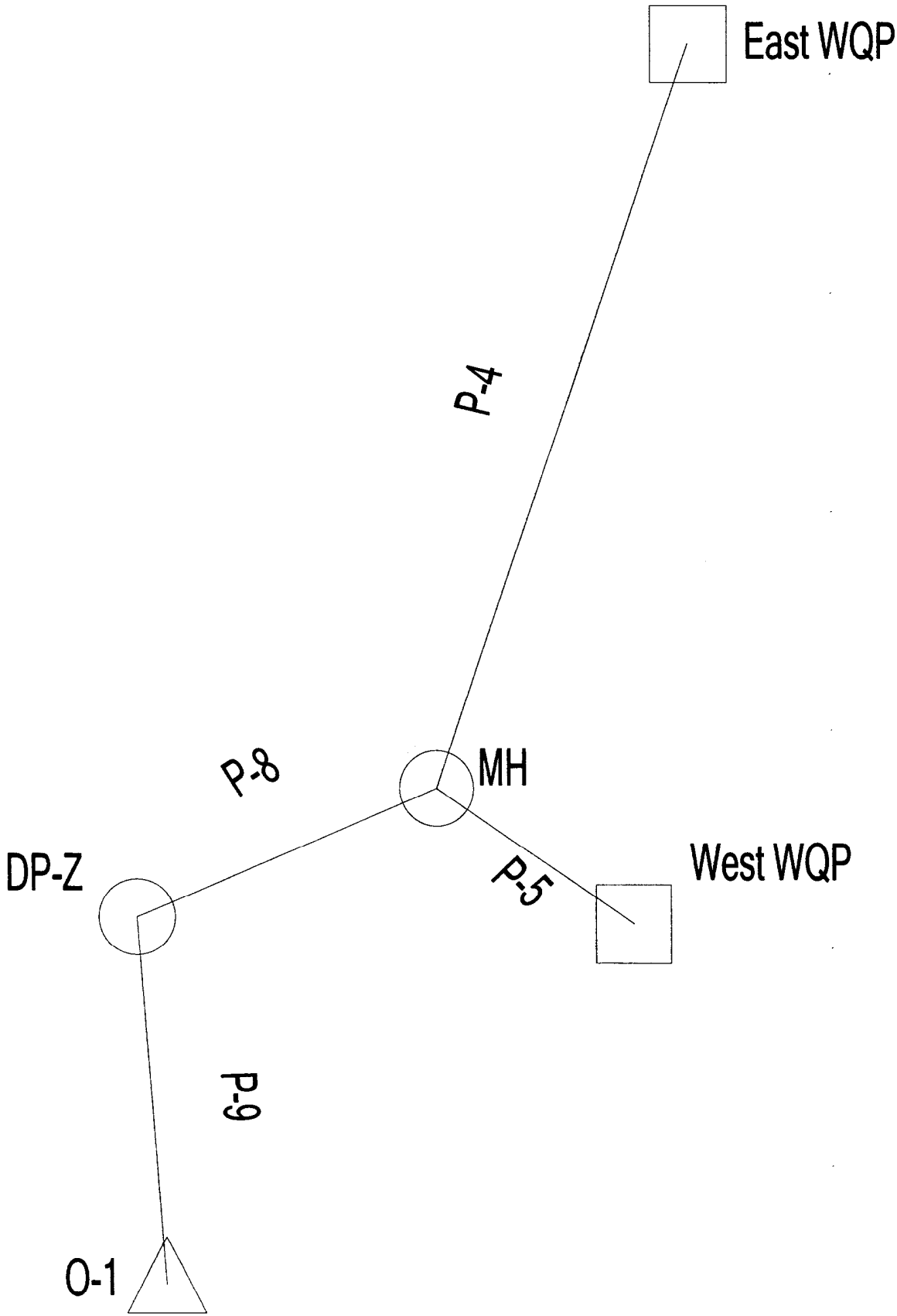
RAMP CURB

FOR 1/2 STREET SECTION

	Formula	Slope	Slope	n	Type	flow	Q _{max}	Q	Comments
Residential	Q=112.6 S ^{1/2}	0.5%	0.02	0.016	R	0.5	20	8.0	County ramp curb is 6"
		1.0%					20	11.3	
		1.5%					20	13.8	
		2.0%					20	15.9	
		2.5%					20	17.8	
		3.0%					20	19.5	
		3.15%					20	20.0	

Appendix E: StormCAD Calculations

Scenario: 100-year



Analysis Results

Scenario: 100-year

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Title: Old Meridian Road
Project Engineer: Charlene Sammons
Project Date: 11/14/07
Comments: Storm in Old Meridian Road for Meridian Crossing Storm Sewer

Scenario Summary

Scenario	100-year
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Catchments-100-year
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Network Inventory

Number of Pipes	4	Number of Inlets	2
- Circular Pipes:	4	- Grate Inlets:	0
- Box Pipes:	0	- Curb Inlets:	0
- Arch Pipes:	0	- Combination Inlets:	0
- Vertical Elliptical Pipes:	0	- Slot Inlets:	0
- Horizontal Elliptical Pipes:	0	- Grate Inlets in Ditch:	0
Number of Junctions	2	- Generic Inlets:	2
Number of Outlets	1		

Circular Pipes Inventory

30 inch	426.11 ft	42 inch	167.58 ft
36 inch	5.58 ft		
Total Length	599.27 ft		

Generic Inlet Inventory

Default 100%	2
--------------	---

Junction elements for network with outlet: O-1

Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Method	System Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
DP-Z	3,841.13	3,840.07	1.06	Standar	0.00	0.00	72.94	8.64	6.22	8.38
MH	3,842.25	3,841.42	0.83	Standar	0.00	0.00	73.34	8.68	6.09	8.38

Inlet elements for network with outlet: O-1

Label	Inlet	Total System Flow (cfs)	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Target Efficiency (%)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Method
East WQP	Generic Default	132.00	32.00	0.00	N/A	3,844.85	3,844.85	0.00	Absolut
West WQP	Generic Default	144.27	44.27	0.00	N/A	3,842.28	3,842.28	0.00	Absolut

Analysis Results

Scenario: 100-year

Outlet: O-1

Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
O-1	3,836.40	3,836.40	0.00	0.00	0.00	72.41	8.57	6.40	8.38

Pipe elements for network with outlet: O-1

Label	Section Shape	Section Size	Length (ft)	Number of Sections	Constructed Slope (ft/ft)	Energy Slope (ft/ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P-4	Circular	30 inch	26.11	1	0.008	0.006	32.00	6.52	3,842.25	6,839.05	3,844.85	3,842.25
P-5	Circular	36 inch	5.58	1	0.047	0.004	44.27	6.26	3,839.11	6,838.85	3,842.28	3,842.25
P-8	Circular	42 inch	60.40	1	0.011	0.005	73.34	7.67	3,838.05	6,837.39	3,841.42	3,841.13
P-9	Circular	42 inch	07.18	1	0.009	0.008	72.94	10.03	3,837.39	6,836.40	3,840.07	3,838.71

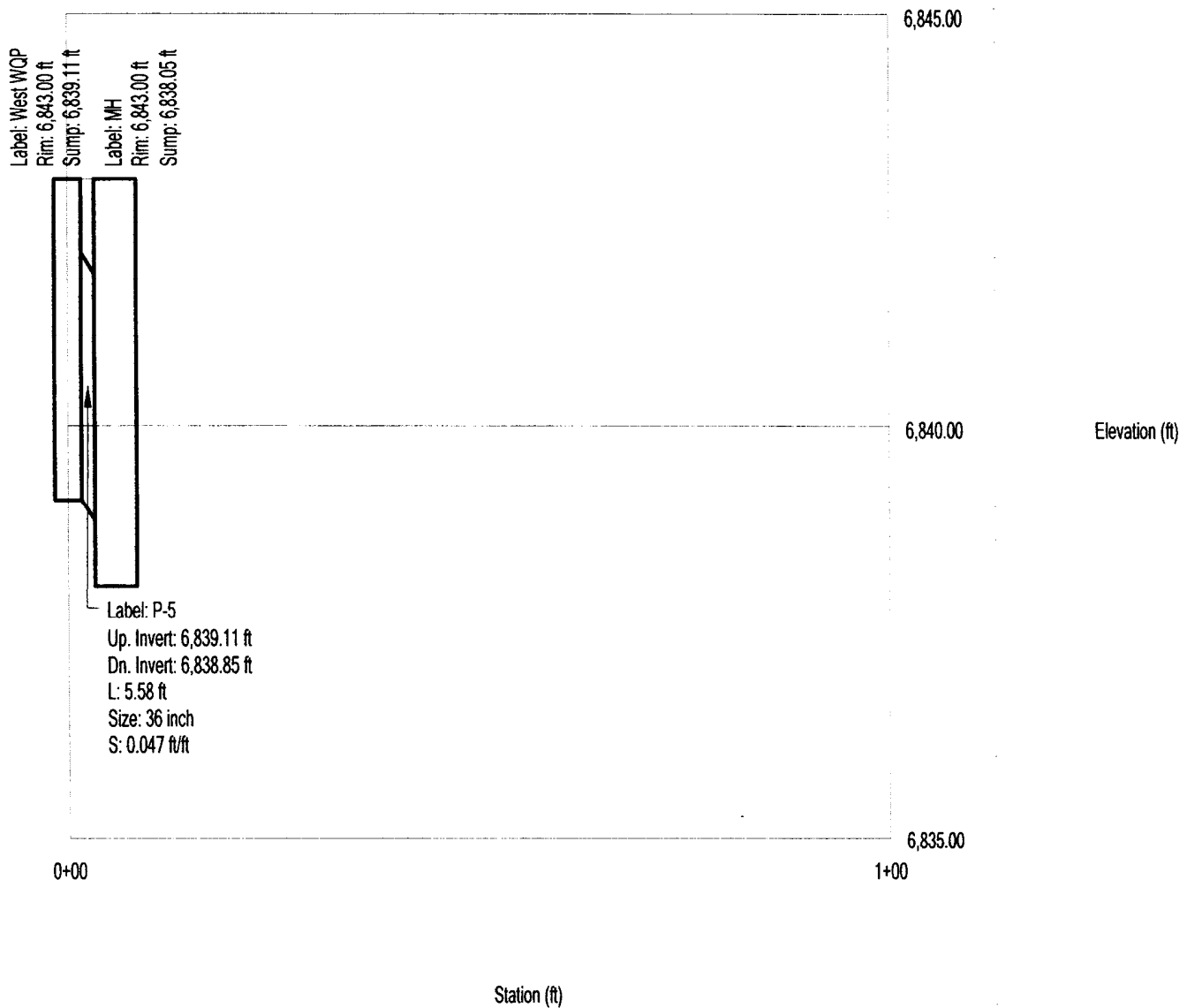
Scenario: 100-year

Combined PipeNode Report

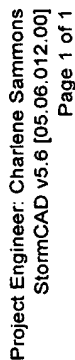
Label	Up. Node	Dn. Node	L (ft)	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	Up. Inlet Rat. Q (cfs)	Size	Q Full (cfs)	Avg. v (ft/s)	Up. Gr Elev. (ft)	HGL In (ft)	Up. Invert (ft)	Dn. Gr. Elev. (ft)	HGL Out (ft)	Dn. Invert (ft)	S (ft/ft)
P-4	East WQF	MH	426.11	3.50	1.00	3.50	3.50	32.00	30 inch	35.54	6.52	6,845.00	6,844.85	6,842.25	6,839.05	6,843.00	6,842.25	0.008
P-5	West WQF	MH	5.58	4.88	1.00	4.88	4.88	44.27	36 inch	143.97	6.26	6,843.00	6,842.28	6,839.11	6,838.85	6,843.00	6,842.25	0.047
P-8	MH	DP-Z	60.40	N/A	N/A	N/A	8.38	N/A	42 inch	105.16	7.57	6,843.00	6,841.42	6,838.05	6,837.39	6,841.75	6,841.13	0.011
P-9	DP-Z	O-1	107.18	N/A	N/A	N/A	8.38	N/A	42 inch	96.69	10.03	6,841.75	6,840.07	6,837.39	6,836.40	6,841.00	6,838.71	0.009

Profile
Scenario: 100-year

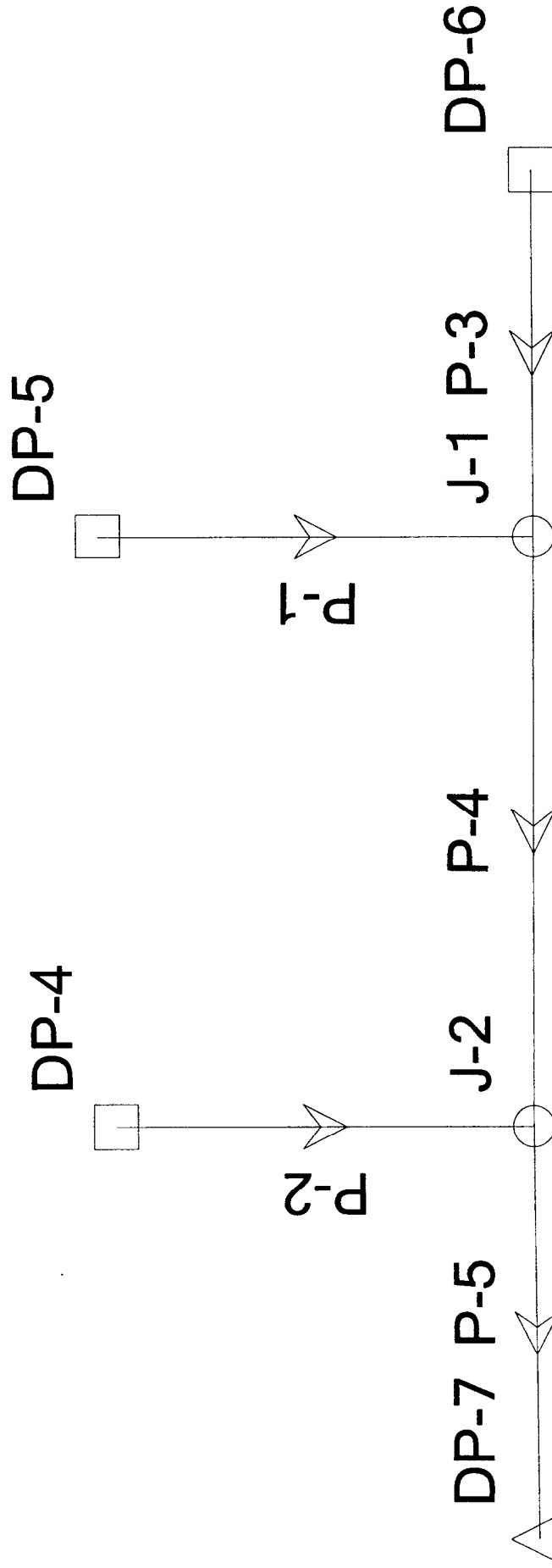
Profile: West Pond
Scenario: 100-year



Profile: East Pond
Scenario: 100-year



Scenario: 100-year



Analysis Results

Scenario: 100-year

Title: Meridian Crossing
 Project Engineer: Charlene Sammons
 Project Date: 01/31/05
 Comments: Analysis of existing storm system downstream of Meridian Crossing Project in Falcon, CO

Scenario Summary

Scenario	100-year
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Catchments-100-year
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Network Inventory

Number of Pipes	5	Number of Inlets	3
- Circular Pipes:	2	- Grate Inlets:	0
- Box Pipes:	3	- Curb Inlets:	2
- Arch Pipes:	0	- Combination Inlets:	0
- Vertical Elliptical Pipes:	0	- Slot Inlets:	0
- Horizontal Elliptical Pipes:	0	- Grate Inlets in Ditch:	0
Number of Junctions	2	- Generic Inlets:	1
Number of Outlets	1		

Circular Pipes Inventory

24 inch	185.50 ft
Total Length	185.50 ft

Box Pipes Inventory

6 x 3 ft	366.02 ft
Total Length	366.02 ft

Curb Inlet Inventory

Type R 10'	2
------------	---

Generic Inlet Inventory

Default 100%	1
--------------	---

Inlet elements for network with outlet: DP-7

Label	Inlet	Total Flow (cfs)	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Target (%)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Headloss Method
DP-4	Curb Type R 10'	22.05	22.05	0.00	N/A	3,818.78	3,818.78	0.00	Absolut
DP-5	Curb Type R 10'	19.80	19.80	0.00	N/A	3,818.70	3,818.70	0.00	Absolut
DP-6	Generic Default	150.69	250.69	0.00	N/A	3,817.78	3,817.78	0.00	Absolut

Analysis Results

Scenario: 100-year

Outlet: DP-7

Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Flow (cfs)	System Flow (cfs)	System Flow (cfs)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
DP-7	3,814.44	3,814.44	0.00	0.00	0.00	273.30	5.21	22.65	52.02

Junction elements for network with outlet: DP-7

Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Method Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)	
J-1	3,817.71	3,817.71	0.00	Absolut	0.00	0.00	262.00	5.25	22.36	49.53
J-2	3,817.08	3,817.08	0.00	Absolut	0.00	0.00	273.54	5.22	22.61	52.02

Pipe elements for network with outlet: DP-7

Label	Section Shape	Section Size	Length (ft)	Number of Sections	Constructed Slope (ft/ft)	Energy Slope (ft/ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P-1	Circular	24 inch	94.00	1	0.009043	008925	19.80	7.56	3,817.10	6,816.25	3,818.70	3,817.76
P-2	Circular	24 inch	91.50	1	0.016940	014085	22.05	8.96	3,817.10	6,815.55	3,818.78	3,816.86
P-3	Box	6 x 3 ft	28.85	2	0.005199	005093	50.69	8.63	3,815.40	6,815.25	3,817.78	3,817.71
P-4	Box	6 x 3 ft	33.50	2	0.005243	005221	62.00	8.76	3,815.25	6,814.55	3,817.71	3,817.08
P-5	Box	6 x 3 ft	20.66	2	0.005324	004607	73.54	9.31	3,814.55	6,814.44	3,817.08	3,816.82

Scenario: 100-year

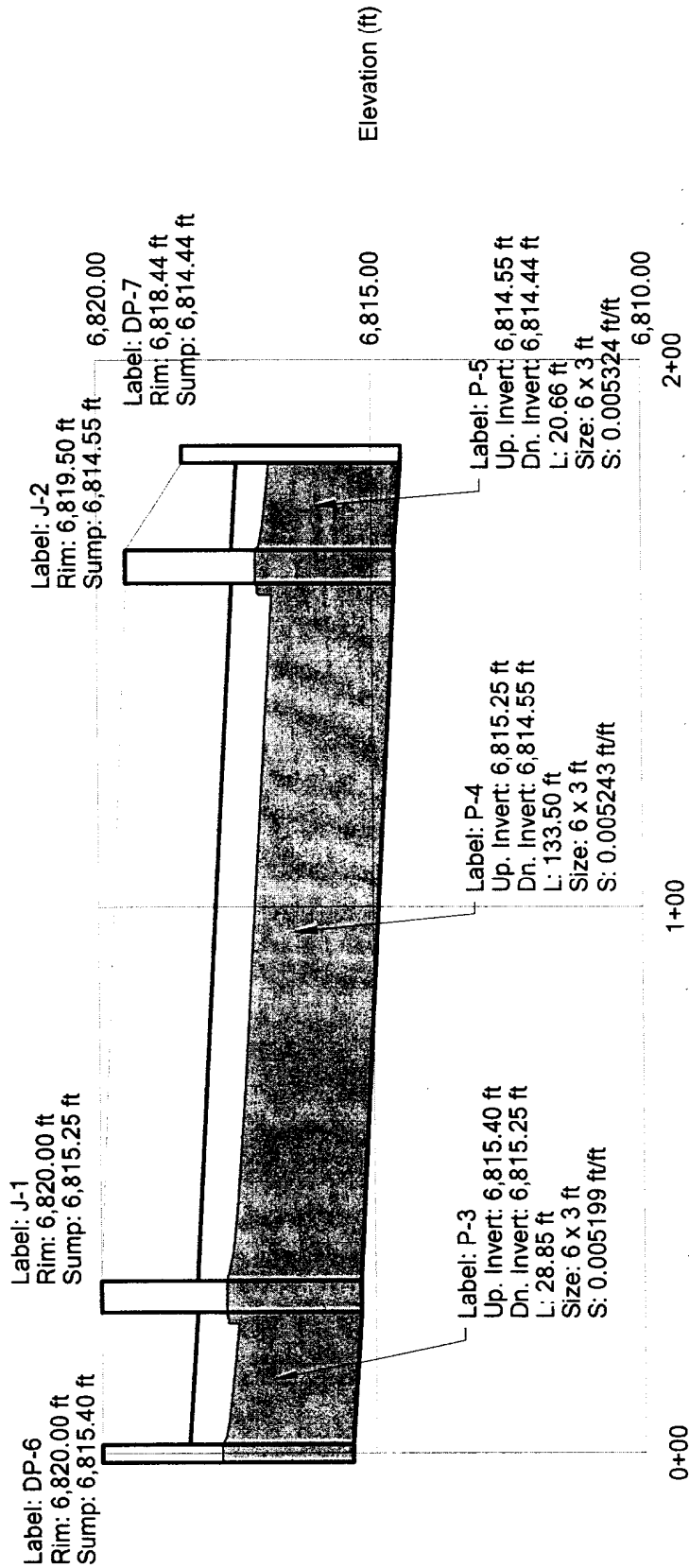
Combined Pipe\Node Report

Label	Up. Node	Dn. Node	L (ft)	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	Up. Inlet Rat. Q (cfs)	Size	Q Full (cfs)	Avg. V (ft/s)	Up. Gr. Elev. (ft)	HGL In (ft)	Up. Invert (ft)	Dn. Gr. Elev. (ft)	HGL Out (ft)	Dn. Invert (ft)	S (ft/ft)
P-2	DP-4	J-2	91.50	2.49	1.00	2.49	2.49	22.05	24 inch	29.44	8.96	6,821.16	6,818.78	6,817.10	6,819.50	6,816.86	6,815.55	0.016940
P-1	DP-5	J-1	94.00	2.20	1.00	2.20	2.20	19.80	24 inch	21.51	7.56	6,821.16	6,818.70	6,817.10	6,820.00	6,817.76	6,816.25	0.009043
P-3	DP-6	J-1	28.85	47.33	1.00	47.33	47.33	250.69	6 x 3 ft	296.71	8.63	6,820.00	6,817.78	6,815.40	6,820.00	6,817.71	6,815.25	0.005199
P-4	J-1	J-2	133.50	N/A	N/A	N/A	49.53	N/A	6 x 3 ft	297.96	8.76	6,820.00	6,817.71	6,815.25	6,819.50	6,817.08	6,814.55	0.005243
P-5	J-2	DP-7	20.66	N/A	N/A	N/A	52.02	N/A	6 x 3 ft	300.25	9.31	6,819.50	6,817.08	6,814.55	6,818.44	6,816.82	6,814.44	0.005324

Profile
Scenario: 100-year

Profile: RCB @ Highway 24

Scenario: 100-year

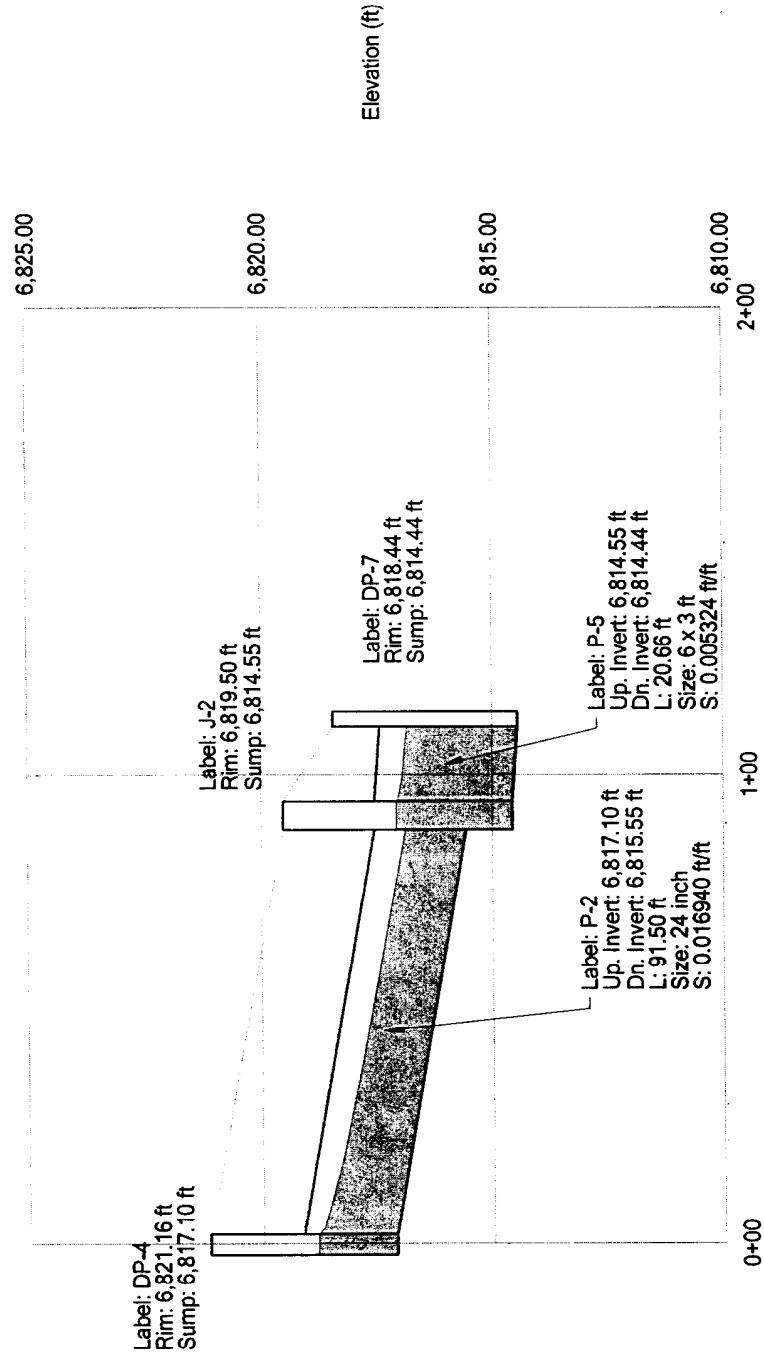


Station (ft)

Profile Scenario: 100-year

Profile: Sump Inlet Left

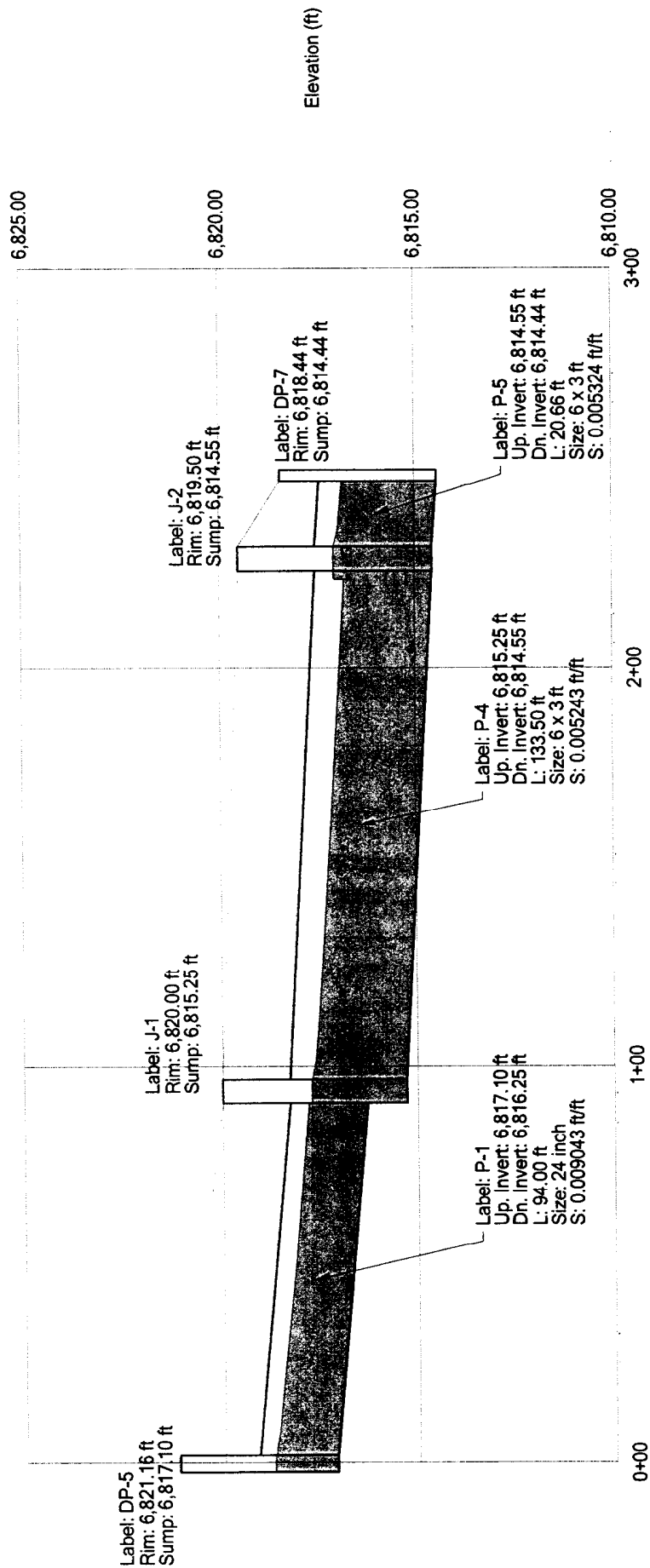
Scenario: 100-year



Profile
Scenario: 100-year

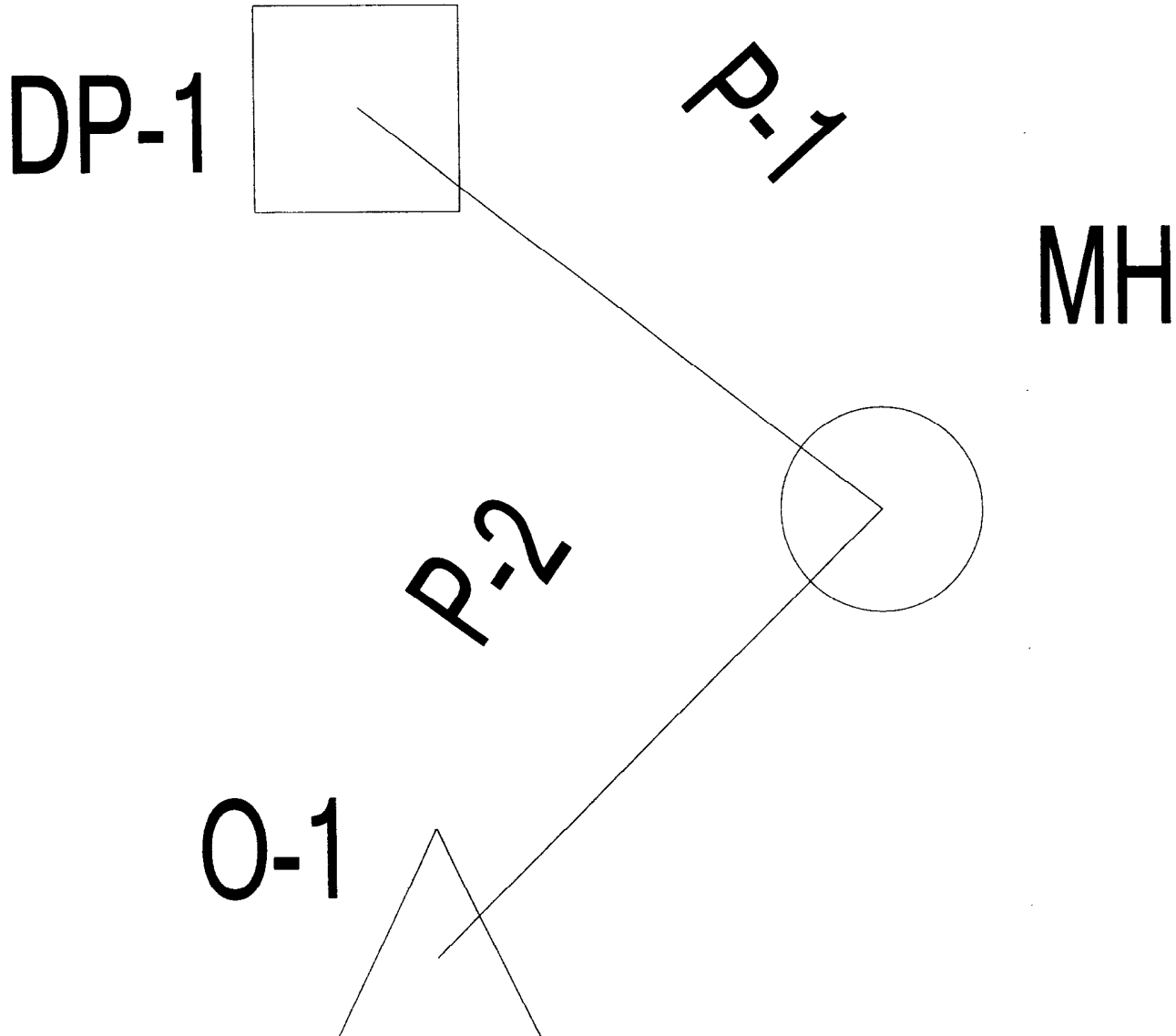
Profile: Sump Inlet Right

Scenario: 100-year



Station (ft)

Scenario: 100-year



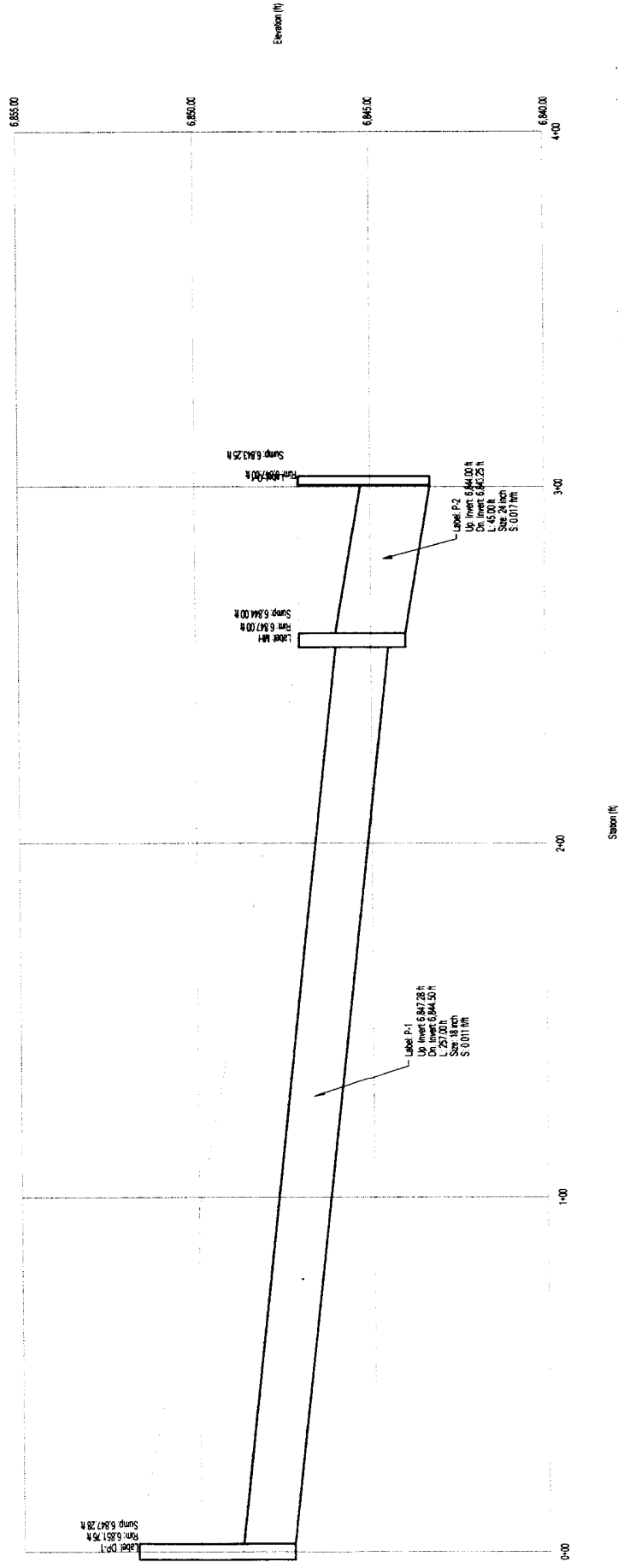
Analysis Results **Scenario: 100-year**

Outlet: O-1									
Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
O-1	3,843.25	3,843.25	0.00	0.00	0.00	7.35	8.28	7.22	0.88

Pipe elements for network with outlet: O-1												
Label	Section Shape	Section Size	Length (ft)	Number of Sections	Constructed Slope (ft/ft)	Energy Slope (ft/ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P-1	Circular	18 inch	57.00	1	0.011	0.011	7.61	6.16	3,847.28	6,844.50	3,848.35	3,845.42
P-2	Circular	24 inch	45.00	1	0.017	0.012	7.39	6.17	3,844.00	6,843.25	3,844.97	3,843.96

Profile Scenario: 100-year

Profile: Ultimate Design
Scenario: 100-year



Existing Channel along Highway 24 ROW

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	65.1000 cfs
Slope	0.0090 ft/ft
Manning's n	0.0350
Height	36.0000 in
Bottom width	480.0000 in
Left slope	0.2500 ft/ft (V/H)
Right slope	0.2500 ft/ft (V/H)

Computed Results:

Depth	6.8903 in
Velocity	2.6805 fps
Full Flowrate	1129.3728 cfs
Flow area	24.2864 ft2
Flow perimeter	536.8189 in
Hydraulic radius	6.5148 in
Top width	535.1224 in
Area	156.0000 ft2
Perimeter	776.8636 in
Percent full	19.1397 %

Critical Information

Critical depth	5.1448 in
Critical slope	0.0241 ft/ft
Critical velocity	3.6400 fps
Critical area	17.8847 ft2
Critical perimeter	522.4254 in
Critical hydraulic radius	4.9297 in
Critical top width	521.1587 in
Specific energy	0.6859 ft
Minimum energy	0.6431 ft
Froude number	0.6404
Flow condition	Subcritical

Existing Temporary Channel along Meridian Road (DP-E)

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	88.2000 cfs
Slope	0.0200 ft/ft
Manning's n	0.0350
Height	36.0000 in
Bottom width	0.0000 in
Left slope	0.2500 ft/ft (V/H)
Right slope	0.1667 ft/ft (V/H)

Computed Results:

Depth	21.4874 in
Velocity	5.5023 fps
Full Flowrate	349.2362 cfs
Flow area	16.0296 ft2
Flow perimeter	219.2720 in
Hydraulic radius	10.5269 in
Top width	214.8480 in
Area	44.9946 ft2
Perimeter	367.3687 in
Percent full	59.6872 %

Critical Information

Critical depth	21.7023 in
Critical slope	0.0190 ft/ft
Critical velocity	5.3939 fps
Critical area	16.3519 ft2
Critical perimeter	221.4655 in
Critical hydraulic radius	10.6322 in
Critical top width	216.9973 in
Specific energy	2.2611 ft
Minimum energy	2.7128 ft
Froude number	1.0252
Flow condition	Supercritical

Proposed Temporary Channel from Old Meridian Road (DP-Z)

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	73.3000 cfs
Slope	0.0050 ft/ft
Manning's n	0.0350
Height	36.0000 in
Bottom width	60.0000 in
Left slope	0.2500 ft/ft (V/H)
Right slope	0.2500 ft/ft (V/H)

Computed Results:

Depth	21.9888 in
Velocity	3.2444 fps
Full Flowrate	219.3674 cfs
Flow area	22.5927 ft2
Flow perimeter	241.3242 in
Hydraulic radius	13.4813 in
Top width	235.9103 in
Area	51.0000 ft2
Perimeter	356.8636 in
Percent full	61.0800 %

Critical Information

Critical depth	16.0014 in
Critical slope	0.0192 ft/ft
Critical velocity	5.3195 fps
Critical area	13.7795 ft2
Critical perimeter	191.9505 in
Critical hydraulic radius	10.3373 in
Critical top width	188.0108 in
Specific energy	1.9960 ft
Minimum energy	2.0002 ft
Froude number	0.5336
Flow condition	Subcritical

Culvert Designer/Analyzer Report **Highway 24 - DP WU**

Analysis Component			
Storm Event	Check	Discharge	1,241.00 cfs
Peak Discharge Method: User-Specified			
Design Discharge	1,241.00 cfs	Check Discharge	1,241.00 cfs
Tailwater properties: Trapezoidal Channel			
Tailwater conditions for Check Storm.			
Discharge	1,241.00 cfs	Bottom Elevation	6,813.00 ft
Depth	3.82 ft	Velocity	7.78 ft/s

Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	3-12 x 6 ft Box	1,240.93 cfs	6,818.87 ft	8.71 ft/s
Weir	Roadway (Constant Elevation)	0.00 cfs	6,818.87 ft	N/A
Total	-----	1,240.93 cfs	6,818.87 ft	N/A

Culvert Designer/Analyzer Report

Highway 24 - DP WU

Component: Culvert-1

Culvert Summary

Computed Headwater Elev.	6,818.87 ft	Discharge	1,240.93 cfs
Inlet Control HW Elev.	6,818.37 ft	Tailwater Elevation	6,816.82 ft
Outlet Control HW Elev.	6,818.87 ft	Control Type	Outlet Control
Headwater Depth/Height	0.96		

Grades

Upstream Invert	6,813.10 ft	Downstream Invert	6,812.87 ft
Length	47.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile

Profile	S1	Depth, Downstream	3.96 ft
Slope Type	Steep	Normal Depth	2.78 ft
Flow Regime	Subcritical	Critical Depth	3.33 ft
Velocity Downstream	8.71 ft/s	Critical Slope	0.002971 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	12.00 ft
Section Size	12 x 6 ft	Rise	6.00 ft
Number Sections	3		

Outlet Control Properties

Outlet Control HW Elev.	6,818.87 ft	Upstream Velocity Head	1.54 ft
Ke	0.50	Entrance Loss	0.77 ft

Inlet Control Properties

Inlet Control HW Elev.	6,818.37 ft	Flow Control	N/A
Inlet Type	45° wingwall flares - offset	Area Full	216.0 ft²
K	0.49700	HDS 5 Chart	13
M	0.66700	HDS 5 Scale	1
C	0.03020	Equation Form	2
Y	0.83500		

Culvert Designer/Analyzer Report McLaughlin Bridge

Component: Culvert-1

Culvert Summary

Computed Headwater Elev.	104.17 ft	Discharge	623.40 cfs
Inlet Control HW Elev.	104.17 ft	Tailwater Elevation	N/A ft
Outlet Control HW Elev.	103.98 ft	Control Type	Inlet Control
Headwater Depth/Height	1.39		

Grades

Upstream Invert	100.00 ft	Downstream Invert	100.00 ft
Length	50.00 ft	Constructed Slope	0.010000 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	1.99 ft
Slope Type	Steep	Normal Depth	1.76 ft
Flow Regime	Supercritical	Critical Depth	2.49 ft
Velocity Downstream	11.21 ft/s	Critical Slope	0.003719 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	7.00 ft
Section Size	7 x 3 ft	Rise	3.00 ft
Number Sections	4		

Outlet Control Properties

Outlet Control HW Elev.	103.98 ft	Upstream Velocity Head	1.24 ft
Ke	0.20	Entrance Loss	0.25 ft

Inlet Control Properties

Inlet Control HW Elev.	104.17 ft	Flow Control	N/A
Inlet Type	90° headwall w 45° bevels	Area Full	84.0 ft2
K	0.49500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	2
C	0.03140	Equation Form	2
Y	0.82000		

Culvert Designer/Analyzer Report

Old Meridian Road - DP Y

Analysis Component			
Storm Event	Check	Discharge	65.10 cfs
Peak Discharge Method: User-Specified			
Design Discharge	34.70 cfs	Check Discharge	65.10 cfs
Tailwater properties: Trapezoidal Channel			
Tailwater conditions for Check Storm.			
Discharge	65.10 cfs	Bottom Elevation	6,813.00 ft
Depth	0.89 ft	Velocity	3.45 ft/s

Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	1-54 inch Circular	65.11 cfs	6,824.75 ft	9.95 ft/s
Weir	Roadway (Constant Elevation)	0.00 cfs	6,824.75 ft	N/A
Total	-----	65.11 cfs	6,824.75 ft	N/A

Culvert Designer/Analyzer Report

Old Meridian Road - DP Y

Component: Culvert-1

Culvert Summary			
Computed Headwater Elev:	6,824.75 ft	Discharge	65.11 cfs
Inlet Control HW Elev.	6,824.43 ft	Tailwater Elevation	6,813.89 ft
Outlet Control HW Elev.	6,824.75 ft	Control Type	Entrance Control
Headwater Depth/Height	0.83		
Grades			
Upstream Invert	6,821.00 ft	Downstream Invert	6,820.50 ft
Length	50.00 ft	Constructed Slope	0.010000 ft/ft
Hydraulic Profile			
Profile	S2	Depth, Downstream	1.94 ft
Slope Type	Steep	Normal Depth	1.78 ft
Flow Regime	Supercritical	Critical Depth	2.35 ft
Velocity Downstream	9.95 ft/s	Critical Slope	0.003794 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.50 ft
Section Size	54 inch	Rise	4.50 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	6,824.75 ft	Upstream Velocity Head	0.93 ft
Ke	0.50	Entrance Loss	0.47 ft
Inlet Control Properties			
Inlet Control HW Elev.	6,824.43 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	15.9 ft2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Designer/Analyzer Report

Old Meridian Road - DP Y

Component: Weir

Hydraulic Component(s): Roadway (Constant Elevation)

Discharge	0.00 cfs	Allowable HW Elevation	6,824.75 ft
Roadway Width	44.00 ft	Overtopping Coefficient	2.90 US
Length	150.00 ft	Crest Elevation	6,825.35 ft
Headwater Elevation	N/A ft	Discharge Coefficient (Cr)	2.90
Submergence Factor (Kt)	1.00		

Sta (ft)	Elev. (ft)
0.00	6,825.35
150.00	6,825.35

Culvert Outlet Protection

Meridian Crossing - Final Drainage Report

Culvert	Diameter (in)	No of Barrels	Slope (%)	Velocity ft/s	Riprap Width ft	Riprap Length ft	Riprap Size
DP-Y	54	1	1.20%	10.5	13.5	21.5	3.78 L
DP-Z	42	1	0.90%	10.0	10.5	18.5	3.44 L

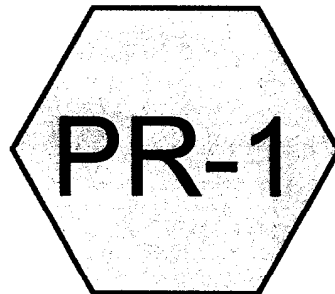
Appendix G: Water Quality Pond Calculations

Design Procedure Form: Porous Landscape Detention (PLD)

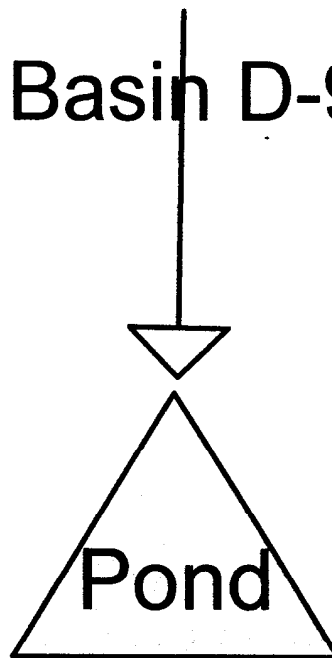
Designer: Thomas Roberts
 Company: Springs Engineering
 Date: July 23, 2008
 Project: Meridian Crossing East Pond
 Location: Falcon, CO

<p>1. Basin Storage Volume ($I_a = 100\%$ if all paved and roofed areas u/s of PLD) A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) B) Contributing Watershed Area Including the PLD (Area) C) Water Quality Capture Volume (WQCV) (WQCV = $0.8 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)$) D) Design Volume: $Vol_{PLD} = (WQCV / 12) * Area$</p>	<p> $I_a = \underline{79.00} \%$ $i = \underline{0.79}$ Area = <u>167,616</u> square feet WQCV = <u>0.26</u> watershed inches Vol = <u>3,600</u> cubic feet </p>				
<p>2. PLD Surface Area (A_{PLD}) and Average Depth (d_{av}) (from 3600.24 square feet to 7200.48 square feet) ($d_{av} = (Vol / A_{PLD})$, Min=0.5', Max=1.0')</p>	<p> $A_{PLD} = \underline{3,600}$ square feet $d_{av} = \underline{1.00}$ feet </p>				
<p>3. Draining of PLD (Check A, or B, or C, answer D) Based on answers to 3A through 3D, check the appropriate method</p> <p> A) Check box if subgrade is heavy or expansive clay <input type="checkbox"/> B) Check box if subgrade is silty or clayey sand <input type="checkbox"/> C) Check box if subgrade is well-draining soil <input checked="" type="checkbox"/> D) Check box if underdrains are not desirable or if underdrains are not feasible at this site. <input type="checkbox"/> E) Does tributary catchment contain land uses that may have petroleum products, greases, or other chemicals present, such as gas station, hardware store, restaurant, etc.? <table border="1"><tr><td>yes</td><td>no</td></tr><tr><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td></tr></table> </p>	yes	no	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p> <u> </u> Infiltration to Subgrade with Permeable Membrane: 3(C) checked and 3(E) = no <u> </u> Underdrain with Impermeable Liner: 3(A) checked or 3(E) = yes <u> </u> Underdrain with Non-Woven Geotextile Fabric: 3(B) checked and 3(E) = no <u> </u> 16-Mil. Impermeable Membrane with No Underdrain: 3(D) checked - Evapotranspiration only <u> x </u> Other: <u>Type D Inlet</u> </p>
yes	no				
<input checked="" type="checkbox"/>	<input type="checkbox"/>				
<p>4. Sand/Peat Mix and Gravel Subbase (See Figure PLD-1)</p> <p> A) Heavy or Expansive Clay (NRCS Group D Soils) Present; Perforated HDPE Underdrain Used. B) Silty or Clayey Sand (NRCS Group C Soils) Present; Perforated HDPE Underdrain Used. C) No Potential For Contamination And Well-Draining (NRCS Group A or B Soils) Are Present; Underdrains Eliminated. D) Underdrains Are Not Desirable Or Are Not Feasible At This Site. E) Other: </p>	<p> <u> </u> 18" Minimum Depth Sand-Peat Mix with 8" Gravel Layer. 16-Mil. Impermeable Liner and a 3" to 4" Perforated HDPE Underdrain. <u> </u> 18" Minimum Depth Sand-Peat Mix with 8" Gravel Layer and a 3" to 4" Perforated HDPE Underdrain w/ Non-Woven Pemeable Membrane. <u> </u> 18" Minimum Depth Sand-Peat Mix with Non-Woven Pemeable Membrane and No Underdrain (Direct Infiltration). <u> </u> 18" Minimum Depth Sand-Peat Mix with An Additional 18" Minimum Layer Sand-Peat Mix or Sand-Class 'A' Compost Bottom Layer (Total Sand-Peat Depth of 36"). 16-Mil. Impermeable Liner Used. <u> x </u> Other: <u>See Detail on Sheet 8</u> </p>				

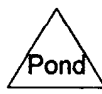
Notes:



Basin D-9



East PLD



Pond Pond: East PLD

Inflow Area = 3.680 ac, Inflow Depth = 0.56" for 2-Year event
 Inflow = 8.32 cfs @ 0.09 hrs, Volume= 0.172 af
 Outflow = 6.50 cfs @ 0.27 hrs, Volume= 0.134 af, Atten= 22%, Lag= 10.7 min
 Primary = 6.50 cfs @ 0.27 hrs, Volume= 0.134 af

Routing by Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 6,844.47' @ 0.27 hrs Surf.Area= 3,394 sf Storage= 4,371 cf

Plug-Flow detention time= 12.8 min calculated for 0.134 af (78% of inflow)
 Center-of-Mass det. time= 10.8 min (20.9 - 10.0)

Volume	Invert	Avail.Storage	Storage Description	
#1	6,843.00'	9,728 cf	Custom Stage Data (Pyramidal) Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
6,843.00	2,200	0	0	2,200
6,844.00	3,300	2,731	2,731	3,320
6,846.00	3,700	6,996	9,728	3,939

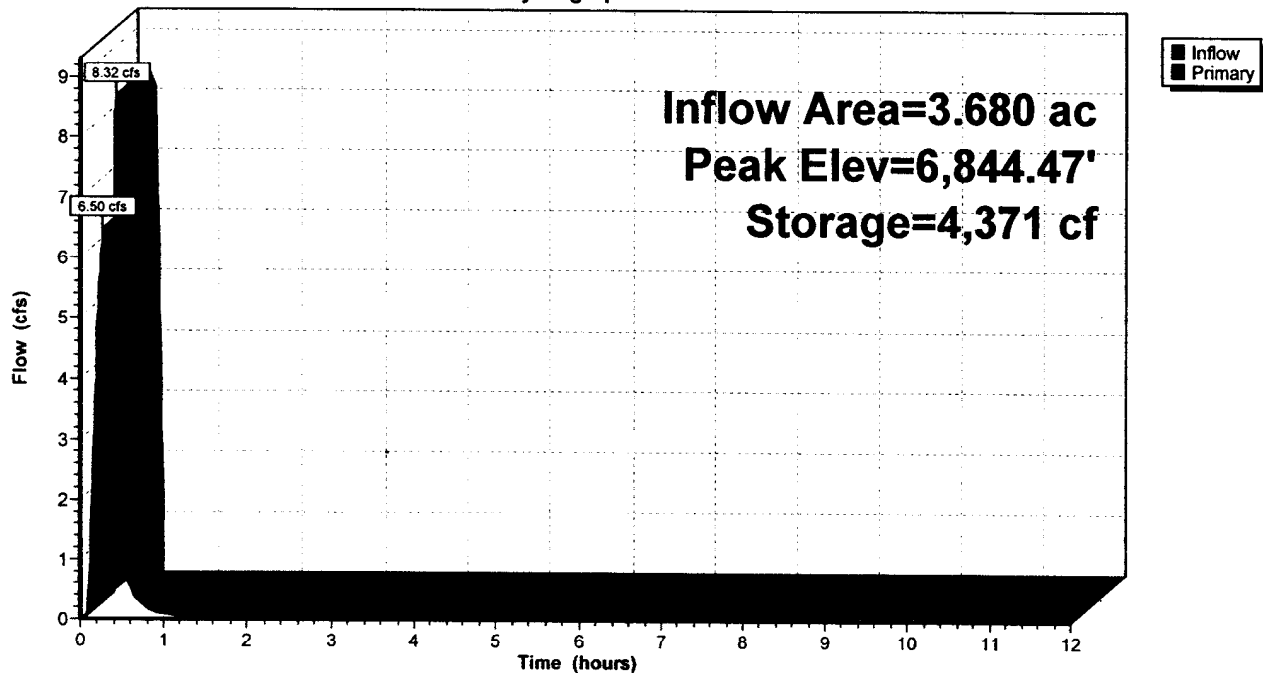
Device	Routing	Invert	Outlet Devices	
#1	Primary	6,845.50'	3.00' x 3.00' Horiz. Orifice/Grate	Limited to weir flow C= 1.000
#2	Primary	6,843.60'	2.50' W x 1.25' H Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=6.49 cfs @ 0.27 hrs HW=6,844.47' (Free Discharge)

- 1=Orifice/Grate (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 6.49 cfs @ 2.99 fps)

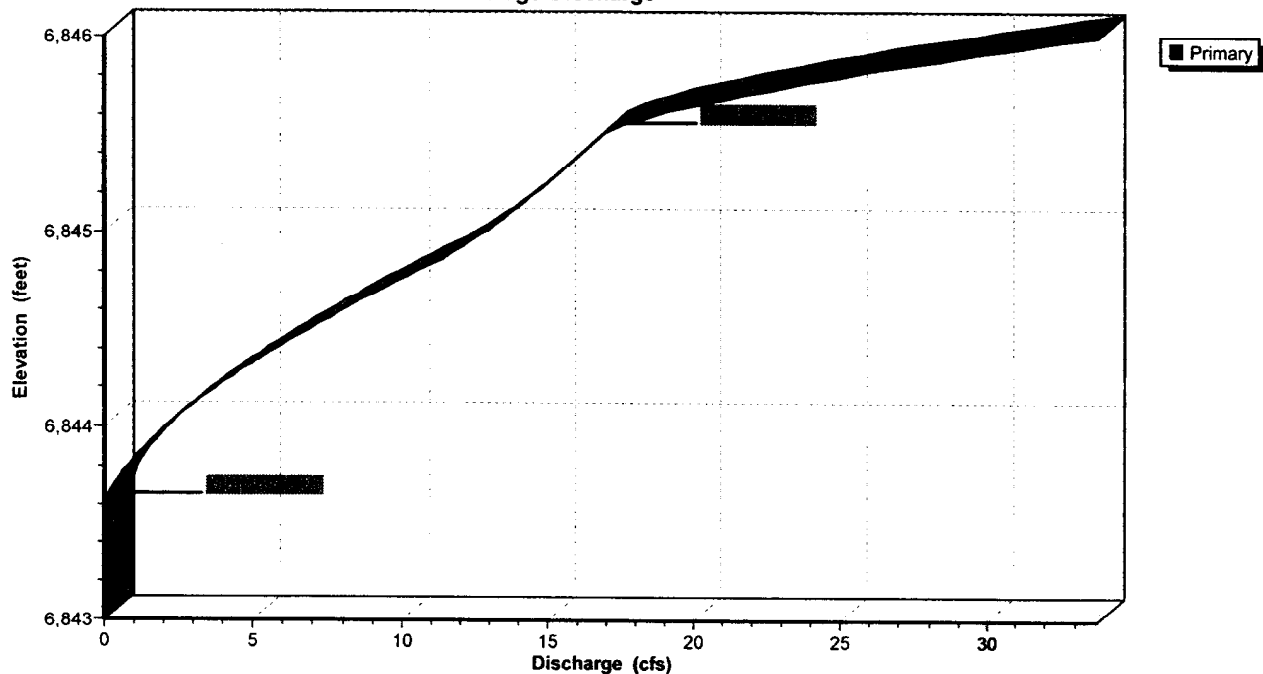
Pond Pond: East PLD

Hydrograph



Pond Pond: East PLD

Stage-Discharge



Pond Pond: East PLD

Inflow Area = 3.680 ac, Inflow Depth = 0.77" for 5-Year event
 Inflow = 11.42 cfs @ 0.09 hrs, Volume= 0.236 af
 Outflow = 9.65 cfs @ 0.26 hrs, Volume= 0.198 af, Atten= 16%, Lag= 10.4 min
 Primary = 9.65 cfs @ 0.26 hrs, Volume= 0.198 af

Routing by Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 6,844.73' @ 0.26 hrs Surf.Area= 3,446 sf Storage= 5,288 cf

Plug-Flow detention time= 10.5 min calculated for 0.198 af (84% of inflow)
 Center-of-Mass det. time= 9.4 min (19.4 - 10.0)

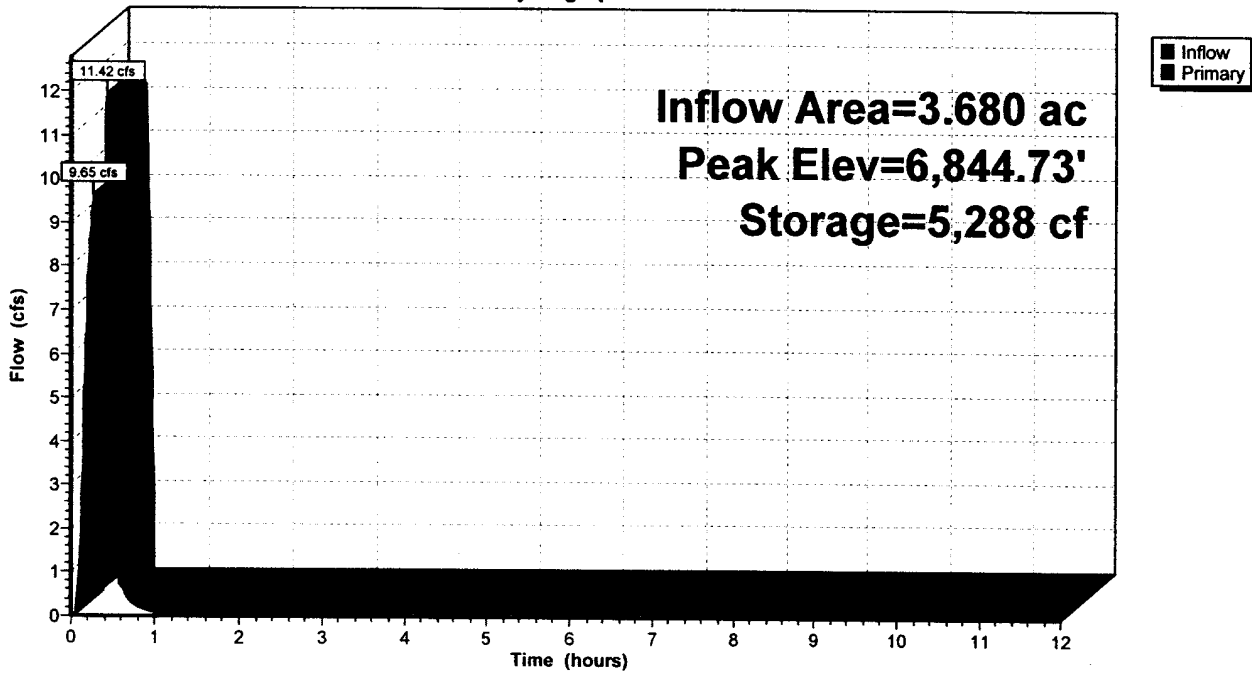
Volume	Invert	Avail.Storage	Storage Description	
#1	6,843.00'	9,728 cf	Custom Stage Data (Pyramidal) Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
6,843.00	2,200	0	0	2,200
6,844.00	3,300	2,731	2,731	3,320
6,846.00	3,700	6,996	9,728	3,939

Device	Routing	Invert	Outlet Devices	
#1	Primary	6,845.50'	3.00' x 3.00' Horiz. Orifice/Grate	Limited to weir flow C= 1.000
#2	Primary	6,843.60'	2.50' W x 1.25' H Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=9.63 cfs @ 0.26 hrs HW=6,844.73' (Free Discharge)
 1=Orifice/Grate (Controls 0.00 cfs)
 2=Orifice/Grate (Orifice Controls 9.63 cfs @ 3.41 fps)

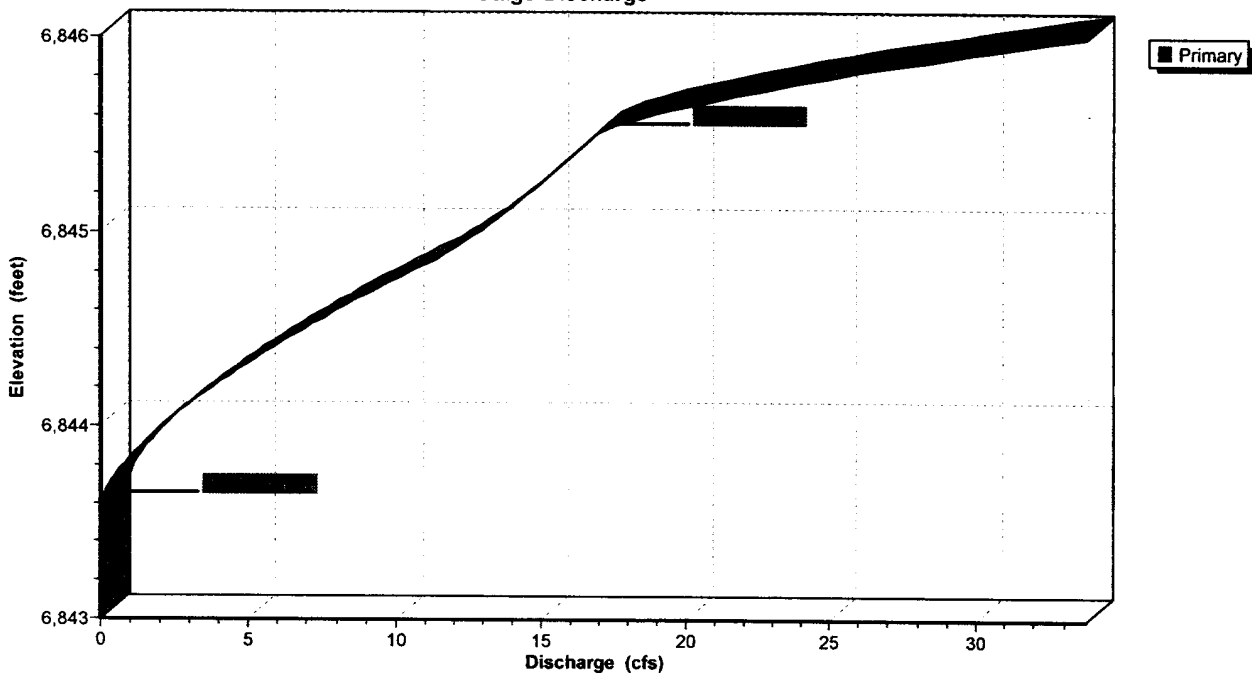
Pond Pond: East PLD

Hydrograph

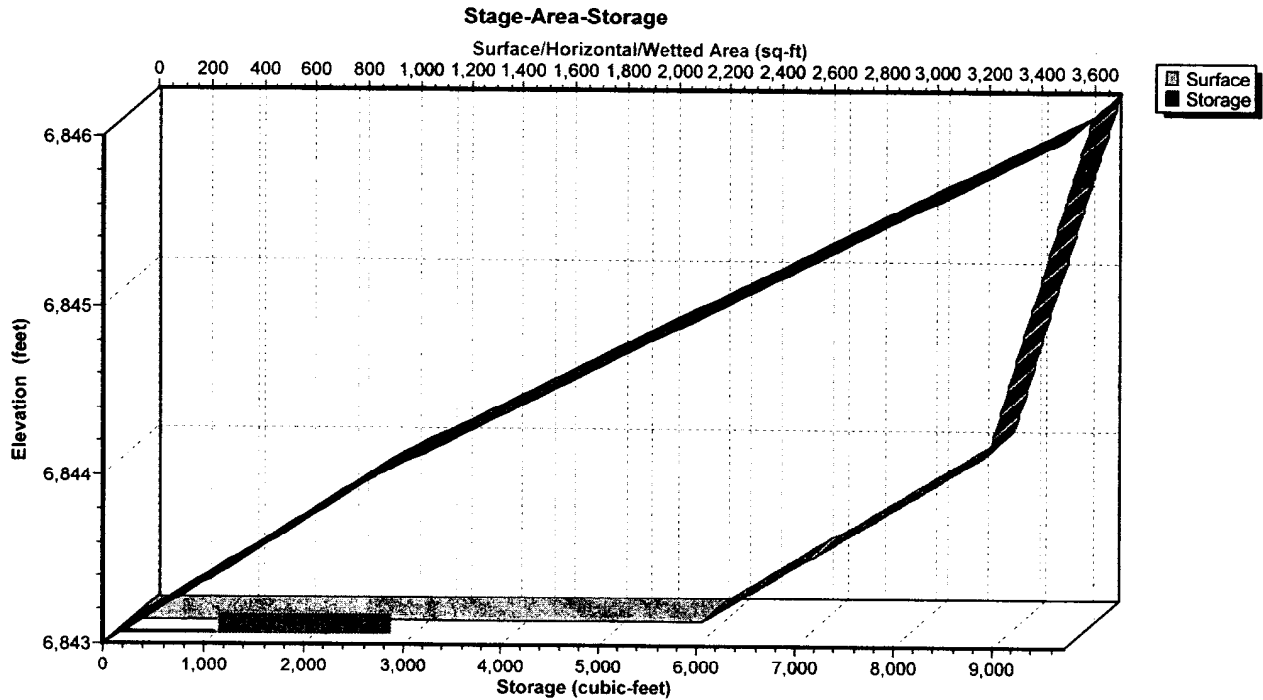


Pond Pond: East PLD

Stage-Discharge



Pond Pond: East PLD



Pond Pond: East PLD

Inflow Area = 3.680 ac, Inflow Depth = 1.37" for 100-Year event
 Inflow = 20.30 cfs @ 0.09 hrs, Volume= 0.420 af
 Outflow = 16.97 cfs @ 0.26 hrs, Volume= 0.382 af, Atten= 16%, Lag= 10.4 min
 Primary = 16.97 cfs @ 0.26 hrs, Volume= 0.382 af

Routing by Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 6,845.51' @ 0.26 hrs Surf.Area= 3,603 sf Storage= 8,024 cf

Plug-Flow detention time= 8.7 min calculated for 0.382 af (91% of inflow)
 Center-of-Mass det. time= 7.8 min (17.8 - 10.0)

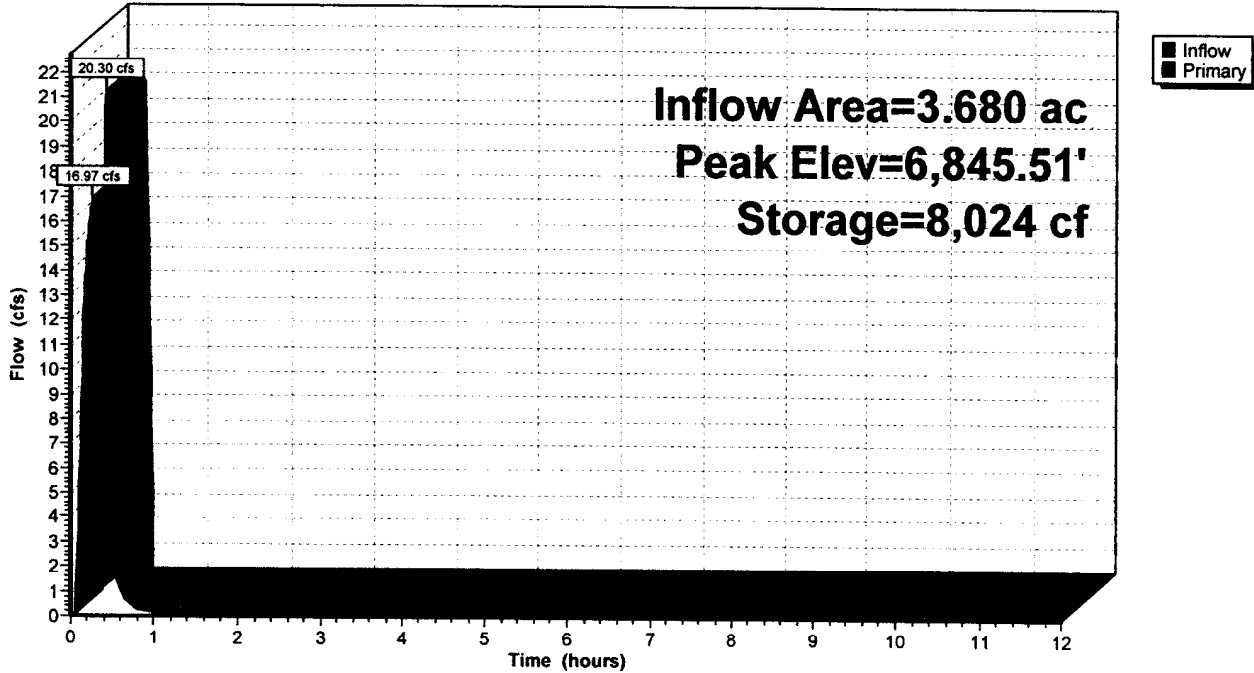
Volume	Invert	Avail.Storage	Storage Description	
#1	6,843.00'	9,728 cf	Custom Stage Data (Pyramidal) Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
6,843.00	2,200	0	0	2,200
6,844.00	3,300	2,731	2,731	3,320
6,846.00	3,700	6,996	9,728	3,939

Device	Routing	Invert	Outlet Devices	
#1	Primary	6,845.50'	3.00' x 3.00' Horiz. Orifice/Grate	Limited to weir flow C= 1.000
#2	Primary	6,843.60'	2.50' W x 1.25' H Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=16.92 cfs @ 0.26 hrs HW=6,845.51' (Free Discharge)
 1=Orifice/Grate (Weir Controls 0.04 cfs @ 0.33 fps)
 2=Orifice/Grate (Orifice Controls 16.88 cfs @ 5.40 fps)

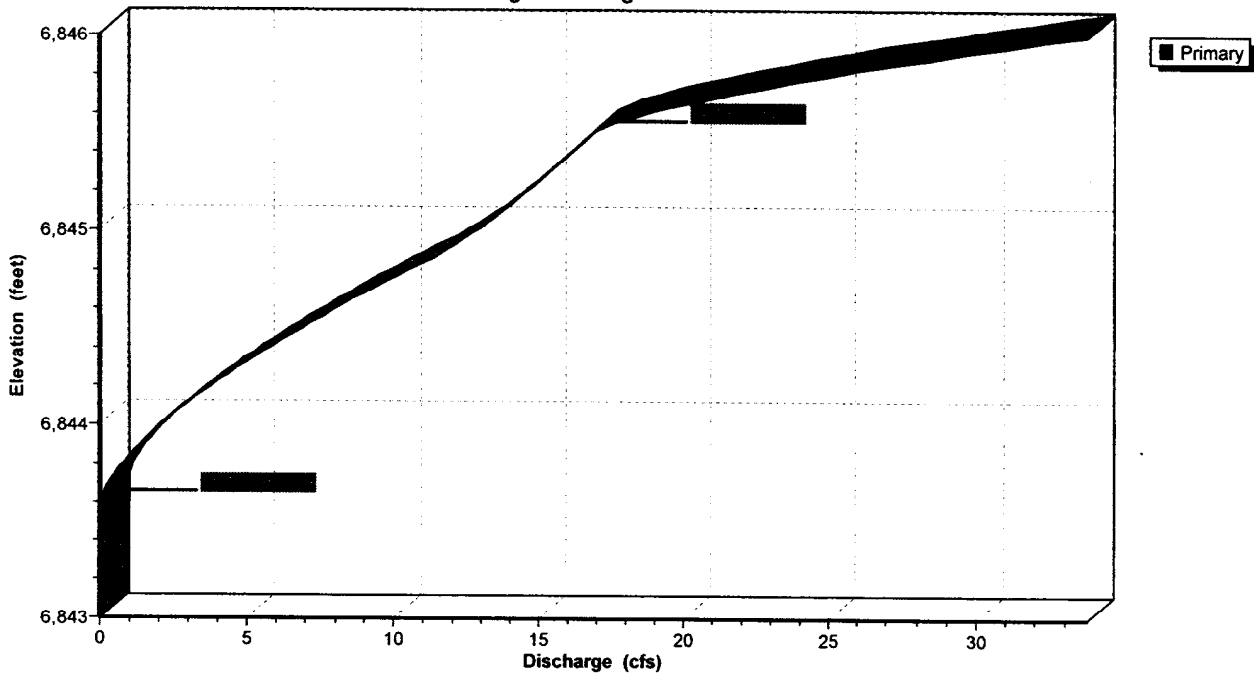
Pond Pond: East PLD

Hydrograph

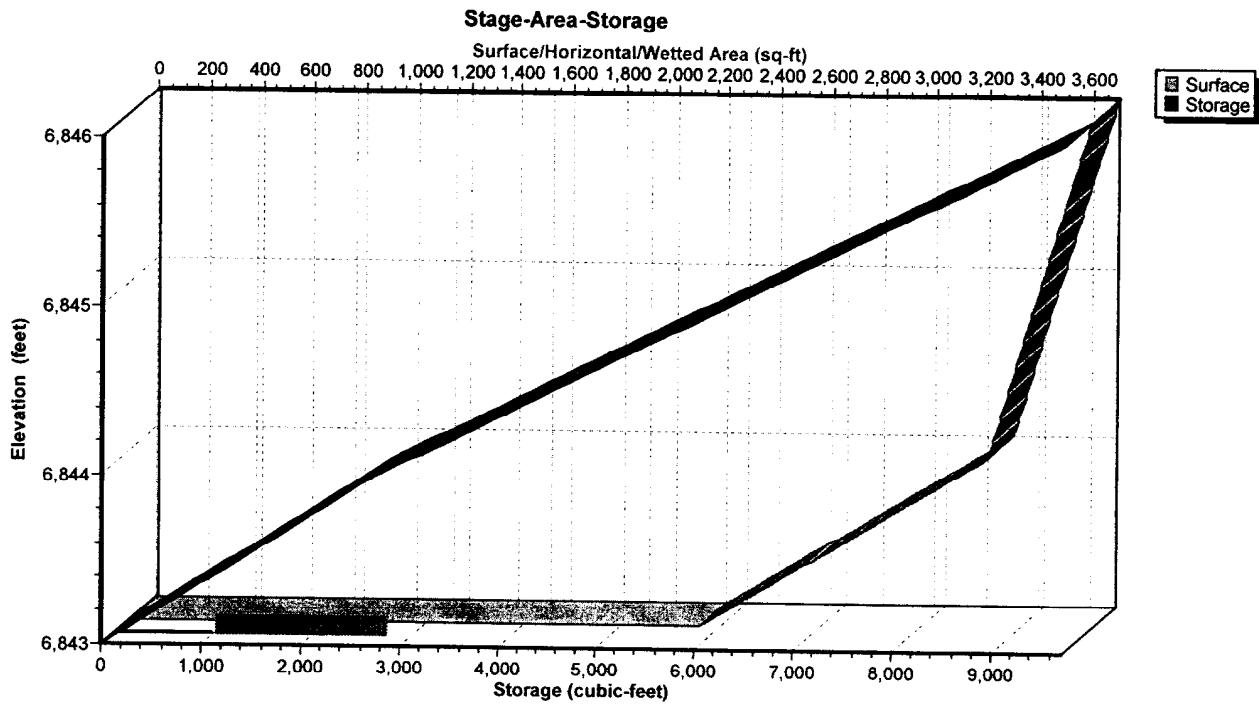


Pond Pond: East PLD

Stage-Discharge



Pond Pond: East PLD

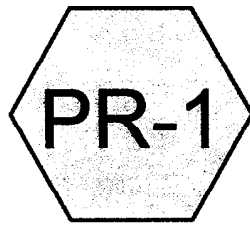


Design Procedure Form: Porous Landscape Detention (PLD)

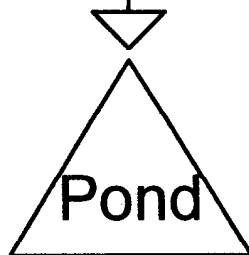
Designer: Thomas Roberts
 Company: Springs Engineering
 Date: July 23, 2008
 Project: Meridian Crossing West Pond
 Location: Falcon, CO

<p>1. Basin Storage Volume ($I_a = 100\%$ if all paved and roofed areas u/s of PLD) A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) B) Contributing Watershed Area Including the PLD (Area) C) Water Quality Capture Volume (WQCV) ($WQCV = 0.8 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I)$) D) Design Volume: $Vol_{PLD} = (WQCV / 12) * Area$</p>	<p> $I_a = \underline{82.00} \%$ $i = \underline{0.82}$ Area = <u>200,821</u> square feet WQCV = <u>0.27</u> watershed inches Vol = <u>4,568</u> cubic feet </p>
<p>2. PLD Surface Area (A_{PLD}) and Average Depth (d_{av}) (from 4567.86 square feet to 9135.72 square feet) ($d_{av} = (Vol / A_{PLD})$, Min=0.5', Max=1.0')</p>	<p> $A_{PLD} = \underline{4,600}$ square feet $d_{av} = \underline{0.99}$ feet </p>
<p>3. Draining of PLD (Check A, or B, or C, answer D) Based on answers to 3A through 3D, check the appropriate method</p> <p> A) Check box if subgrade is heavy or expansive clay <input type="checkbox"/> B) Check box if subgrade is silty or clayey sand <input type="checkbox"/> C) Check box if subgrade is well-draining soil <input checked="" type="checkbox"/> </p> <p> D) Check box if underdrains are not desirable or if underdrains are not feasible at this site. <input type="checkbox"/> </p> <p> E) Does tributary catchment contain land uses that may have petroleum products, greases, or other chemicals present, such as gas station, hardware store, restaurant, etc.? yes no <input checked="" type="checkbox"/> <input type="checkbox"/> </p>	<p> <u> </u> Infiltration to Subgrade with Permeable Membrane: 3(C) checked and 3(E) = no <u> </u> Underdrain with Impermeable Liner: 3(A) checked or 3(E) = yes <u> </u> Underdrain with Non-Woven Geotextile Fabric: 3(B) checked and 3(E) = no <u> </u> 16-Mil. Impermeable Membrane with No Underdrain: 3(D) checked - Evapotranspiration only <u> </u> <input checked="" type="checkbox"/> Other: <u>Type D Inlet</u> </p>
<p>4. Sand/Peat Mix and Gravel Subbase (See Figure PLD-1)</p> <p>A) Heavy or Expansive Clay (NRCS Group D Soils) Present; Perforated HDPE Underdrain Used.</p> <p>B) Silty or Clayey Sand (NRCS Group C Soils) Present; Perforated HDPE Underdrain Used.</p> <p>C) No Potential For Contamination And Well-Draining (NRCS Group A or B Soils) Are Present; Underdrains Eliminated.</p> <p>D) Underdrains Are Not Desirable Or Are Not Feasible At This Site.</p> <p>E) Other:</p>	<p> <u> </u> 18" Minimum Depth Sand-Peat Mix with 8" Gravel Layer. 16-Mil. Impermeable Liner and a 3" to 4" Perforated HDPE Underdrain. <u> </u> 18" Minimum Depth Sand-Peat Mix with 8" Gravel Layer and a 3" to 4" Perforated HDPE Underdrain w/ Non-Woven Pemeable Membrane. <u> </u> 18" Minimum Depth Sand-Peat Mix with Non-Woven Pemeable Membrane and No Underdrain (Direct Infiltration). <u> </u> 18" Minimum Depth Sand-Peat Mix with An Additional 18" Minimum Layer Sand-Peat Mix or Sand-Class 'A' Compost Bottom Layer (Total Sand-Peat Depth of 36"). 16-Mil. Impermeable Liner Used. <u> </u> <input checked="" type="checkbox"/> Other: <u>See Detail on Sheet 8</u> </p>

Notes:



Basin D-9



West PLD



Drainage Diagram for west pond-PLD Sizing

Prepared by {enter your company name here} 7/23/2008
HydroCAD® 8.00 s/n 004515 © 2006 HydroCAD Software Solutions LLC

Pond Pond: West PLD

Inflow Area = 3.680 ac, Inflow Depth = 0.32" for 2-Year event
 Inflow = 11.93 cfs @ 0.10 hrs, Volume= 0.098 af
 Outflow = 11.81 cfs @ 0.10 hrs, Volume= 0.098 af, Atten= 1%, Lag= 0.2 min
 Primary = 11.81 cfs @ 0.10 hrs, Volume= 0.098 af

Routing by Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 6,841.48' @ 0.10 hrs Surf.Area= 148 sf Storage= 133 cf

Plug-Flow detention time= 0.2 min calculated for 0.098 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (5.7 - 5.5)

Volume	Invert	Avail.Storage	Storage Description
#1	6,840.00'	6,085 cf	Custom Stage Data (Prismatic) Listed below
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
6,840.00	20	0	0
6,841.00	100	60	60
6,842.00	200	150	210
6,843.00	1,500	850	1,060
6,844.50	5,200	5,025	6,085

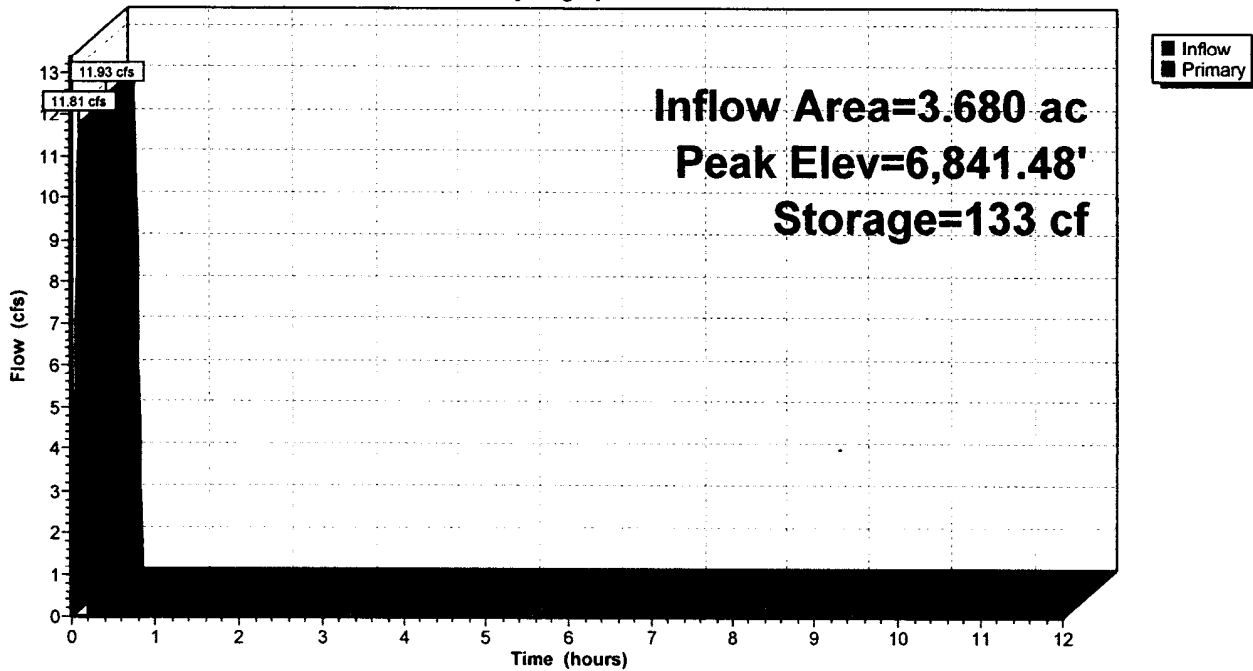
Device	Routing	Invert	Outlet Devices
#1	Primary	6,842.85'	3.00' x 3.00' Horiz. Orifice/Grate Limited to weir flow C= 1.000
#2	Primary	6,840.00'	2.50' W x 1.00' H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=11.74 cfs @ 0.10 hrs HW=6,841.47' (Free Discharge)

1=Orifice/Grate (Controls 0.00 cfs)
 2=Orifice/Grate (Orifice Controls 11.74 cfs @ 4.70 fps)

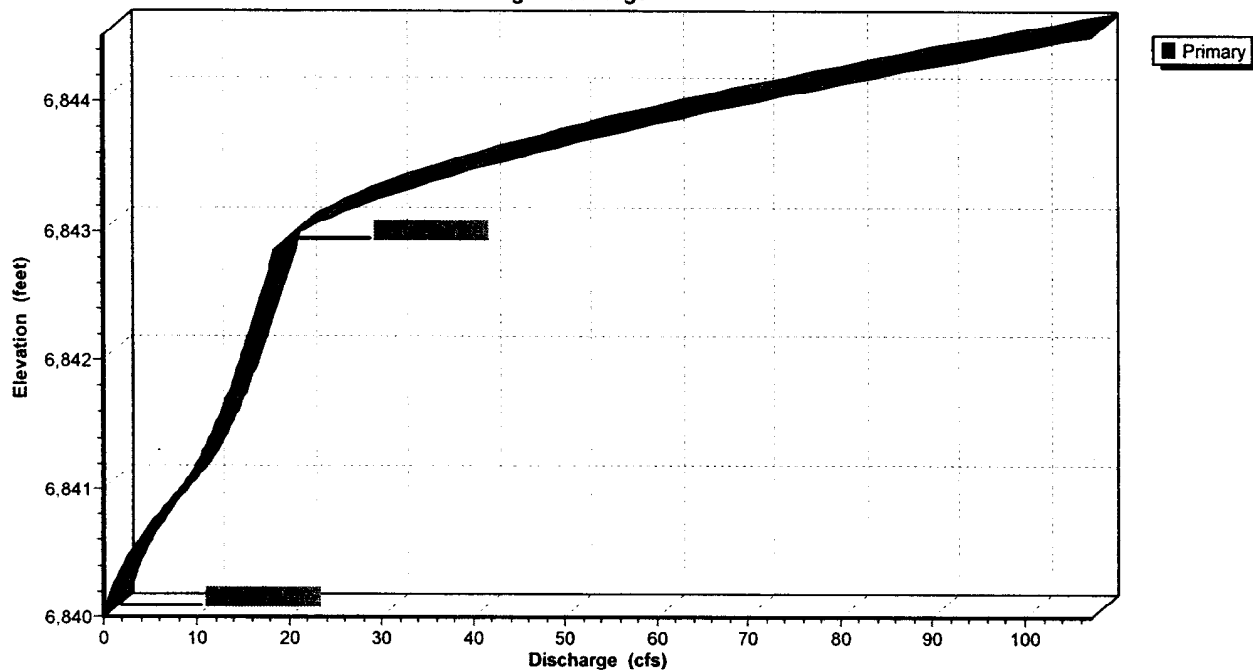
Pond Pond: West PLD

Hydrograph

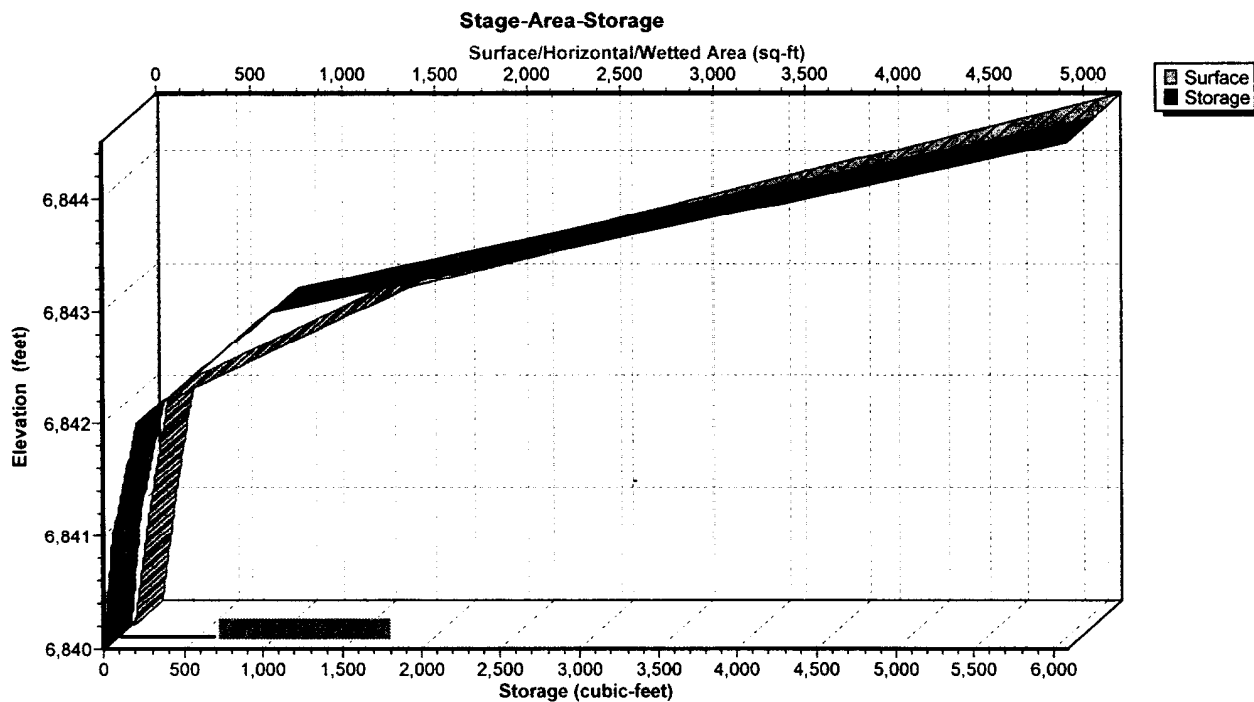


Pond Pond: West PLD

Stage-Discharge



Pond Pond: West PLD



Pond Pond: West PLD

Inflow Area = 3.680 ac, Inflow Depth = 0.44" for 5-Year event
 Inflow = 16.39 cfs @ 0.09 hrs, Volume= 0.135 af
 Outflow = 15.20 cfs @ 0.11 hrs, Volume= 0.135 af, Atten= 7%, Lag= 0.6 min
 Primary = 15.20 cfs @ 0.11 hrs, Volume= 0.135 af

Routing by Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 6,842.11' @ 0.11 hrs Surf.Area= 340 sf Storage= 302 cf

Plug-Flow detention time= 0.2 min calculated for 0.134 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (5.7 - 5.5)

Volume	Invert	Avail.Storage	Storage Description
#1	6,840.00'	6,085 cf	Custom Stage Data (Prismatic) Listed below
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
6,840.00	20	0	0
6,841.00	100	60	60
6,842.00	200	150	210
6,843.00	1,500	850	1,060
6,844.50	5,200	5,025	6,085

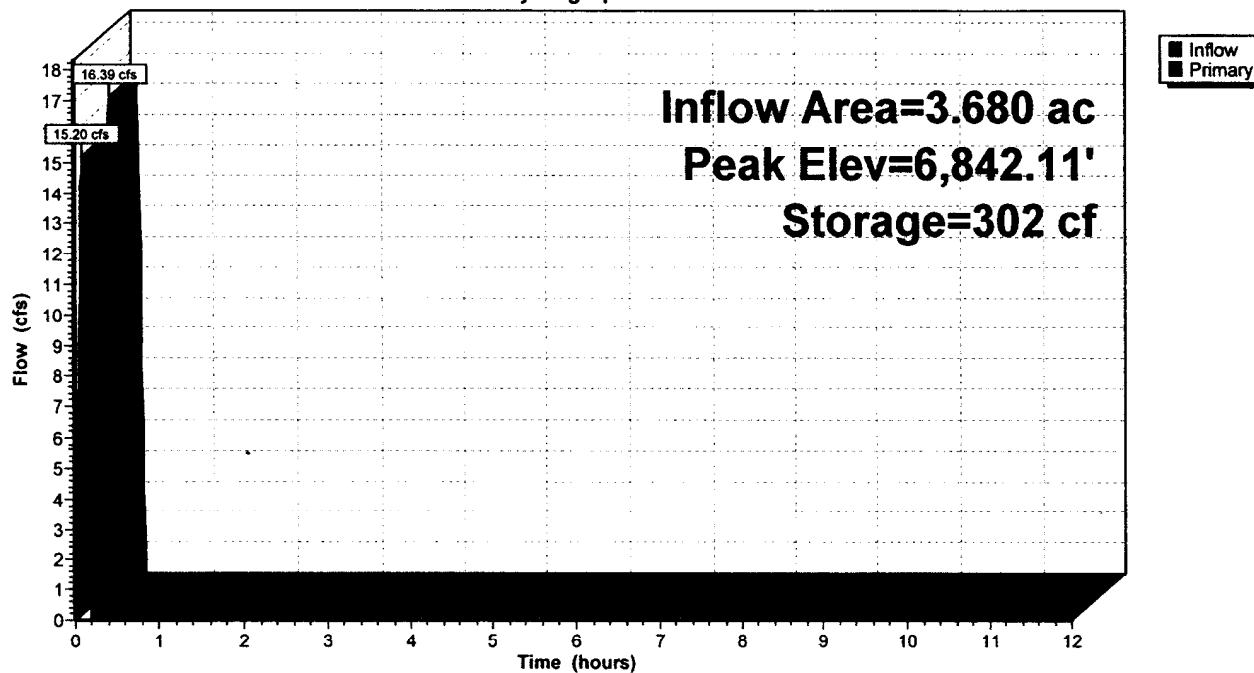
Device	Routing	Invert	Outlet Devices
#1	Primary	6,842.85'	3.00' x 3.00' Horiz. Orifice/Grate Limited to weir flow C= 1.000
#2	Primary	6,840.00'	2.50' W x 1.00' H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=15.16 cfs @ 0.11 hrs HW=6,842.10' (Free Discharge)

- 1=Orifice/Grate (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 15.16 cfs @ 6.06 fps)

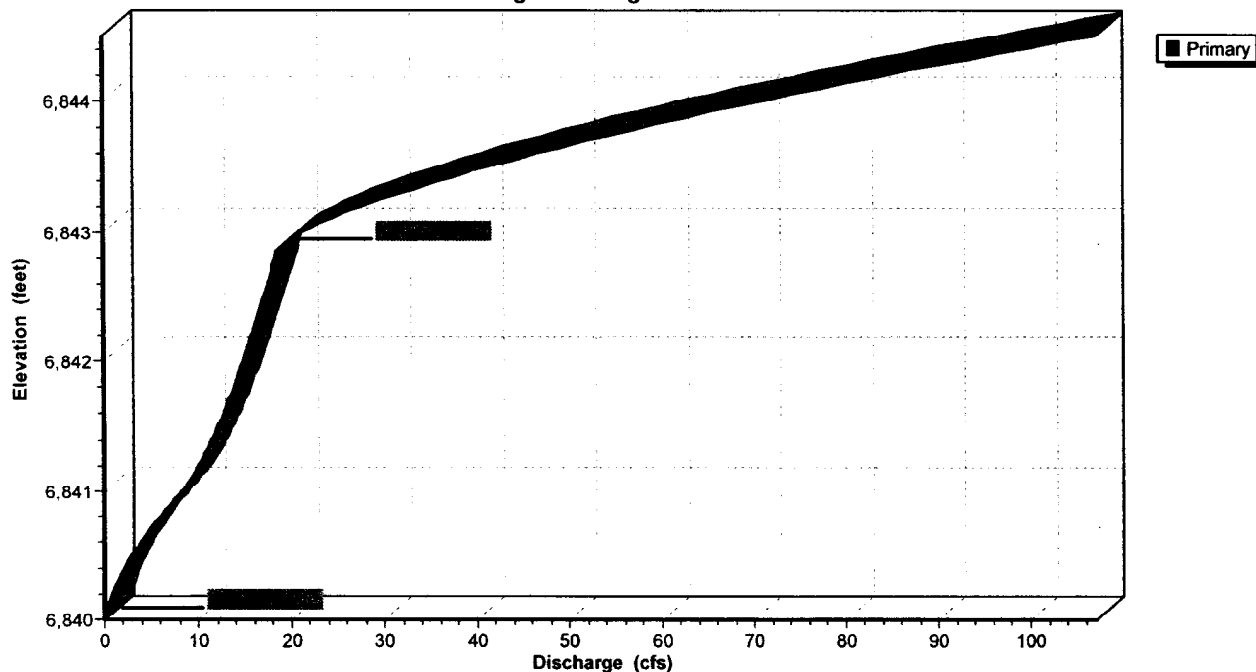
Pond Pond: West PLD

Hydrograph

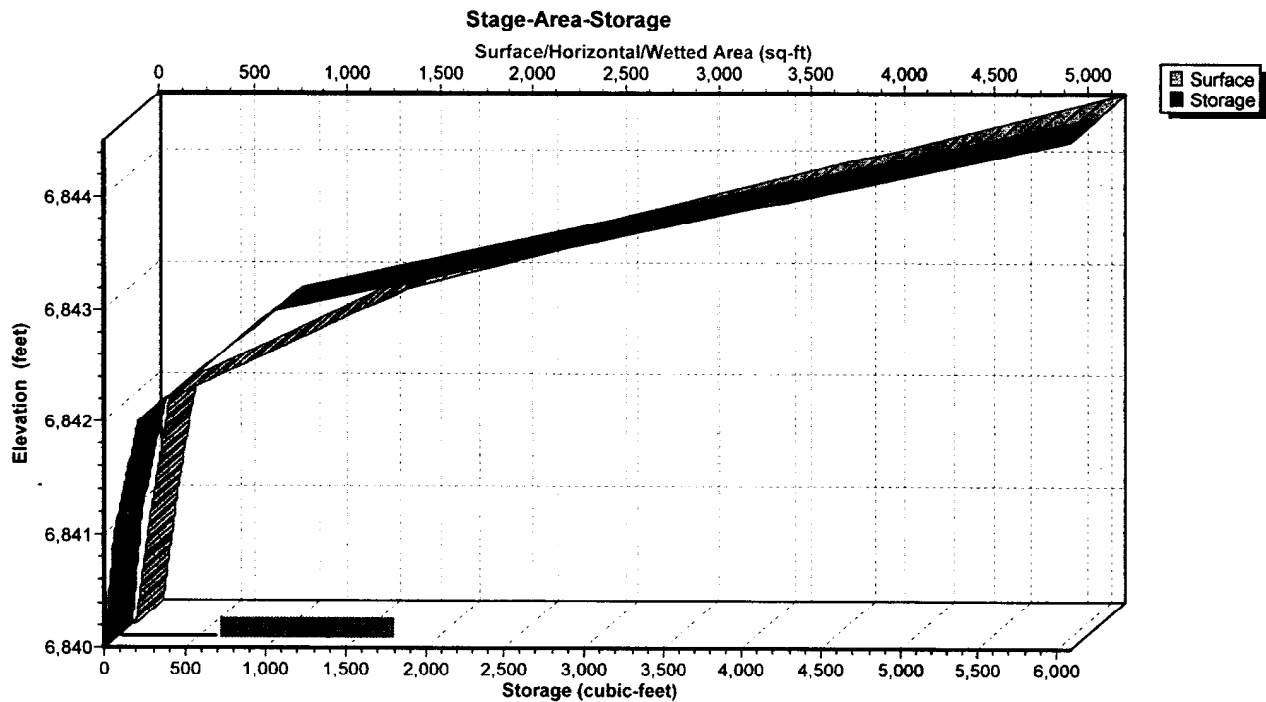


Pond Pond: West PLD

Stage-Discharge



Pond Pond: West PLD



Pond Pond: West PLD

Inflow Area = 3.680 ac, Inflow Depth = 0.78" for 100-Year event
 Inflow = 29.14 cfs @ 0.09 hrs, Volume= 0.240 af
 Outflow = 25.15 cfs @ 0.11 hrs, Volume= 0.239 af, Atten= 14%, Lag= 1.0 min
 Primary = 25.15 cfs @ 0.11 hrs, Volume= 0.239 af

Routing by Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 6,843.13' @ 0.11 hrs Surf.Area= 1,809 sf Storage= 1,479 cf

Plug-Flow detention time= 0.7 min calculated for 0.239 af (100% of inflow)
 Center-of-Mass det. time= 0.7 min (6.2 - 5.5)

Volume	Invert	Avail.Storage	Storage Description
#1	6,840.00'	6,085 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
6,840.00	20	0	0
6,841.00	100	60	60
6,842.00	200	150	210
6,843.00	1,500	850	1,060
6,844.50	5,200	5,025	6,085

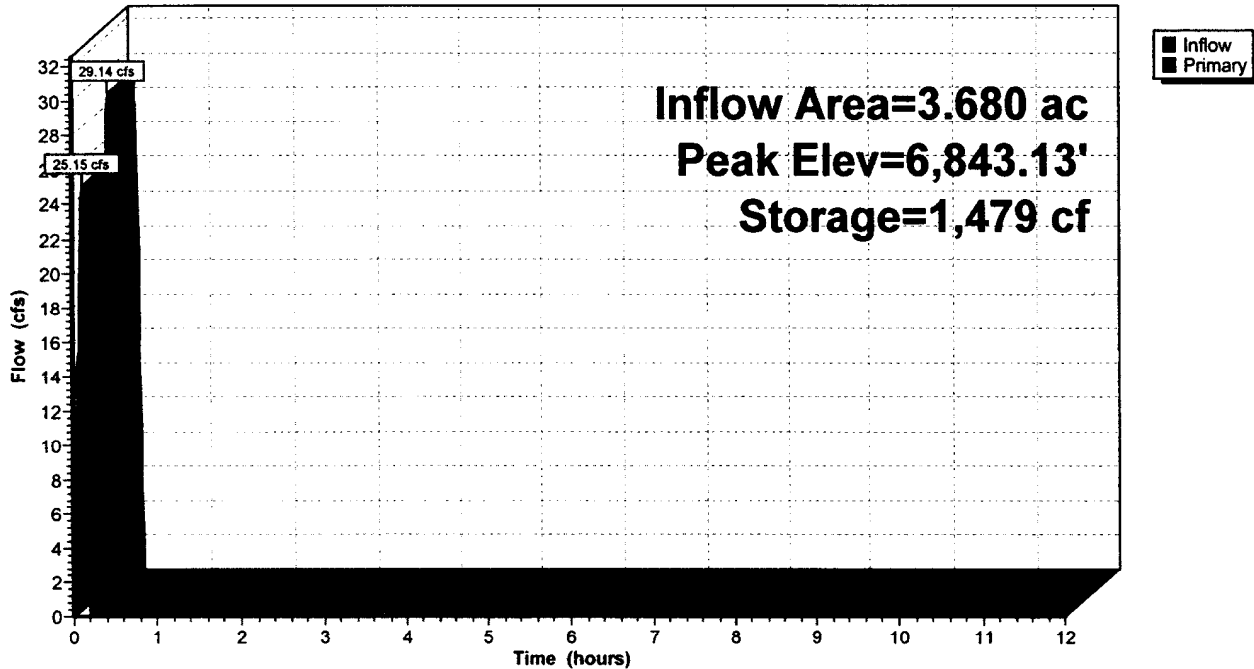
Device	Routing	Invert	Outlet Devices
#1	Primary	6,842.85'	3.00' x 3.00' Horiz. Orifice/Grate Limited to weir flow C= 1.000
#2	Primary	6,840.00'	2.50' W x 1.00' H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=25.05 cfs @ 0.11 hrs HW=6,843.12' (Free Discharge)

1=Orifice/Grate (Weir Controls 5.58 cfs @ 1.71 fps)
 2=Orifice/Grate (Orifice Controls 19.46 cfs @ 7.79 fps)

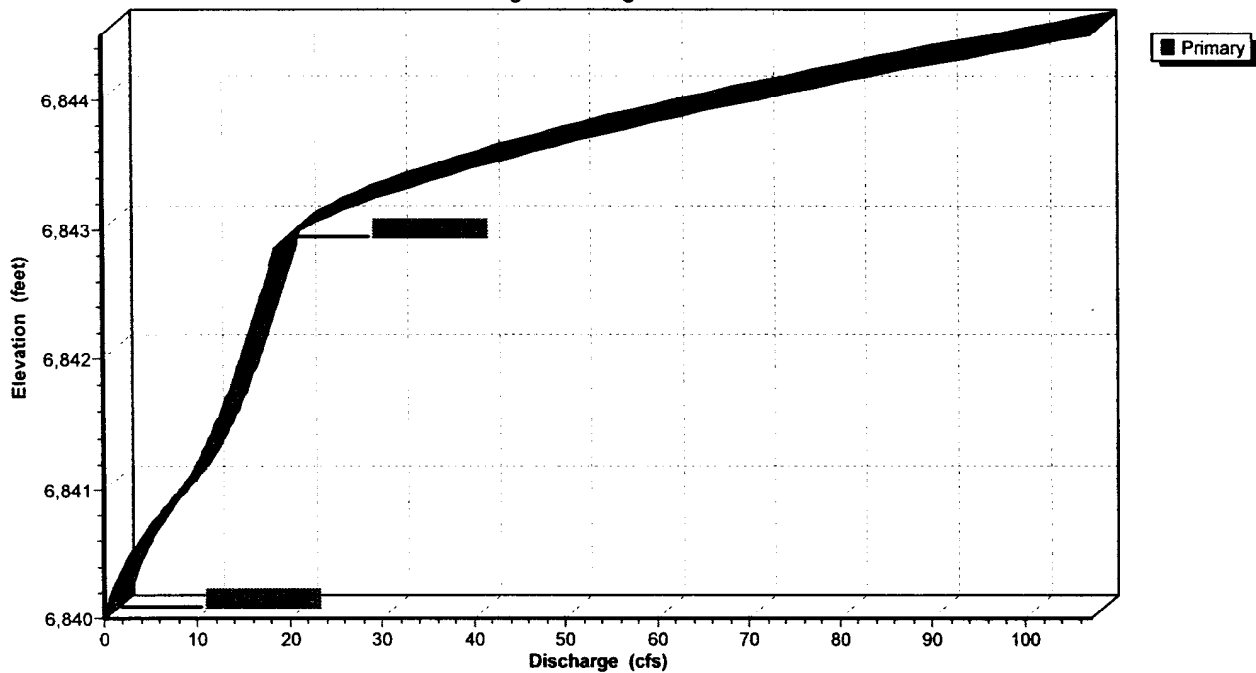
Pond Pond: West PLD

Hydrograph

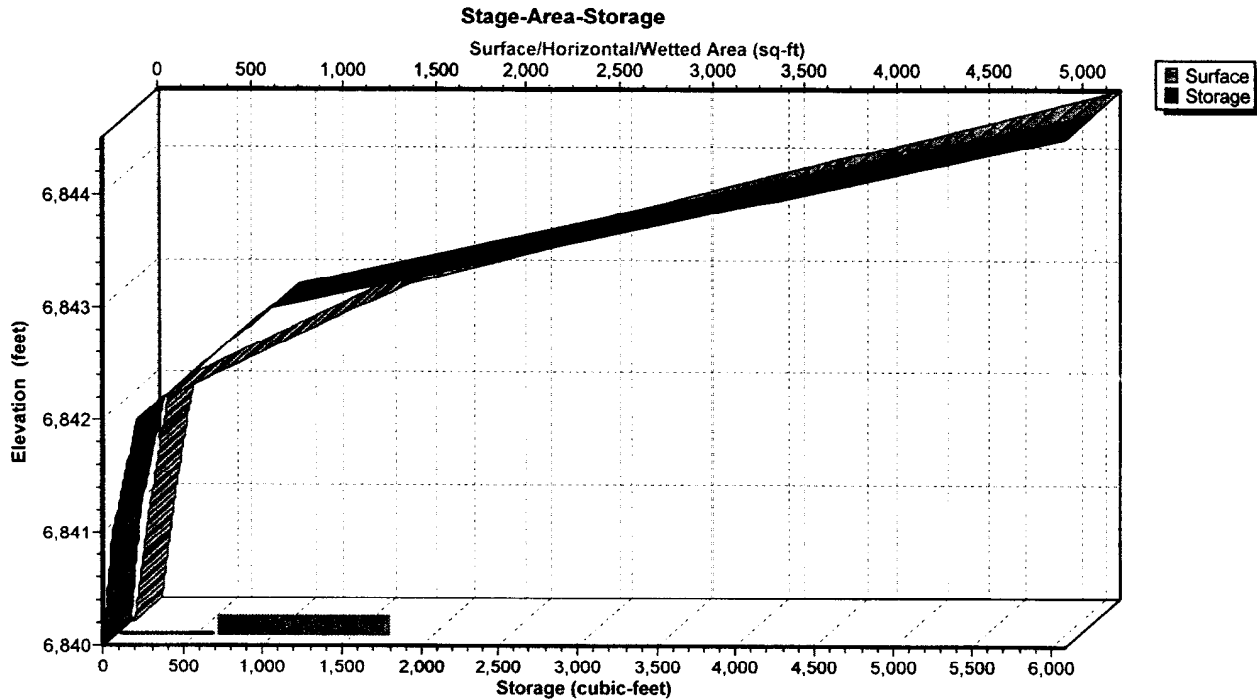


Pond Pond: West PLD

Stage-Discharge



Pond Pond: West PLD



Appendix H: Operations and Maintenance Manual

**OPERATION AND MAINTENANCE MANUAL
MERIDIAN CROSSING
PARK PLACE ENTERPRISES
EL PASO COUNTY, COLORADO**

May 2008

PREPARED FOR:

Park Place Enterprises
15 Miranda Road
Colorado Springs, CO 80906

PREPARED BY:

Springs Engineering
31 N. Tejon Street
Suite 315
Colorado Springs, CO 80903

PROJECT NO. 07-057-0032

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POROUS LANDSCAPE DETENTION FACILITY	2
OPERATION & MAINTENANCE LOG	4

Introduction

This Operation and Maintenance Plan is being submitted on behalf of Park Place Enterprises for a development known as Meridian Crossing in Falcon, Colorado. The purpose of this Operation and Maintenance Manual (O&M) is to identify facilities which are to be maintained by the Meridian Crossing Properties Owners Association (POA) and the frequency with which these items are to be maintained.

General Location and Description

Meridian Crossing is currently zoned CR and the proposed development includes 6 commercial lots, proposed water quality facilities, streets, and utilities.

Meridian Crossing is approximately 9.5 acres and is located north of the intersection of Meridian Road and Old Meridian Road in Falcon, Colorado, Section 12, Township 13 South, Range 65 West of the 6th Principal Meridian.

Description of Construction

Construction will consist of site grading, utility installation, and road paving. Approximately 9.5 acres of the site will be graded for construction of the proposed commercial units. Erosion control will be provided prior to construction.

Facilities

Water quality facilities will be owned and maintained by the POA. Water and sanitary sewer will be maintained by the Falcon Highlands Metropolitan District. All other utilities are to be maintained by their respective owners.

Inspection and Maintenance

A thorough inspection of the permanent structures shall be performed every 30 days as well as after any significant rain or snowmelt event. Inspectors are to look for any significant deterioration of the facilities including:

- Erosion of channels and side slopes.
- Accumulated trash or debris.

Repairs and removal of debris shall occur as soon as practical.

Porous Landscape Detention Facility

Lawn mowing and vegetative care shall be performed routinely, as aesthetic requirements demand. This shall limit unwanted vegetation. Irrigated turf grass shall be between 2 and 4 inches in height and non irrigated native turf grasses shall be 4 to 6 inches in height. Debris and litter removal shall be performed routinely, as aesthetic requirements demand. Removal of debris and litter from any detention area minimizes clogging of the sand media. Landscaping removal and replacement shall be done every 5 to 10 years depending on infiltration rates needed to drain the area in 12 hours or less. Over time the sandy loam

sandy loam turf will clog. The layer will need to be replaced, along with all turf and other vegetation growing on the surface, to rehabilitate infiltration rates. Bin-annual inspections of the hydraulic performance of the area will need to be performed. This will determine if the sand media is allowing acceptable infiltration.

An Operation and Maintenance Log follows.

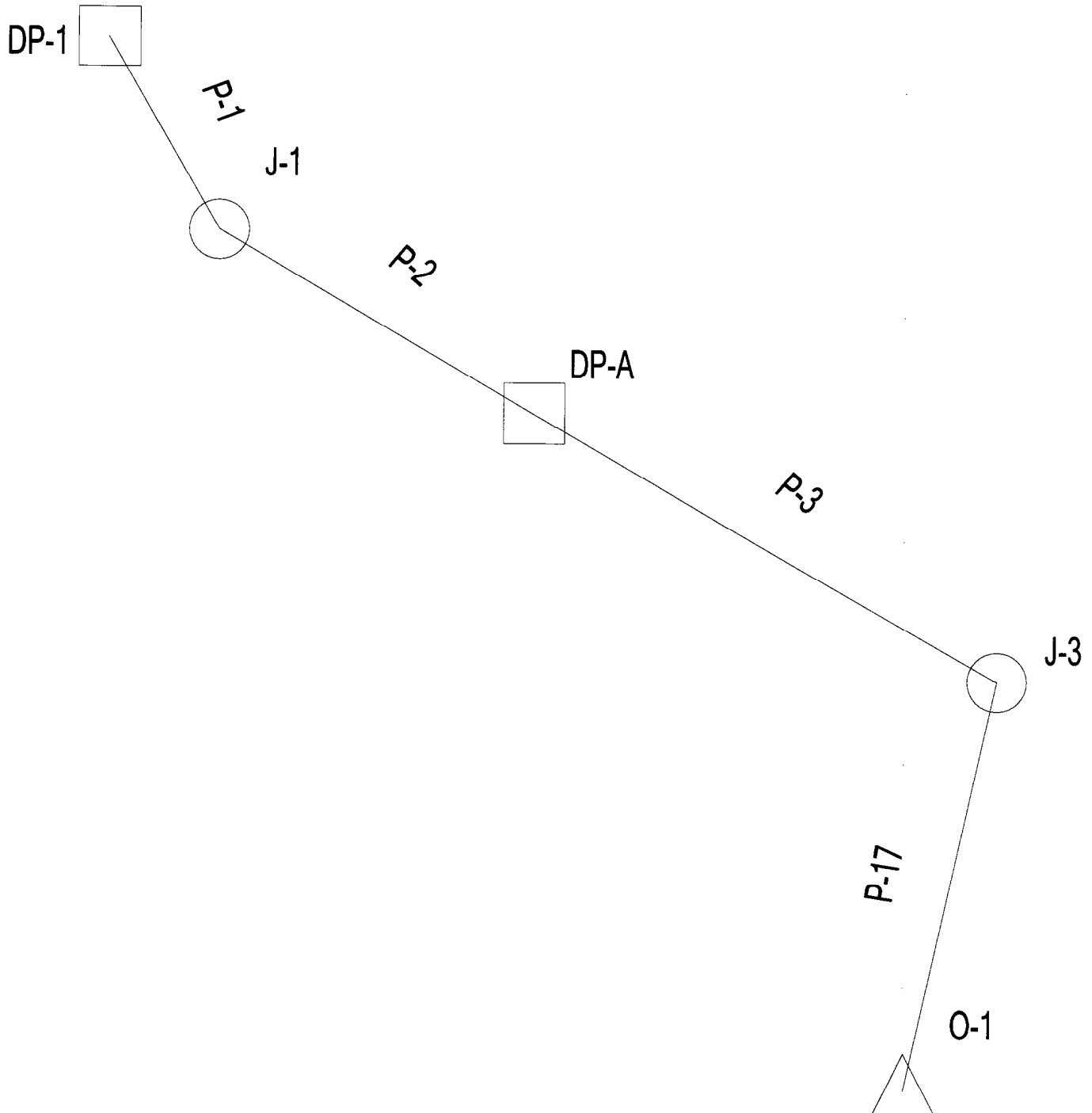
THE SHOPPES AT FALCON OPERATION AND MAINTENANCE LOG

(Record inspections, items found maintenance and corrective actions taken. Also record any training received by Contractor personnel with regard to erosion control, materials handling and any inspections by outside agencies)

[illegible]

Appendix I: Ultimate Design StormCAD Calculations

Scenario: 100-year



Analysis Results

Scenario: 100-year

Note:

The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Title: Old Meridian Road
Project Engineer: Charlene Sammons
Project Date: 11/14/07
Comments: Storm in Old Meridian Road for Meridian Crossing Storm Sewer

Scenario Summary

Scenario	100-year
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Catchments-100-year
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Cost
User Data Alternative	Base-User Data

Network Inventory

Number of Pipes	4	Number of Inlets	2
- Circular Pipes:	4	- Grate Inlets:	0
- Box Pipes:	0	- Curb Inlets:	2
- Arch Pipes:	0	- Combination Inlets:	0
- Vertical Elliptical Pipes:	0	- Slot Inlets:	0
- Horizontal Elliptical Pipes:	0	- Grate Inlets in Ditch:	0
Number of Junctions	2	- Generic Inlets:	0
Number of Outlets	1		

Circular Pipes Inventory

18 inch	274.57 ft	24 inch	55.00 ft
Total Length	329.57 ft		

Curb Inlet Inventory

Type R 10'	2
------------	---

Inlet elements for network with outlet: O-1

Label	Inlet	Total Flow (cfs)	Total Interceptor Flow (cfs)	Total Bypassed Flow (cfs)	Bypass Target	Capture Efficiency (%)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Headloss Method
DP-1	Curb Type R	7.61	7.61	10.28	DP-A	42.5	3,848.83	3,848.83	0.00	Absolut
DP-A	Curb Type R	9.39	2.10	14.37	<Automati	12.8	3,846.39	3,846.08	0.31	Standar

Junction elements for network with outlet: O-1

Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Headloss Method	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
J-1	3,847.76	3,847.46	0.30	Standar	0.00	0.00	7.55	8.50	6.59	0.88
J-3	3,844.91	3,844.91	0.00	Absolut	0.00	0.00	9.30	8.13	7.63	1.13

Analysis Results

Scenario: 100-year

Outlet: O-1

Label	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	System Additional Flow (cfs)	System Known Flow (cfs)	System Rational Flow (cfs)	System Intensity (in/hr)	System Flow (min)	System Time (min)	System CA (acres)
O-1	3,843.10	3,843.10	0.00	0.00	0.00	9.22	8.06	7.83	1.13	

Pipe elements for network with outlet: O-1

Label	Section Shape	Section Size	Length (ft)	Number of Sections	Constructed Slope (ft/ft)	Energy Slope (ft/ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P-1	Circular	18 inch	71.21	1	0.012	0.011	7.61	6.31	3,847.76	6,846.90	3,848.83	3,847.79
P-2	Circular	18 inch	17.16	1	0.009	0.009	7.55	5.53	3,846.40	6,845.29	3,847.46	3,846.39
P-3	Circular	18 inch	86.20	1	0.009	0.009	9.39	6.33	3,844.90	6,844.13	3,846.08	3,845.29
P-17	Circular	24 inch	55.00	1	0.007	0.010	9.30	4.62	3,843.50	6,843.10	3,844.91	3,844.19

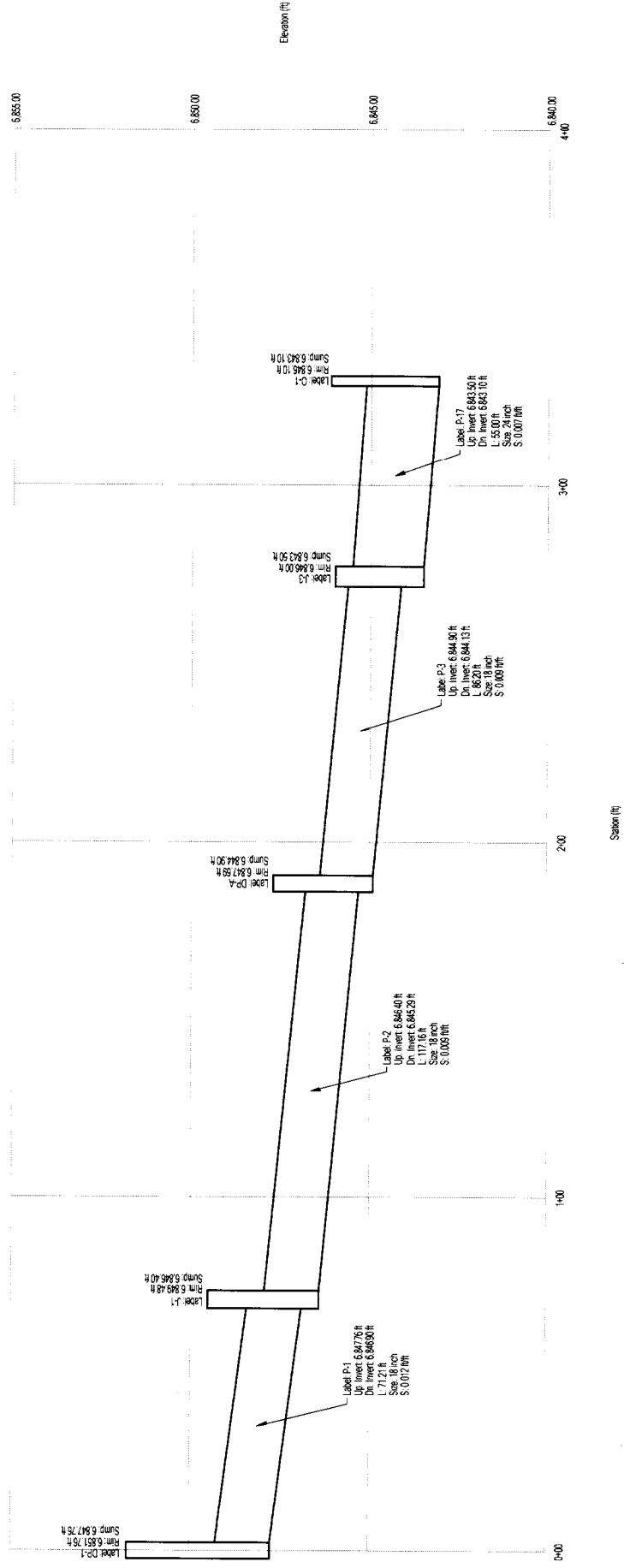
Scenario: 100-year

Combined Pipe\Node Report

Label	Up. Node	Dn. Node	L (ft)	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	Up. Inlet Rat. Q (cfs)	Size	Q Full (cfs)	Avg. v (ft/s)	Up. Gr Elev. (ft)	HGL In (ft)	Up. Invert (ft)	Dn. Gr. Elev. (ft)	HGL Out (ft)	Dn. Invert (ft)	S (ft/ft)
P-1	DP-1	J-1	71.21	2.07	1.00	2.07	0.88	17.89	18 inch	11.54	6.31	6,851.76	6,848.83	6,847.76	6,849.48	6,847.79	6,846.90	0.012
P-2	J-1	DP-A	117.16	N/A	N/A	N/A	0.88	N/A	18 inch	10.22	5.53	6,849.48	6,847.46	6,846.40	6,847.69	6,846.39	6,845.29	0.009
P-3	DP-A	J-3	86.20	0.80	1.00	0.80	1.13	6.63	18 inch	9.93	6.33	6,847.69	6,846.08	6,844.90	6,846.00	6,845.29	6,844.13	0.009
P-17	J-3	O-1	55.00	N/A	N/A	N/A	1.13	N/A	24 inch	10.45	4.62	6,846.00	6,844.91	6,843.50	6,846.10	6,844.19	6,843.10	0.007

Profile Scenario: 100-year

Profile: Ultimate
Scenario: 100-year



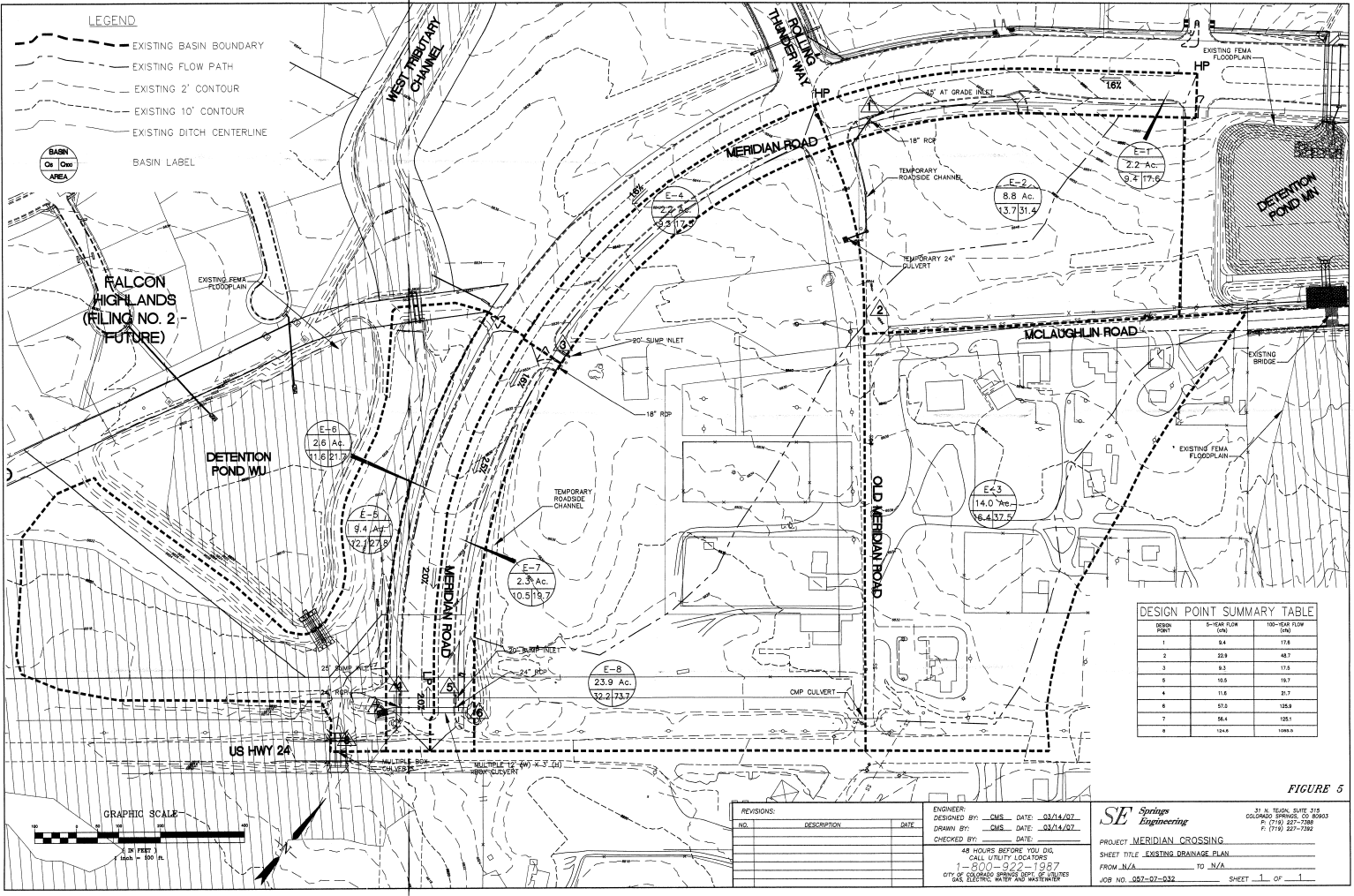


FIGURE 5

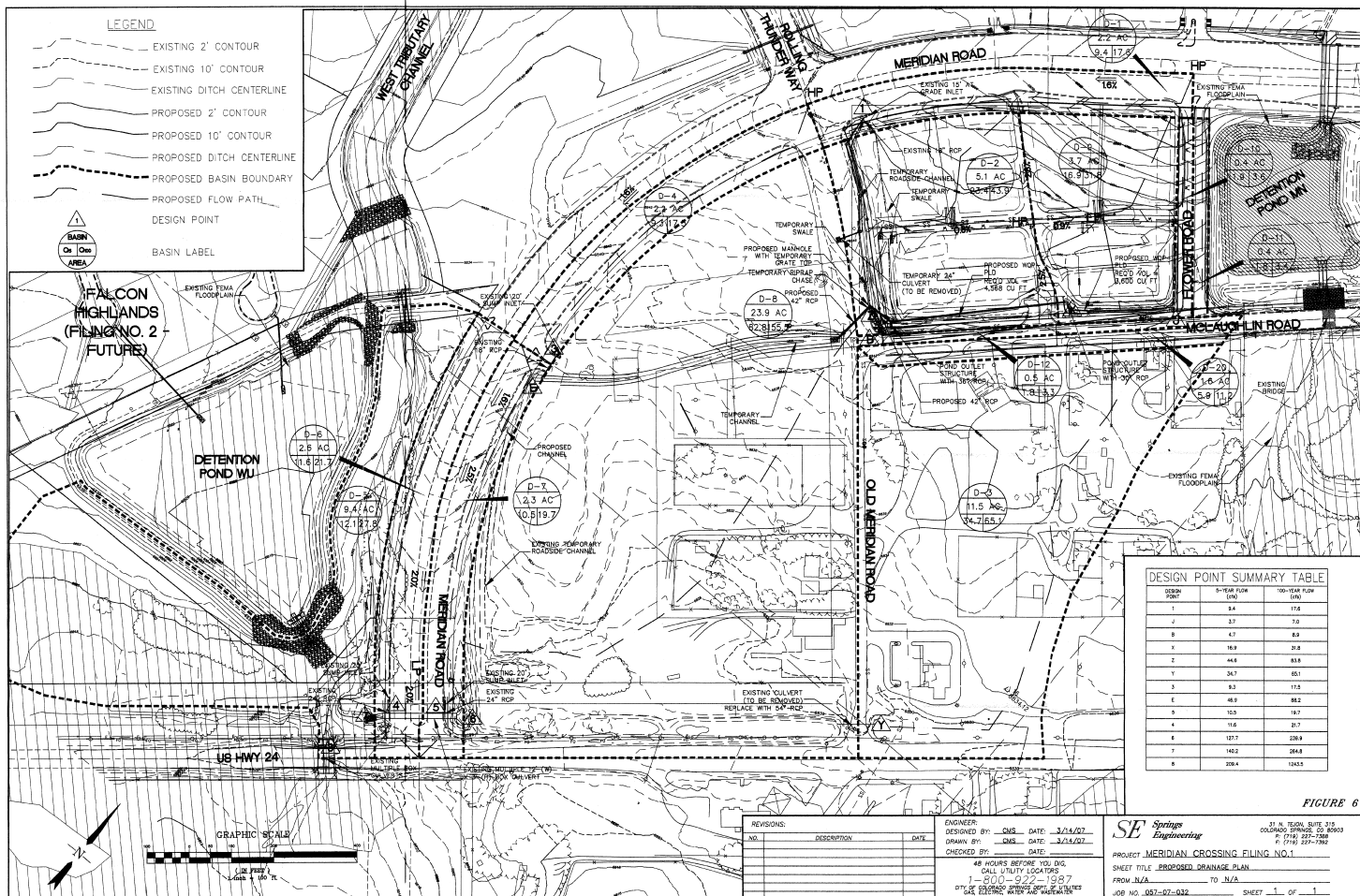


FIGURE 6