



PLANNING COMMISSION

Bruce Davis
Lynne Derby
Lucas Marone

Mike Simone, Chairperson

Dan Parrish
Paul Weber
Bushrod White, Vice-Chairperson

**Planning Commission Agenda
Regular Meeting
Tuesday, November 1, 2016
6:00 P.M.**

(Order & Contents Subject to Change by Action of the Commission)

Call to Order – Roll Call

Approval of Agenda

Consent Agenda – Consent Agenda items are considered to be routine and will be enacted by one motion and vote. There will be no separate discussion of Consent Agenda items unless a Commission member so requests, in which case the item may be removed from the Consent Agenda and considered at the end of the Consent Agenda.

- a. Approval of the Minutes of the September 20, 2016 meeting

Discussion Items

- b. **P2016-007** Dave's Earthworks, Inc.'s Site Plan & Special Use Permit
- c. Upcoming land use applications and updates

Future Business

MINUTES

**RECORD OF PROCEEDINGS
FORT LUPTON PLANNING COMMISSION
September 20, 2016**

The Planning Commission of the City of Fort Lupton met in session at the City Complex, 130 South McKinley Avenue, the regular meeting place of the Planning Commission, on Tuesday, September 20, 2016. Chairperson Mike Simone called the meeting to order at 6:00 p.m.

ROLL CALL

Planning Technician Mari Peña called the roll. Those present were Chairperson Mike Simone, Commission members Bruce Davis, Bush White, Dan Parrish, Lucas Marone and Lynne Derby. Also present were Planning Director Todd Hodges, Planner Alyssa Knutson, and Planning Technicians Mari Peña and Jennifer Cupp.

APPROVAL OF AGENDA

It was moved by Bush White and seconded by Lynne Derby to approve the Agenda as submitted.

Motion carried unanimously by voice vote.

CONSENT AGENDA

It was moved by Bush White and seconded by Lynne Derby to approve the Consent Agenda as submitted. The following item was part of the Consent Agenda:

Approval of the Minutes of the March 8, 2016 meeting.

Motion carried unanimously by a voice vote.

DISCUSSION ITEMS

P2016-006 Mountain Sky PUD Development Plan, Preliminary PUD Plat, and Final PUD Plat – Filing 1

The Planning Chair asked for a brief description of the project.

The Planning Director, Todd Hodges, explained the Planned Unit Development process for a subdivision per the requirements of the Municipal Code. This project is for the Mountain Sky Subdivision where the sketch plat was previously approved. The developers plan on incorporating a metro district due to the amount of offsite improvements. Metro districts are presented before the Commission as a hearing however this hearing doesn't include the district. The developer has the right to pursue a metro district, however it isn't guaranteed that City Council will accept the district. The metro district must be approved and adopted and an Intergovernmental Agreement (IGA) entered into between the City and the metro district. Mr. Hodges stated that this project is for a preliminary plat and the final plat for the first filing. The property is located at the northwest corner of County Road 29 ½, to be known

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September 20, 2016**

as South College Road and County Road 12, to be known as Cemetery Road and is approximately 77 acres. The preliminary plan is for 199 single family residential lots with substantial open space and includes oil and gas on the southwest corner of the property, where there is a surface use agreement between the owners of the property and Kerr-McGee. The first filing contains 44 lots and the submittal packet includes a phasing plan based on infrastructure, offsite improvements requirements and the ability to market the lots. Due to the file sizes, not all documents were forwarded to the Commission however, they are available for review on the City's website. Staff recommendations cover the conditions of approval that correspond to the referral comments received during the review process. The applicant shall continue to work with staff to address several items needed to finalize the improvements agreement. Staff recommends approval of the project with conditions as noted in the Resolution. The applicant and several representatives are in attendance and have a presentation prepared.

Member Bruce Davis asked if an escrow account will be set up for site improvements to be completed within a certain time or upon a certain percentage completed. Mr. Hodges indicated that the percentage is 125% of the estimated cost and in the case of roadways and a previous one (1) year time frame is now two (2) years. The total amount won't be released until acceptance. A partial release can be made based on a portion of the contract.

The Planning Chair asked that the City have the developer obtain the bond through a Colorado institution. Roy Vestal, the Public Works Director, indicated that the department is working with the bond requirements and he will review having the bond issued from a Colorado institution.

Member Bruce Davis asked if a third party engineering firm would be reviewing the submittal? Mr. Vestal indicated that he, as an engineer, will be reviewing all the documents.

Mr. Gene Osborne, Manager of FL Mountain Sky, introduced himself and his partner Guy James. Greg Panza and Russ Burrows with Calibre Engineering were also present. Greg Panza indicated that his firm and another firm, Rokeh Engineering, are working with the owners on the engineering portion of the subdivision. Mr. Panza provided a PowerPoint presentation on the Mountain Sky Subdivision. He stated the hearing was for approval of a preliminary plat and final plat first filing improvements. A total of seven (7) filings are planned. The subdivision resembles the City's R-3 District zoning. The proposal is for 5,500 square foot lots with 95% of the lots backing to open space and green space. Mr. Panza also presented the landscape plan consisting of green space area, Cemetery Road (County Road 12) to the south and County Road 29 ½ to be known as South College Avenue, a detention pond, a tot lot, thirty (30) feet asphalt roadway with sidewalk, and an entrance to the subdivision. He also indicated first filing offsite improvements together with 44 lots from the main entrance. The development of Phase I includes a water line from north of Hwy 52. The new twelve inch water line main will be constructed from north College Avenue near Aims Community College, then extended south under Hwy 52 and across the Fulton Ditch. Future developments will be able to tie into the water line at South College Avenue (County Road

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29 ½). The sanitary sewer connection will be from the Appel Farms Subdivision, in the southeast portion of the subdivision and north of the oil & gas parcel. The new sewer line will be upsized to accommodate future development. The Mountain Sky Subdivision is at the low end of a drainage basin and therefore contains ground water in the area. There is approximately 800 acres of upstream drainage that drains into the Mountain Sky Subdivision. Due to the ground water, a full underdrain system will be constructed.

Mr. Panza's presentation also indicated the location of a (County Road 29 ½) regional bypass channel with box culverts to be installed underneath South College Avenue. Half of South College Avenue (County Road 29 ½) will be paved a portion of the way then gravel to Hwy 52. Once 80 lots have been improved, CDOT is requiring an acceleration/deceleration lane on the south side of Hwy 52. At this time, during Phase II, box culverts will be installed at Fulton Ditch. Mr. Panza corrected himself stating that there are a total of six (6) phases, not seven (7) like originally indicated at the beginning of the presentation. He also explained water and sewer lines connections and well as time of improvements for South College Avenue (County Road 29 ½) and Cemetery Road (County Road 12).

The Planning Chair asked if each phase will come before the Planning Commission. The Planning Director answered yes, and added that the road is part of the improvements agreement. If the improvements agreement is not approved by City Council then it will be re-presented to Council.

The Public Works Director, Roy Vestal, indicated that College Avenue is a future four (4) lane road. At this time only two (2) lanes will be paved.

The Planning Director added that half of the four (4) lane road is to be constructed. The adjacent property to the east has not been annexed and there is no additional right-of-way dedicated from the property for the four (4) lanes. To the north, Aims Community College paved a portion of College Avenue with, the remaining portion to be paved by Coyote Creek upon development. The intent of South College Avenue is to have a two (2) lane paved road from the subdivision to Hwy 52. As Planning Commission, a recommendation can be made to pave from the subdivision to Hwy 52 and have it become part of the record.

The Planning Chair asked that a copy of the presentation be added as part of the record of this hearing.

The Planning Chair opened the public hearing at 6:39 p.m. He asked if anyone from the public would like to speak on the project. There was no public for or against the project. The Planning Chair closed the public hearing at 6:40 p.m.

The Planning Chair asked the Commission Members if they had any comments or questions on the project.

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Member Dan Parrish asked how much of the road (County Road 29 ½) will be paved and how much will be gravel. It appears that there will be paving to the end of the first phase of the subdivision then from there to Hwy 52 is gravel.

Mr. Panza indicated that was correct.

Member Bush White noted that the size of lots appear too small. Mr. Osborne replied that these lots are low maintenance like patio homes but are single family individually owned lots. A market study was completed, indicating buyers prefer bigger houses on smaller lots. There is less landscaping and less yard maintenance.

Member Bruce Davis asked Mr. Osborne if he will be the home builder. Mr. Osborn indicated that he is only the developer and the lots will be sold to a home builder, who will still need to follow the subdivision guidelines.

Mr. Osborne was asked if there was a time frame in which to build the subdivision. The Planning Director indicated that the improvements agreement will contain a time frame. The Planning Chair suggested that if construction does not start within, for example three (3) to five (5) years, then the developer should come back so that staff can review changes in the area. Mr. Hodges indicated that there are statutory requirements on timing and he will review the Municipal Code.

The Planning Chair asked for clarification of the multifamily zoning on the plat map. The City Planner, Alyssa Knutson, indicated the items that were referenced refer to the Town of Severance. The PUD charts references multifamily, however it is just for comparison to the R-3 district.

The Planning Chair asked for clarification of the size of the homes since reference was made to the square footage of homes at 900 square feet and also 1,800 square feet. Mr. Osborne indicated that the homes will be between 1,800 and 2,200 square feet.

The Planning Chair asked if these changes will be made prior to the City Council hearing. The City Planner indicated that as a condition of approval, the applicant will work with staff to correct redlines throughout the document and that there is a possibility these items may not be corrected prior to the City Council hearing.

The Planning Chair asked if the front setback of the homes may be staggered so that the homes are not all lined up. Mr. Panza indicated that the covenants do not dictate different setbacks.

The Planning Chair asked who will pay for the tot lot and at what point will it be constructed. Mr. Panza indicated that the tot lot is part of the sales of the first homes and will be constructed after filing one. Mr. Russ Burrows added that due to the dangerous construction

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activities, the tot lot shouldn't be built until construction is complete. A clean fence line is needed to landscape the tot lot and surrounding area.

The Planning Chair stated that the surface of the trail is to be crushed granite and asked why not pave the trail with concrete. Mr. Panza answered that concrete requires more maintenance. Discussion occurred among the Commission over the crushed granite. Members Dan Parrish and Lucas Marone added that crushed granite is a quality road base that binds, and when applied correctly is rock hard. The Commission asked that a condition of approval be added to the Resolution that the trail be of rubble or road base and have good compaction.

The Planning Chair asked if there were any architectural requirements for homes that abut the park or thoroughfare. The City Planner indicated that there are requirements in the residential design guidelines and as a condition of approval the developer will work with City staff to finalize the guidelines. She also stated the Severance document indicates three sided architecture. The Planning Chair added that this should be a condition of approval.

Discussion occurred among members regarding the type and size of fence in the subdivision. Mr. Osborne was asked if the developer would be installing fences. Mr. Osborne noted that there is a difference between the developer and the builder and as a developer he wouldn't be erecting any fences.

The Planning Chair inquired about a lighting plan. He asked what type of lights would be installed and asked that the developer install lighting that will face down.

The Planning Chair asked that the landscape plan be reviewed so that evergreen trees are not placed south of the trails. He explained that snow will not melt in the winter with evergreens and will cause the trails to be icy.

The Planning Chair suggested that the covenants be reviewed to prohibit parking of construction and maintenance vehicles parked on properties over a period of time. The Appel Farms Subdivision had issues when the owner of a property had his landscape vehicles parked in the back yard for over a year.

Member Bush White made a motion to approve Resolution P2016-006 with the condition that the developers evaluate the type of material and application of the surface for the trail to be included in the improvements agreement and a condition that the developers submit lighting detail for the streets. Member Dan Parrish seconded the motion.

Motion carried unanimously by voice vote.

Upcoming land use applications and updates

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The City Planner stated that there are no upcoming land use application and updates. She provided the Commissioners with the postcard for the upcoming Comprehensive Plan workshops.

ADJOURNMENT

It was moved by Bruce Davis and seconded by Bush White to adjourn the September 20, 2016 Planning Commission meeting at 7:22 p.m.

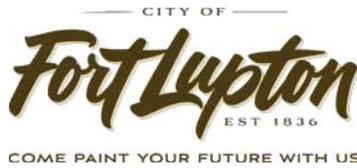
Motion carried on voice vote.

Mari Peña, Planning Technician

Approved by Planning Commission

Mike Simone, Chairperson

STAFF REPORT



**DAVE’S EARTHWORKS, INC. SITE PLAN & SPECIAL USE PERMIT
STAFF REPORT
SPR2016-001 & SUP2016-002**

PROJECT DESCRIPTION

Project Nos.: SPR2016-001 & SUP2016-002

Project Name: Dave’s Earthworks, Inc. Site Plan & Special Use Permit

Owner’s Name: Dave’s Earthworks, Inc. (“Applicant”)

Location of Request:

West and adjacent to County Road 27 and approximately one-half mile north of County Road 8 on Lots 2 and 3 of the Yarbrough Acres Minor Subdivision, City of Fort Lupton, County of Weld, State of Colorado (“Property”)

The Property is located directly north of an industrial business (Maxum Enterprises LLC) and south of a residential lot. Additional residential properties and an industrial park (Greenfield Industrial Park LLC) are located across from the property.

Nature of Request:

The Applicant has submitted a request for a site plan for approval of a storage yard, maintenance shop and commercial office and special use permit for three above-ground fuel tanks. The applicant will construct the majority of improvements on the southern parcel, which will include construction of the combined shop and office building and the storage yard. Improvements to the northern parcel include landscaping, leach field and drainage improvements. Future phasing plans for a small building to serve a landscaping materials business, with the time for this development unknown.

Site Size: Parcel No. 1 (southern parcel) is 5.005 acres, more or less. Parcel No. 2 (northern parcel) is 5.007 acres, more or less.

Zone District: I-1 Light Industrial.

Proposed Use: Heavy Commercial/Light Industrial.

Existing Use: Agricultural.

Hearing Dates: Planning Commission – November 1, 2016 at 6:00 PM; and
City Council – November 7, 2016 at 7:00 PM.

Hearing Location: Fort Lupton City Hall – Council Chambers, 130 S. McKinley Ave., Fort Lupton, Colorado.

Staff Recommendation: Approval with conditions, as shown on the proposed resolution.

SUMMARY OF PREVIOUS APPLICATIONS

In 2013, this property was annexed and initially zoned to I-1 Light Industrial by the City of Fort Lupton. This property also includes Lots 2 and 3 of the Yarbrough Acres Minor Subdivision, also approved by the Fort Lupton Planning Commission and City Council in 2013.

APPLICATION PROCESS

The Applicant is requesting approval of:

- 1) A site plan for a storage yard, maintenance shop and commercial office.
- 2) A special use permit for three above-ground fuel tanks, which include:
 - two 2,000 gallon diesel fuel tanks; and
 - one 1,000 gallon gas tank.

A site plan is processed under Section 16-173 of the Fort Lupton Municipal Code (“Code”) and special use permits are processed under Section 16-7 of the Code.

After required public notice of the site plan and special use permit, the Planning Commission shall consider the application, referral comments and any public testimony at a public hearing and make a recommendation to City Council to approve, approve with conditions or deny the site plan and special use permit. The Planning Commission’s comments shall be based on the evidence presented, conformance with the Comprehensive Plan and compliance with the City’s standards, regulations and policies.

The City Council shall then conduct a public hearing and evaluate the site plan and special use permit, referral agency comments, Planning Commission recommendation and any public testimony, and shall approve, conditionally approve, continue for additional information or for further study or deny the application based on the evidence presented and compliance with the City’s standards, regulations and policies and other guidelines.

NOTIFICATION REQUIREMENTS

The Zoning Regulations require published notice of the hearings at least fifteen (15) days prior to the hearings. The Planning Commission and City Council hearings were published in the Fort Lupton Press on October 12, 2016.

Notice of the public hearings were posted on the Property on October 13, 2016, pursuant to the Zoning Regulations, which require the Applicant post the Property with notice of the hearings at least fifteen (15) days prior to the hearings.

Notice was mailed to neighbors within one-hundred (100) feet of the Property and oil and gas lessees on October 5, 2016.

CONFORMANCE WITH CITY STANDARDS, REGULATIONS AND POLICIES

The Property is located within the I-1 Light Industrial Zone District. The objective of the I-1 Light Industrial District is to provide for the location and development of manufacturing and industrial uses which generate limited amounts of noise, fumes, dust, vibrations and traffic, or which are designed in such a fashion that such factors are contained and all storage screened from adjacent residential uses.

The I-1 Light Industrial Zone District permits storage (provided outdoor storage is screened from adjacent residential uses), auto and truck services and repairs, and personal offices as a use by right. However, an approved site plan for utilization of an I-1 zone lot is required prior to release of building permits. The Applicant’s use complies with the intent of the I-1 Light Industrial Zone District and will have limited amounts of noise, fumes, dust, vibrations and traffic. Additionally, the Applicant has submitted a landscape plan that will screen its use from surrounding residential properties.

A special use permit for above-ground storage tanks is required in the I-1 Light Industrial District.

The Applicant has submitted the required documents pursuant to the Code.

CONFORMANCE WITH THE COMPREHENSIVE PLAN

The Fort Lupton Comprehensive Plan designates this area as the Employment Area Tier 1 land use type. This land use type is intended to serve as a job center and uses envisioned include business parks, large scale commercial and complementary uses to meet the needs of employees. These uses should be adequately buffered from less intense uses and comply with design standards. Employment Area Tier 1 areas should have access to one or more major arterials and highways.

The proposed development provides additional jobs to the community and is a less intense use than others described in the Comprehensive Plan for this land use type, including less traffic generation. The location is located along County Road 27, which is a major arterial in the City and has close access to U.S. Highway 85 off of County Road 8.

The Property is within Growth Tier Two (secondary growth boundary), as defined in the Comprehensive Plan. Growth Tiers are based on the proximity of infrastructure. Since the adoption of the Comprehensive Plan, infrastructure has been extended to County Road 8, allowing the City to efficiently provide services to this location.

REFERRALS

Referrals were provided to the list below. Any comments received are enclosed with the Planning Commission packet.

City Engineer	City Attorney	Police Chief
Public Works Director	Building Inspector	Zoning Compliance
Wastewater Plant Supervisor	GIS Specialist	Fort Lupton Fire Protection District
CDOT	United Power	Comcast
CenturyLink	Xcel Energy	Postmaster
Weld County Department of Planning	Weld County Department of Public Health & Environment	Weld County School District RE-8
Northern Colorado Water Conservation District		

For more information on this development, please refer to the Planning Commission packet provided. Additional documents are available for review at the Fort Lupton City Hall.

PROPOSED RESOLUTION

RESOLUTION NO. P2016-007

A RESOLUTION OF THE PLANNING COMMISSION OF FORT LUPTON RECOMMENDING TO CITY COUNCIL APPROVAL OF DAVE’S EARTHWORKS, INC.’S SITE PLAN FOR A STORAGE YARD, MAINTENANCE SHOP AND COMMERCIAL OFFICE AND SPECIAL USE PERMIT FOR ABOVE-GROUND FUEL TANKS LOCATED AT LOTS 2 AND 3 OF THE YARBROUGH ACRES MINOR SUBDIVISION, CITY OF FORT LUPTON, COUNTY OF WELD, STATE OF COLORADO.

WHEREAS, the Planning Commission held a public hearing on November 1, 2016, for the purpose of reviewing the site plan for a storage yard, maintenance shop and commercial office and special use permit for above-ground fuel tanks; and

WHEREAS, after review of the application and supporting documentation, find the site plan generally conforms with City codes and requirements and policies therein; and

WHEREAS, all legal requirements for the public hearing have been met including publication of the legal notice in the Fort Lupton Press, mailing of public hearing notices to adjacent property owners within 100 feet and posting of the hearing on the site; and

NOW THEREFORE BE IT RESOLVED, the Planning Commission has considered the application and has taken into consideration staff comments, the applicant’s presentation, all referral comments and any citizen testimony in response to this application. Based on the facts presented on this date, the Planning Commission hereby recommends approval of the Dave’s Earthworks, Inc.’s site plan for a storage yard, maintenance shop and commercial office and special use permit for three above-ground fuel tanks located west and adjacent to County Road 27 and approximately on-half mile north of County Road 8 on Lots 2 and 3 of the Yarbrough Acres Minor Subdivision, City of Fort Lupton, County of Weld, State of Colorado, with the following conditions:

- I. Prior to recording the Site Plan:
 - A. The title of the site plan map shall include the Project No. SPR2016-001 and SUP2016-002.
 - B. Details shall be removed from the Site Plan and placed on a separate detail sheet.
 - C. A dedicated emergency access road 20 feet in width shall be delineated on the Site Plan.
 - D. The following notes shall be placed on the site plan map:
 - 1. The property shall be maintained to the curb, or roadway if no curb exists.

2. Dead and dying landscaping material shall be replaced at the earliest reasonable date as determined by the City.
3. In the event traffic numbers and usage significantly exceed those represented by the Property Owner and relied upon by the City for compilation of the traffic study applicable to this project, future improvements to the truck routes may be required by the City for reasons related to site activity or truck circulation patterns and numbers, roadway classification changes and newly permitted facilities affecting the truck haul route traffic usage. Property Owner shall pay a proportionate cost share of future improvements not described herein based on the Property Owner's percentage of truck total trips using the current data on the haul route in comparison to the numbers and usage represented by Applicant in compilation of the traffic study. The City may retain a third party traffic study consultant to evaluate traffic data usage by Property Owner and provide said study to Property Owner prior to the imposition of any costs stated herein.
4. Lighting on site shall be maintained so that light is directed on the site and shall not spill onto adjacent properties.
5. The septic systems serving the property shall maintain compliance with all regulations and/or requirements of the Weld County Health Department.
6. A three foot clear space shall be maintained around the circumference of fire hydrants. *2012 IFC 507.5.5.*
7. Lots 2 and 3 may not be sold separately without Planning Department approval.

II. Prior to release of building permits:

- A. Written evidence of a final grading permit from the State must be provided.
- B. Written evidence shall be provided to show that the comments from the City Engineer have been adequately addressed.
- C. Written evidence shall be provided to show that the comments from the Planning Technician have been adequately addressed.
- D. Written evidence shall be provided to show that Paragraph 7 of the Fort Lupton Fire Protection District's response and map comments have been adequately addressed.
- E. Two sets of Mylars of the site plan maps shall be submitted for recording with the Weld County Clerk & Recorder.

- III. Prior to release of building permits for the above-ground fuel tanks:
 - A. Applicant must provide a copy of the permit(s) from the State of Colorado permitting the above-ground fuel tanks.
 - B. Applicant must provide written evidence that the Fort Lupton Fire Protection District's comments related to the above-ground fuel tanks have been adequately addressed.

- IV. Prior to the release of a certificate of occupancy:
 - A. Written evidence shall be provided to show that the comments from United Power have been adequately addressed.
 - B. Written evidence shall be provided to show that the comments from the Fort Lupton Fire Protection District have been adequately addressed.
 - C. Written evidence of a final septic permit shall be provided.

DONE THIS 1st DAY OF NOVEMBER, 2016, BY THE PLANNING COMMISSION FOR THE CITY OF FORT LUPTON, COLORADO.

Chairman

ATTEST:

Planning Director

LAND USE APPLICATION & PROJECT DESCRIPTION



Planning & Building

130 S. McKinley Avenue
Fort Lupton, CO 80621

Phone: 303.857.6694
Fax: 303.857.0351

www.fortlupton.org

Project No. SPR2016-001

Land Use Application Form

A. CONTACT INFORMATION

1) Property Owner Name: Dwayne D Hunt

Company: Dave's Earthworks

Phone: 303-944-0746 Email: Dthunt@deiteam.com

Address: 3355 County road 27 Fort Lupton, CO

Preferred method of contact? Email: Phone: Mail:

2) Representative Name: Kelly C. Deitman

Company: Halcyon design, LLC

Phone: 303-906-2617 Email: kelly@halcyonarch.com

Address: Firestone, CO

Preferred method of contact? Email: Phone: Mail:

3) Billing Contact (where invoices should be directed to): Dave Hunt

Billing Company: Dave's Earthworks Inc

Phone: 303-558-0930 Email: office@deiteam.com

Address: 1137 E. Bridge st. Brighton, CO

B. SITE DESCRIPTION

Site Address: 3355 county Road 27

Parcel Number: 147118401002 & 147118401003

Existing Zone Classification: light industrial Proposed Zone Classification: light industrial

Water Type: public Name: Dave's Earthworks Inc. Shop + office

Sewage Type: septic District Name or Location Hauled to: CCW + CCS + New

C. APPLICATION TYPE (CHECK ALL THAT APPLY)

- Sketch Plat
- Preliminary Plat
- Final Plat
- Minor Subdivision
- Amended Plat
- Site Plan
- Administrative Site Plan
- Special Use Permit
- Oil & Gas Permit
- Annexation & Initial Zone
- Change of Zone
- Comp Plan Amendment
- PUD Plan (Preliminary & Final)
- Variance
- Administrative Variance
- Appeal
- Other: _____

D. PROJECT DESCRIPTION

Project Name: Dave's Earthworks Inc. Shop + Office

Please provide a short description of the proposed project in the space provided below:

refer to the narrative

E. REQUIRED DOCUMENTS

For an application to be considered complete, and for planning staff to begin review and schedule any applicable public hearings, this Land Use Application Form must be fully completed and all required attachments included. Planning staff will review the application for completeness and will provide notice to the representative and/or owner whether the application has been deemed complete.

F. CERTIFICATIONS

Representative Certification

By signing this application, I attest that I am acting with the knowledge and consent of all owners of the property that is the subject of this application, and that I have been designated to act as the representative for the project described in this land use application. I further certify that all information submitted with this application is true and accurate to the best of my knowledge.

Representative: _____ Date: _____

Owner Certification

I hereby certify that I am the legal owner of record of the property that is the subject of this application. I hereby authorize the representative listed on this application, if any, to communicate directly with City officials and to submit documentation and information regarding this application on my behalf.

Owner: [Signature] Date: 9-21-16

For Office Use Only

Received Date: 9/16/16

If the application is not complete, state reasons why it is incomplete:

• Need land use app. signed.

Deemed Complete Date: _____

Fees Submitted: \$2,650 Escrow Submitted: \$2,500



August 31, 2016

Project: #1607 DEI Shop/Office
3355 County Road 27, Fort Lupton, CO
Site Plan Review Narrative

To Whom It May Concern:

Included with this submittal are Drawings and Documents as itemized in the City of Fort Lupton Site Plan Process Form WKBK001. The Site Plan Review will include two parcels as noted below. Parcels are intended to remain separate. Descriptions of proposed development items is as follows:

3355 County Road 27 Parcel No. 147118401002

Item 6.m

This project consists of a proposed storage yard, maintenance shop and commercial office for Dave's Earthworks, Inc., currently based out of Brighton, CO. The Owner anticipates having ten (10) employees occupy the office (East) side of the building on a full-time basis during regular business hours (Monday-Friday, 8am-5pm). In addition, there may be up to (20) construction and maintenance staff that will make trips to the office, storage yard and maintenance shop on a brief (1-2 hours), but regular basis of two (2) visits per week. Construction and maintenance staff will routinely work at off-site project locations. It is anticipated that few, if any, office or maintenance staff will be on-site beyond the Monday thru Friday work week. Maintenance activities will be contained with the shop (West) side of the building and will consist of light vehicle repair and construction equipment servicing. The storage yard at the West half of the site away from the street will be where construction equipment and company-owned vehicles are parked, some on trailers. Office employees will park immediately adjacent to the East side of the building in an asphalt paved parking area. An existing structure along the South property line will be maintained for storage, with no modifications planned for the structure. A trash enclosure and monument sign will be as indicated on the Construction Documents.

Item 6.o

Construction of the shop and office (one building) will occur in a single/first phase to include all grading and drainage improvements, street access, paved parking areas, landscaping, exterior lighting, and other site development indicated on the attached Construction Documents.

North Parcel No. 147118401003

Item 6.m

This parcel will be used for a future landscaping materials business. The small building and scale indicated on the Site Plan will be constructed in a future phase, date unknown

Item 6.o

Work proposed for this project phase consists of a leach field to serve both parcels, landscaping, and storm drain. The site will be graded as shown for drainage to a shared detention pond at the Southwest corner of the parcel to the South.

Kelly C. Deitman, AIA, LEED AP, NCARB
Halcyon Design LLC
PO Box 30
Frederick, CO 80530
303.906.2617 (cell)
Kelly@halcyonarch.com

From: [Kelly Deitman](mailto:Kelly.Deitman@halcyonarch.com)
To: [Alyssa Knutson](mailto:Alyssa.Knutson@halcyonarch.com)
Subject: FW: shop fuel tank
Date: Wednesday, September 28, 2016 8:17:00 AM

Here is the fuel tank info. requested (below). Let me know if you have any other questions.

Kelly Deitman, AIA, LEED AP, NCARB
Halcyon Design LLC
PO Box 30
Frederick, CO 80530
8393 W I-25 Frontage Rd, Unit #1
Frederick, CO 80516
303.906.2617
Kelly@halcyonarch.com
www.halcyonarch.com

From: Dave Hunt [mailto:dhunt@deiteam.com]
Sent: Monday, September 26, 2016 4:54 PM
To: Kelly Deitman <kelly@halcyonarch.com>
Subject: Re: shop fuel tank

Kelly

As of right now I have 2- 2,000 gallon tanks for diesel and 1- 1,000 gallon tank for gas. I would like to upgrade these to 2- 6,000 gallon tanks for diesel and 1- 2,000 gallon tank for gas. The diesel fuel is for on road and off road just in case. hope this helps!

On Mon, Sep 26, 2016 at 4:45 PM, Kelly Deitman <kelly@halcyonarch.com> wrote:

Alyssa is asking for additional info. on the proposed fuel tank for your shop/office site. Specifically, tank size and type of fuel. Thanks,

Kelly Deitman, AIA, LEED AP, NCARB
Halcyon Design LLC
PO Box 30
Frederick, CO 80530
8393 W I-25 Frontage Rd, Unit #1
Frederick, CO 80516
[303.906.2617](tel:303.906.2617)
Kelly@halcyonarch.com
www.halcyonarch.com

--

Dave Hunt

President/Owner
dhunt@deiteam.com

Dave's Earthworks Inc.

1137 E Bridge Street
Brighton, CO. 80601

303-944-0746 – Cell
303-558-0930 – Office



This email has been scanned by the Symantec Email Security.cloud service.
For more information please visit <http://www.symanteccloud.com>

MAPS

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. DATE OF DECLASSIFICATION IS INDEFINITE. THIS INFORMATION IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. DATE OF DECLASSIFICATION IS INDEFINITE. THIS INFORMATION IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. DATE OF DECLASSIFICATION IS INDEFINITE.

Dave's Earthworks Inc. Shop & Office
Site Plan Review
 3355 County Rd 27
 Fort Lupton, Colorado 80621

Halcyon Design LLC
 PO Box 30
 Frederick, CO 80530
 303.906.5617

DATE	8.31.16
REVISIONS	
SHEET TITLE	Site Plan Map
SHEET NUMBER	SP2

Project No. 16007

Site Legend

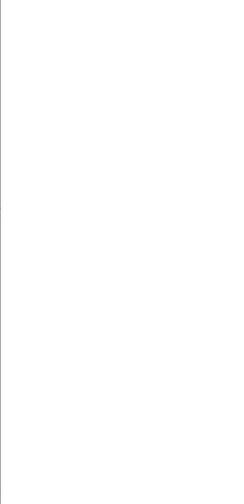
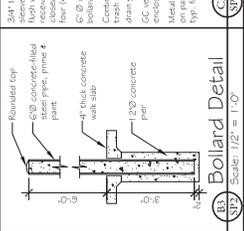
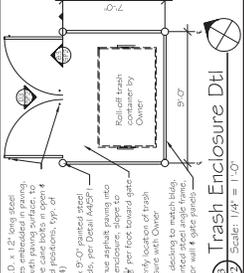
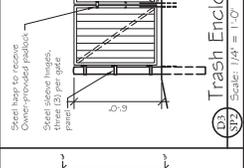
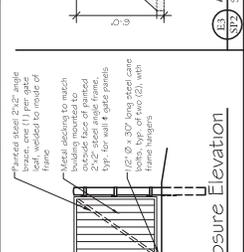
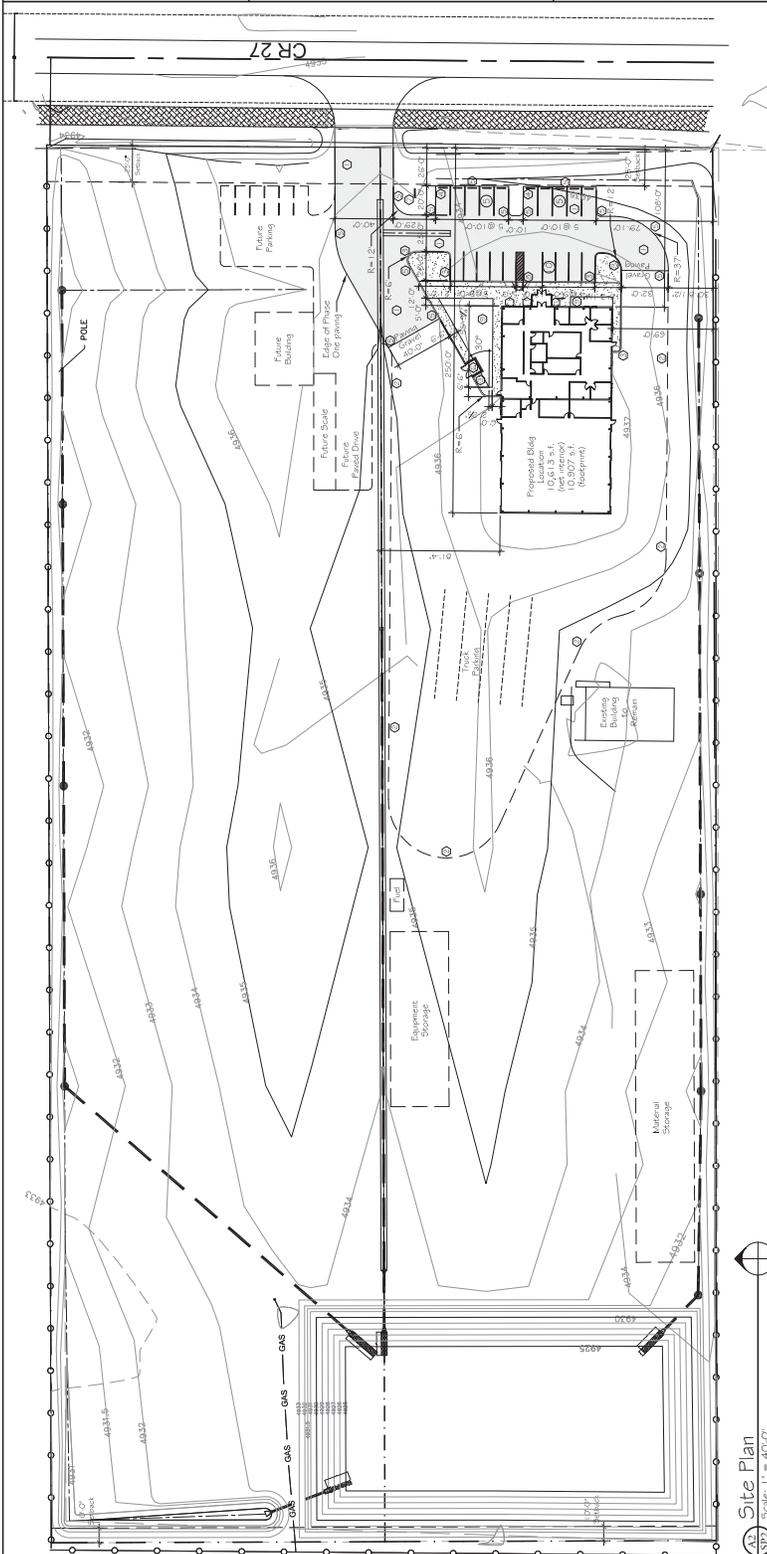
- Property Line
- Setback Line
- Existing Contours
- New Contours
- Existing Water Line
- New Water Service
- Existing Sanitary Sewer Line
- New Sanitary Sewer Service
- New Telephone Service
- New Electrical Service
- Antenna Tower (Existing)
- New Gas Service

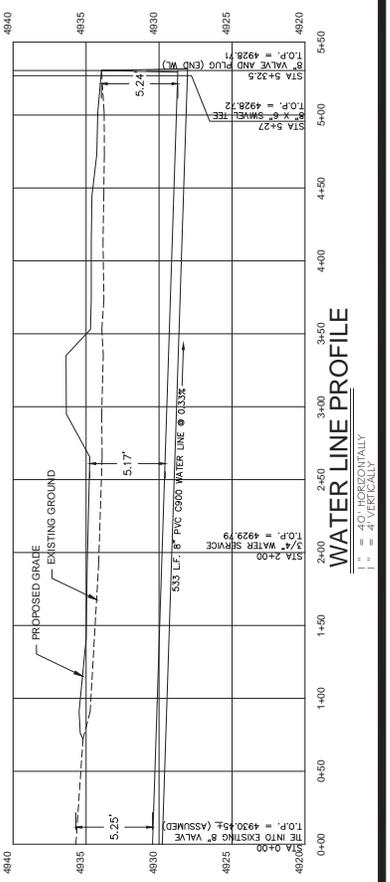
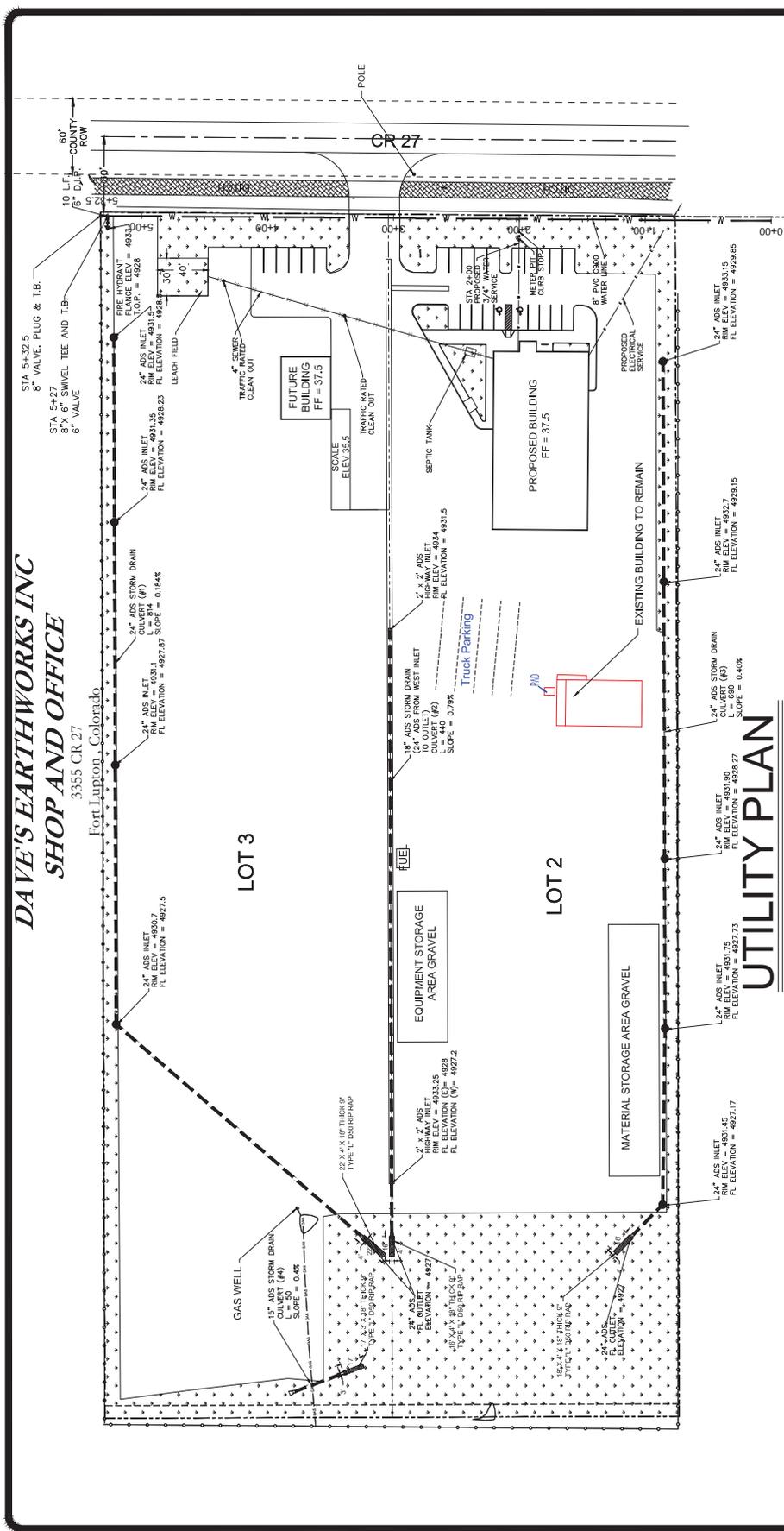
General Notes

- The project consists of work on two separate parcels to include Parcel # 147118401003 and Parcel # 147118401002 also known as 3355 CR 27. No subdivision process is intended for this phase of the project.
- See Civil Drawings for grading, drainage, and irrigation information.
- See Landscaping Drawings for planting and building information.
- Building dimensions are to the outside face of foundation.
- Building eave height is approximately 28'-4" high from finished floor height to highest roof fascia.
- The proposed office and shop building will be 100' x 100'.
- Concrete curb radius shall be 3'-0" to outside face of curb, unless noted otherwise on plan.

Plan Key Notes

- Asphalt paving per Geotechnical Report.
- Owner.
- Approximate edge of gravel paving, verify with Owner.
- 4" thick concrete curb per Civil.
- 6" wide concrete weed strips in locations shown.
- Edge of asphalt paving.
- Trash enclosure per Detail, this Sheet.
- Accessible ramp per Detail E309P2.
- Planter bed per Landscape Plans.
- Bicycle Rack.
- See specific parking signage per Detail Category.





DAVE'S EARTHWORKS INC
 SHOP AND OFFICE
 3355 CR 27
 Fort Lupton, Colorado

DAVE'S EARTHWORKS INC SHOP AND OFFICE

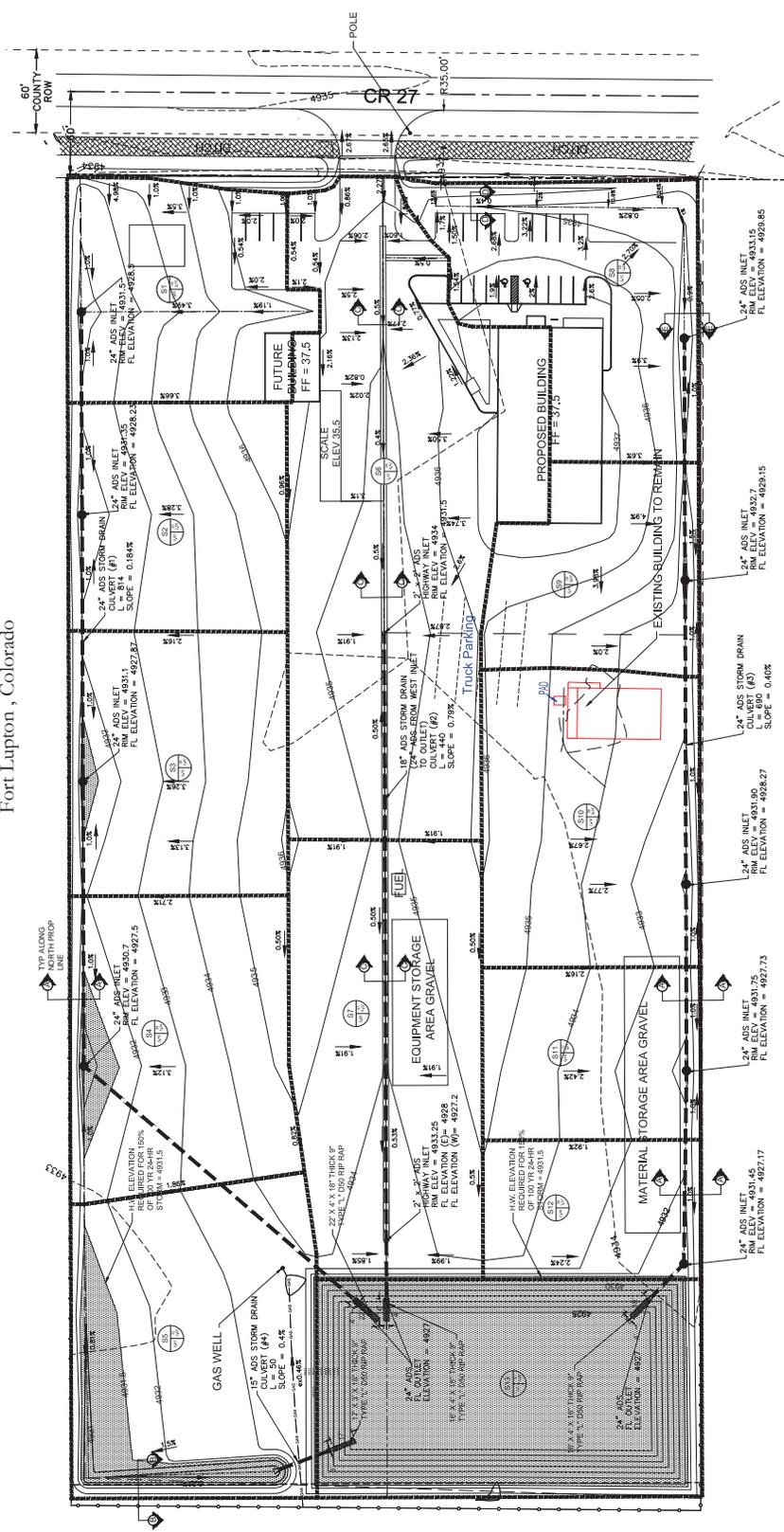
3355 CR 27
Fort Lupton, Colorado

DAVE HUNT
DRAWN FOR
P.O. Box 322
Brython, CO 80001

DAVES
EARTHWORKS INC
3555 CR 27
FORT LUTON COLORADO

WERNSMAN ENGINEERING
STEVE WERNSMAN
1011 42ND STREET
EVANS, CO 80620
(970) 393-4483

DATE: 08/26/09
PROJECT # 09-001
SHEET 1 OF 4
C3



PROPOSED BASINS
SCALE 1" = 40'

BASIN ENTIRE SITE	AREA (AC)	C(100)	IMP	C(100)CFS
S1	0.01	0.58	38	37.65
S2	0.60	0.58	40	2.75
S3	0.60	0.58	38	2.55
S4	0.70	0.58	38	2.97
S5	0.91	0.57	32	3.69
S6	1.57	0.62	56	6.82
S7	0.98	0.59	41	4.02
S8	0.70	0.62	55	3.09
S9	0.59	0.58	38	2.85
S10	0.45	0.58	37	1.91
S12	0.96	0.57	34	1.61
S13	1.01	0.51	3	5.98

NOTE ALL VALUES SHOWN ARE FOR 100-YR EVENT

DRAINAGE LEGEND

----- SUB-BASIN BOUNDARY

--- DIRECTION OF FLOW

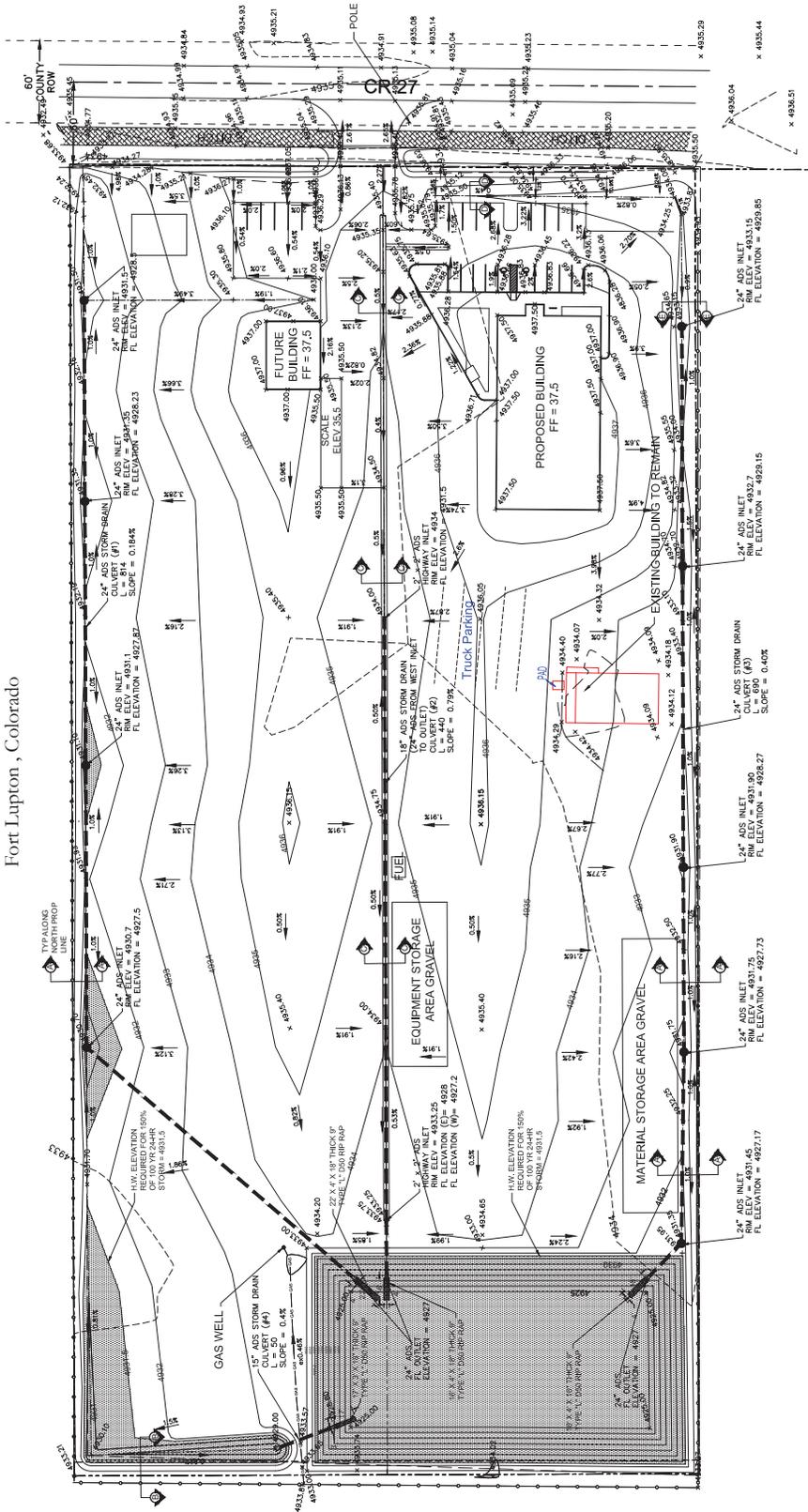
ASIS

A = Basin Designation
B = Area In Acres
C = % Imperviousness
D = Q(100) cfs



DAVE'S EARTHWORKS INC SHOP AND OFFICE

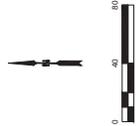
3355 CR 27
Fort Lupton, Colorado



GRADING PLAN

LEGEND:

	PROPERTY LINE
	EDGE OF BUILDING
	EDGE OF EASEMENT
	SWALE CENTERLINE
	EXISTING GRADE CONTOUR
	FINISHED GRADE CONTOUR
	CULVERT

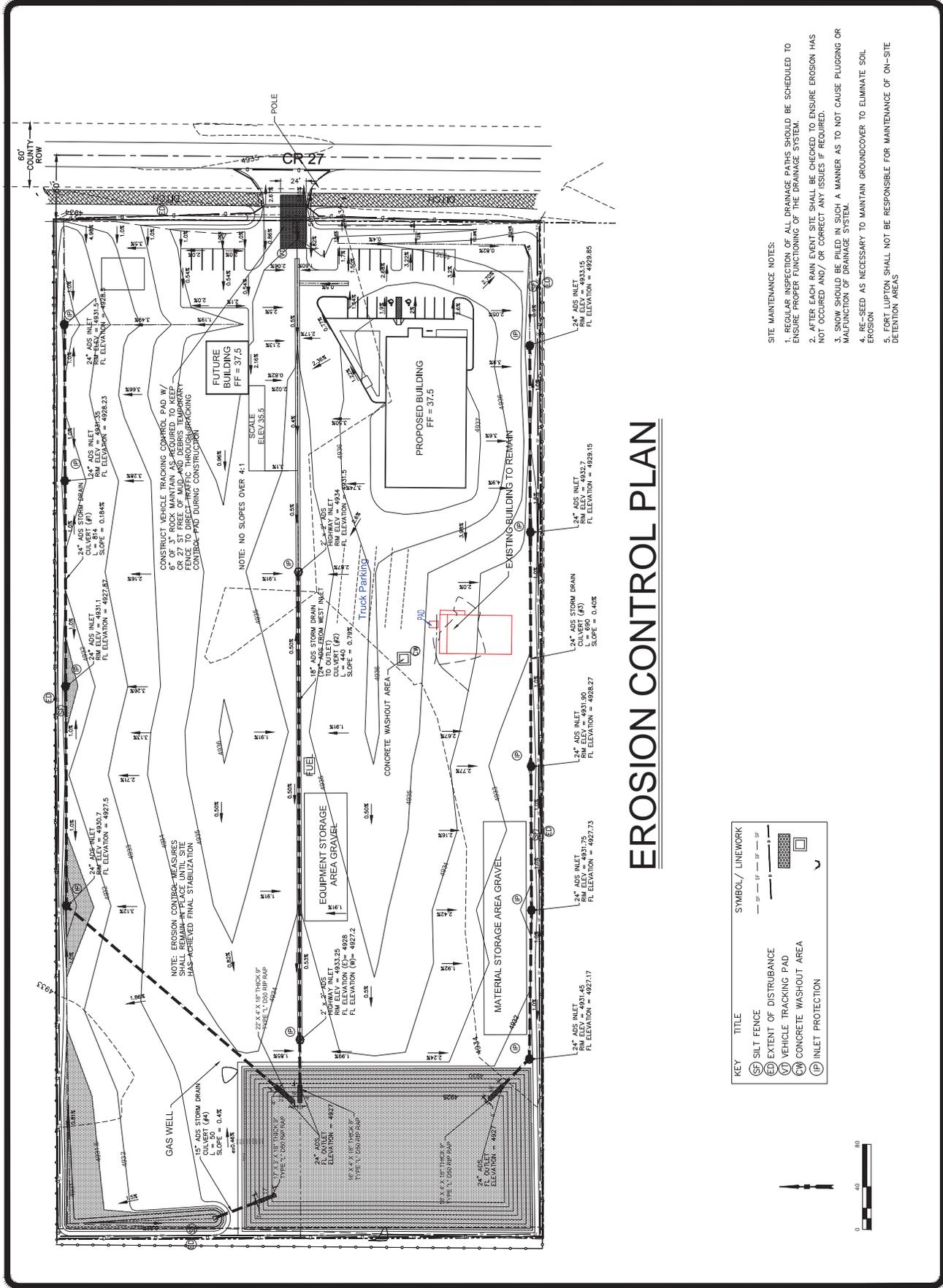


DAVE HUNT
DRAWN FOR
P.O. Box 322
Blythe, CO 80901

DAVES
EARTHWORKS INC
3355 CR 27
FORT LUPTON COLORADO

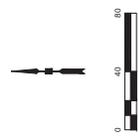
WERNSMAN ENGINEERING
STEVE WERNSMAN
1011 42ND STREET
EVANS, CO 80620
(970) 393-4483

DATE	08/26/09
PROJECT #	1-47
SHEET	C4
OF	CF



EROSION CONTROL PLAN

KEY	TITLE	SYMBOL / LINEWORK
(SF)	SILT FENCE	--- SF --- SF --- SF
(ED)	EXTENT OF DISTURBANCE	--- ED --- ED --- ED
(VP)	VEHICLE TRACKING PAD	[Hatched Box]
(CW)	CONCRETE WASHOUT AREA	[Solid Box]
(PI)	INLET PROTECTION	[Circle with 'P']



CONCRETE THRUST BLOCKS - BEARING SURFACES AND INSTALLATION

PIPE SIZE (IN)	10' SPACING	15' SPACING	20' SPACING	25' SPACING	30' SPACING
4"	1.08	2.16	3.24	4.32	5.40
6"	1.62	3.24	4.86	6.48	8.10
8"	2.16	4.32	6.48	8.64	10.80
10"	2.70	5.40	8.10	10.80	13.50
12"	3.24	6.48	9.72	12.96	16.20
14"	3.78	7.56	11.34	15.12	18.36
16"	4.32	8.64	12.96	17.28	20.52
18"	4.86	9.72	14.58	19.44	22.68
20"	5.40	10.80	16.20	21.60	24.84
22"	5.94	11.88	17.82	23.76	27.00
24"	6.48	12.96	19.44	25.92	29.16

NOTES:
1. BEARING SURFACES SHOWN IN CHART ARE MINIMUM.
2. BEARING SURFACES ARE BASED ON 150 PPS INTERNAL PIPE.
3. 4", 6", 8", AND 10" WATER HAMMER = 100 PPS.
4. BEARING SURFACE CALCULATIONS ARE BASED ON 400 PPS SOIL BEARING CAPACITY.
5. BEARING SURFACE CALCULATIONS AND FITTINGS SHALL BE SHOWN IN POLYETHYLENE AND SECURELY TIED TO THE CONCRETE THRUST BLOCK.
6. CONCRETE THRUST BLOCK SHALL BE MINIMUM OF 24 HOURS AFTER PLACEMENT.

FIRE HYDRANT INSTALLATION DETAIL

NOTES:
1. HYDRANT, IN PIPE AND HYDRANT AREAS, SHALL BE POLYETHYLENE.
2. HYDRANT SHALL BE 1/2" TOLERANCE WITH 1/4" TOLERANCE.
3. PRIOR TO PLACING INTO SERVICE, THE FOLLOWING SHALL BE PERFORMED:
a. HYDRANT SHALL BE TESTED TO 150 PPS.
b. HYDRANT SHALL BE BRUSH PAINTED THE EXPOSED END OF HYDRANT.
4. THE EXPOSED PORTION OF HYDRANT SHALL BE PROTECTED WITH A PROTECTIVE CAP.
5. THE EXPOSED PORTION OF HYDRANT SHALL BE PROTECTED WITH A PROTECTIVE CAP.

TYPICAL TRENCH SECTION PIPE PROTECTION

PIPE DIAMETER (IN)	TRENCH WIDTH (IN)	TRENCH DEPTH (IN)	MINIMUM BEDDING SAND (IN)
4"	12"	18"	4"
6"	18"	24"	6"
8"	24"	30"	8"
10"	30"	36"	10"
12"	36"	42"	12"
14"	42"	48"	14"
16"	48"	54"	16"
18"	54"	60"	18"
20"	60"	66"	20"
22"	66"	72"	22"
24"	72"	78"	24"

NOTES:
1. TRENCHES SHALL BE 12" DEEP OR GREATER, REQUIRE A "PROTECTIVE SYSTEM" AS DEFINED BY OSHA TRENCHES 2010.
2. OSHA TRENCHES 2010 REQUIRE THAT TRENCHES BE INSPECTED ONLY BY A REGISTERED PROFESSIONAL ENGINEER.
3. MINIMUM COVER OVER PIPE TO BE BELOW OFFICIAL STREET GRADE.
4. FOR PIPE BEDDING REQUIREMENTS REFER TO CHAPTER 9 OF THE SPECIFICATIONS AND ADDENDUMS.
5. PIPE BEDDING SHALL BE PLACED AGAINST UNDISTURBED SOIL IN THE TRENCH BOTTOM, HOWEVER, WHERE UNDISTURBED SOIL IS NOT AVAILABLE, BEDDING SHALL BE PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS OF A GEOTECHNICAL ENGINEER.

POLYETHYLENE WRAP

FIELD INSTALLATION/CONNECTIONS:
STEP-1: PLACE TUBE OF POLYETHYLENE MATERIAL AROUND PIPE PRIOR TO LOWERING PIPE INTO TRENCH.
STEP-2: PULL THE TUBE OVER THE LENGTH OF THE PIPE. TUBE TO BE TO PIPE AT JOINT.
STEP-3: OVERLAP FIRST TUBE WITH ADJACENT TUBE AND SECURE WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE JOINT SHALL BE FOLDED ON TOP OF THE PIPE AND TIED IN PLACE.
NOTE: POLYETHYLENE SHALL BE MINIMUM 4-MIL THICKNESS.

CONCRETE THRUST BLOCK FOR UNBALANCED SURFACES

NOTES:
1. SIZE OF BLOCK TO BE A MINIMUM OF 8" THICK.
2. ALL BEDDING TO BE ON UNDISTURBED MATERIAL.

MINIMUM DIMENSIONS FOR THRUST BLOCKS

FITTING SIZE	TEES & PLUGS		45° BENDS & WYES	
	A	B	A	B
4"	10"	10"	10"	10"
6"	12"	12"	12"	12"
8"	14"	14"	14"	14"
10"	16"	16"	16"	16"
12"	18"	18"	18"	18"
14"	20"	20"	20"	20"
16"	22"	22"	22"	22"
18"	24"	24"	24"	24"
20"	26"	26"	26"	26"
22"	28"	28"	28"	28"
24"	30"	30"	30"	30"

GENERAL NOTES:
1. BEARING SURFACE GRADE SHOWN IN CHART ARE MINIMUM.
2. BASED ON 150 P.S.I. INTERNAL PIPE PRESSURE.
3. SOIL BEARING CAPACITY = 2000 LB./SQ. FT.
4. (MINIMUM 8" MIN.)



DESIGN STANDARDS
TRACER WIRE

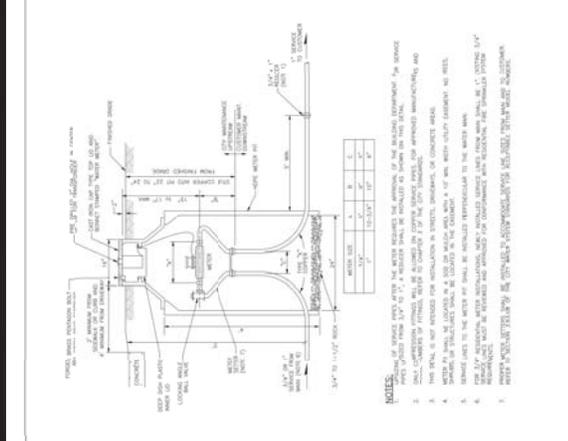
STANDARD DRAWING
W7

DATE: 8/15/14

Fort Lupton
Standard Drawing: Standard Drawing: W7

GENERAL NOTES

1. NOT FOR INSTALLATION IN CONCRETE. CONCRETE, ASPHALT, OR OTHER SURFACES SHALL BE CONSTRUCTED TO THE SURFACE OF THE FITTING. THE METER SHALL BE INSTALLED ABOVE THE SURFACE OF THE FITTING. THE METER SHALL BE INSTALLED ABOVE THE SURFACE OF THE FITTING. THE METER SHALL BE INSTALLED ABOVE THE SURFACE OF THE FITTING.
2. METER SHALL BE SET WITHIN PUBLIC R.O.M. OR PUBLIC EASEMENT.
3. METER PIT SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
4. POLYETHYLENE SHALL BE 3/4\"/>



DESIGN STANDARDS
3/4\"/>

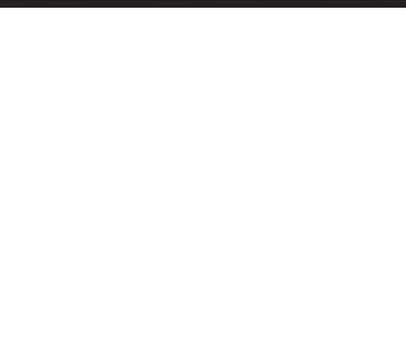
STANDARD DRAWING
W8

DATE: 8/15/14

Fort Lupton
Standard Drawing: Standard Drawing: W8

GENERAL NOTES

1. METER SHALL BE SET WITHIN PUBLIC R.O.M. OR PUBLIC EASEMENT.
2. METER PIT SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
3. POLYETHYLENE SHALL BE 3/4\"/>



DESIGN STANDARDS
3/4\"/>

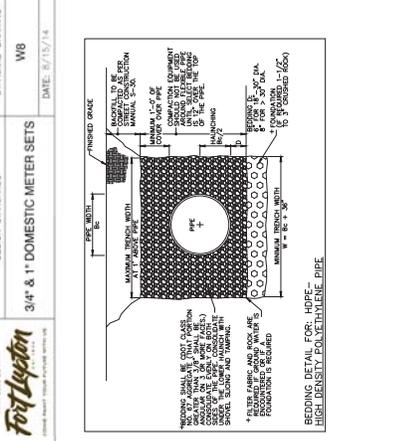
STANDARD DRAWING
W9

DATE: 8/15/14

Fort Lupton
Standard Drawing: Standard Drawing: W9

GENERAL NOTES

1. METER SHALL BE SET WITHIN PUBLIC R.O.M. OR PUBLIC EASEMENT.
2. METER PIT SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
3. POLYETHYLENE SHALL BE 3/4\"/>



DESIGN STANDARDS
VALVE BOX

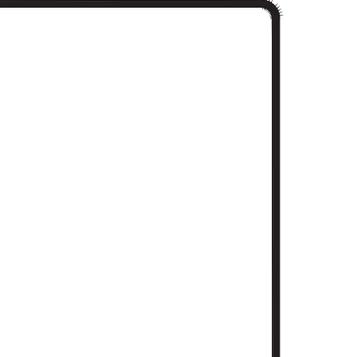
STANDARD DRAWING
W10

DATE: 8/15/14

Fort Lupton
Standard Drawing: Standard Drawing: W10

GENERAL NOTES

1. CARE SHALL BE TAKEN WHEN INSTALLING VALVES TO ASSURE PROPER SUPPORT OF VALVES.
2. VALVES SHALL NOT BE PLACED IN CONCRETE, ASPHALT, OR OTHER SURFACES.
3. VALVES SHALL NOT BE PLACED IN CONCRETE, ASPHALT, OR OTHER SURFACES.
4. VALVES SHALL NOT BE PLACED IN CONCRETE, ASPHALT, OR OTHER SURFACES.
5. VALVES SHALL NOT BE PLACED IN CONCRETE, ASPHALT, OR OTHER SURFACES.
6. VALVES SHALL NOT BE PLACED IN CONCRETE, ASPHALT, OR OTHER SURFACES.



DESIGN STANDARDS
VALVE BOX

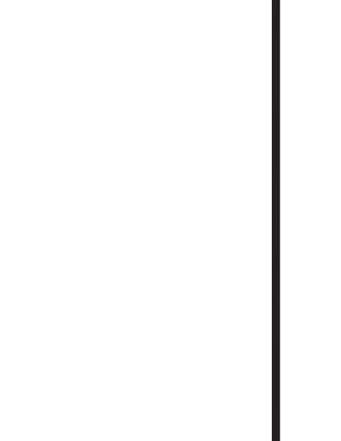
STANDARD DRAWING
W11

DATE: 8/15/14

Fort Lupton
Standard Drawing: Standard Drawing: W11

GENERAL NOTES

1. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
2. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
3. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
4. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
5. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
6. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.



DESIGN STANDARDS
VALVE BOX

STANDARD DRAWING
W12

DATE: 8/15/14

Fort Lupton
Standard Drawing: Standard Drawing: W12

GENERAL NOTES

1. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
2. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
3. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
4. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
5. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.
6. VALVE BOX SHALL BE CONSTRUCTED OF MODIFIED H-DENSITY POLYETHYLENE.

REPORTS



WERNSMAN ENGINEERING, INC.

1011 42nd STREET ♦ EVANS, CO 80620
Phone (970) 353-4463 Fax (970) 353-9257

August 7, 2016

Roy Vestal
City of Fort Lupton
130 S. McKinley Ave.
Fort Lupton, CO 80621

RE: Preliminary Drainage Report for Dave Hunt

To whom it may concern;

Attached is the Preliminary Drainage Report and Plan for Dave' Excavation Inc. new facility at 3355 CR 27 in Fort Lupton. This report addresses both the off-site and on-site hydrology that affects or is affected by the proposed development.

If you have any further questions or comments regarding this matter, please contact this office.

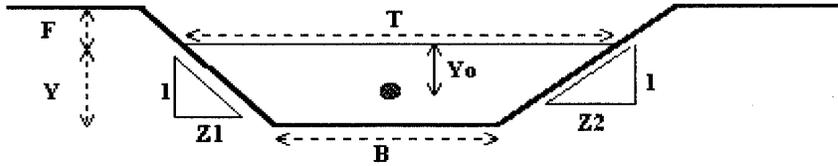
Sincerely,



Eric Wernsman P.E.

Normal Flow Analysis - Trapezoidal Channel

Project: Daves Ex
 Channel ID: Sec B-B BASIN 5



Design Information (Input)

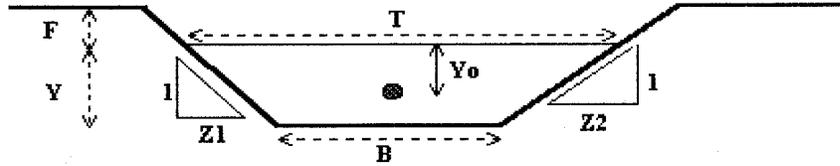
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Manning's n	n =	0.040
Bottom Width	B =	0.00 ft
Left Side Slope	Z1 =	4.00 ft/ft
Right Side Slope	Z2 =	4.00 ft/ft
Freeboard Height	F =	1.00 ft
Design Water Depth	Y =	0.75 ft

Normal Flow Condition (Calculated)

Discharge	Q =	3.94 cfs
Froude Number	Fr =	0.50
Flow Velocity	V =	1.75 fps
Flow Area	A =	2.25 sq ft
Top Width	T =	6.00 ft
Wetted Perimeter	P =	6.18 ft
Hydraulic Radius	R =	0.36 ft
Hydraulic Depth	D =	0.38 ft
Specific Energy	Es =	0.80 ft
Centroid of Flow Area	Yo =	0.25 ft
Specific Force	Fs =	0.05 kip

Normal Flow Analysis - Trapezoidal Channel

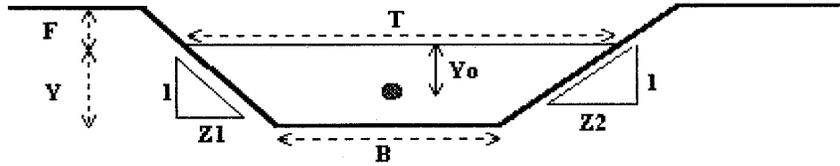
Project: Daves Ex
 Channel ID: Sec C-C



Design Information (Input)	
Channel Invert Slope	So = <u>0.0050</u> ft/ft
Manning's n	n = <u>0.025</u>
Bottom Width	B = <u>0.00</u> ft
Left Side Slope	Z1 = <u>42.00</u> ft/ft
Right Side Slope	Z2 = <u>33.00</u> ft/ft
Freeboard Height	F = <u>1.00</u> ft
Design Water Depth	Y = <u>0.37</u> ft
Normal Flow Condition (Calculated)	
Discharge	Q = <u>7.02</u> cfs
Froude Number	Fr = <u>0.56</u>
Flow Velocity	V = <u>1.37</u> fps
Flow Area	A = <u>5.13</u> sq ft
Top Width	T = <u>27.75</u> ft
Wetted Perimeter	P = <u>27.76</u> ft
Hydraulic Radius	R = <u>0.18</u> ft
Hydraulic Depth	D = <u>0.19</u> ft
Specific Energy	Es = <u>0.40</u> ft
Centroid of Flow Area	Yo = <u>0.12</u> ft
Specific Force	Fs = <u>0.06</u> kip

Normal Flow Analysis - Trapezoidal Channel

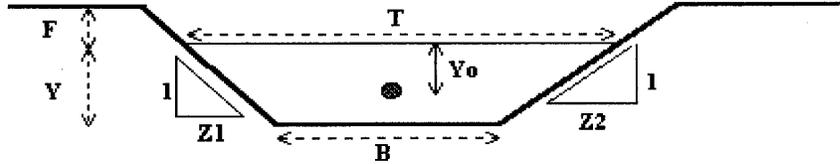
Project: Daves Ex
 Channel ID: Sec D-D BASIN S8



Design Information (Input)	
Channel Invert Slope	So = 0.0040 ft/ft
Manning's n	n = 0.040
Bottom Width	B = 0.00 ft
Left Side Slope	Z1 = 4.00 ft/ft
Right Side Slope	Z2 = 33.00 ft/ft
Freeboard Height	F = 1.00 ft
Design Water Depth	Y = 0.45 ft
Normal Flow Condition (Calculated)	
Discharge	Q = 3.26 cfs
Froude Number	Fr = 0.32
Flow Velocity	V = 0.87 fps
Flow Area	A = 3.75 sq ft
Top Width	T = 16.65 ft
Wetted Perimeter	P = 16.71 ft
Hydraulic Radius	R = 0.22 ft
Hydraulic Depth	D = 0.23 ft
Specific Energy	Es = 0.46 ft
Centroid of Flow Area	Yo = 0.15 ft
Specific Force	Fs = 0.04 kip

Normal Flow Analysis - Trapezoidal Channel

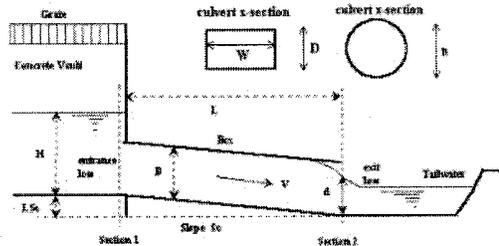
Project: **Daves Ex**
 Channel ID: **Sec E-E BASIN S8**



Design Information (Input)	
Channel Invert Slope	So = <u>0.0100</u> ft/ft
Manning's n	n = <u>0.040</u>
Bottom Width	B = <u>0.00</u> ft
Left Side Slope	Z1 = <u>4.00</u> ft/ft
Right Side Slope	Z2 = <u>4.00</u> ft/ft
Freeboard Height	F = <u>1.00</u> ft
Design Water Depth	Y = <u>0.67</u> ft
Normal Flow Condition (Calculated)	
Discharge	Q = <u>3.12</u> cfs
Froude Number	Fr = <u>0.54</u>
Flow Velocity	V = <u>1.76</u> fps
Flow Area	A = <u>1.78</u> sq ft
Top Width	T = <u>5.34</u> ft
Wetted Perimeter	P = <u>5.50</u> ft
Hydraulic Radius	R = <u>0.32</u> ft
Hydraulic Depth	D = <u>0.33</u> ft
Specific Energy	Es = <u>0.71</u> ft
Centroid of Flow Area	Yo = <u>0.22</u> ft
Specific Force	Fs = <u>0.04</u> kip

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: **Daves Ex**
 Basin ID: **North Storm Drain CULVERT #1**
 Status: _____



Design Information (input):

Circular Culvert: Barrel Diameter in Inches
 Inlet Edge Type (choose from pull-down list)

D = inches
 Square End Projection

OR:

Box Culvert: Barrel Height (Rise) in Feet
 Barrel Width (Span) in Feet
 Inlet Edge Type (choose from pull-down list)

Height (Rise) = ft.
 Width (Span) = ft.
 Square Edge w/ 90-15 Deg. Headwall

Number of Barrels
 Inlet Elevation at Culvert Invert
 Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)
 Culvert Length in Feet
 Manning's Roughness
 Bend Loss Coefficient
 Exit Loss Coefficient

No =
 Inlet Elev = ft. elev.
 Outlet Elev = ft. elev.
 L = ft.
 n =
 K_b =
 K_x =

Design Information (calculated):

Entrance Loss Coefficient
 Friction Loss Coefficient
 Sum of All Loss Coefficients
 Orifice Inlet Condition Coefficient
 Minimum Energy Condition Coefficient

K_e =
 K_f =
 K_s =
 C_d =
 K_{E_{low}} =

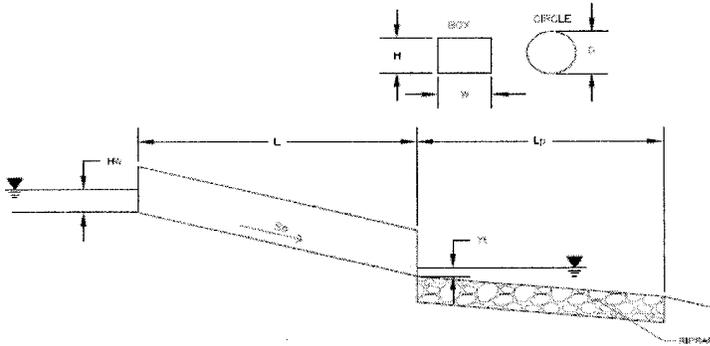
Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
31.00	29.00	16.70	11.26	11.26	Regression Eqn.	OUTLET
31.25	29.00	18.50	11.94	11.94	Regression Eqn.	OUTLET
31.50	29.00	20.10	12.57	12.57	Regression Eqn.	OUTLET
31.75	29.00	21.60	13.20	13.20	Regression Eqn.	OUTLET
32.00	29.00	23.10	13.78	13.78	Regression Eqn.	OUTLET
32.25	29.00	24.40	14.36	14.36	Regression Eqn.	OUTLET
32.50	29.00	25.60	14.89	14.89	Regression Eqn.	OUTLET
32.75	29.00	26.80	15.41	15.41	Regression Eqn.	OUTLET
33.00	29.00	27.90	15.94	15.94	Regression Eqn.	OUTLET
33.25	29.00	29.00	16.41	16.41	Regression Eqn.	OUTLET
33.50	29.00	30.00	16.89	16.89	Regression Eqn.	OUTLET
33.75	29.00	31.00	17.36	17.36	Regression Eqn.	OUTLET
34.00	29.00	32.00	17.78	17.78	Regression Eqn.	OUTLET
34.25	29.00	32.90	18.25	18.25	Regression Eqn.	OUTLET
34.50	29.00	33.80	18.67	18.67	Regression Eqn.	OUTLET
34.75	29.00	34.70	19.09	19.09	Orifice Eqn.	OUTLET
35.00	29.00	35.50	19.52	19.52	Orifice Eqn.	OUTLET
35.25		36.30	19.88	19.88	Orifice Eqn.	OUTLET
35.50		37.10	20.30	20.30	Orifice Eqn.	OUTLET
35.75		37.80	20.67	20.67	Orifice Eqn.	OUTLET
36.00		38.60	21.04	21.04	Orifice Eqn.	OUTLET
36.25		39.30	21.41	21.41	Orifice Eqn.	OUTLET
36.50		40.00	21.78	21.78	Orifice Eqn.	OUTLET
36.75		40.80	22.15	22.15	Orifice Eqn.	OUTLET
37.00		41.40	22.51	22.51	Orifice Eqn.	OUTLET
37.25		42.10	22.83	22.83	Orifice Eqn.	OUTLET
37.50		42.80	23.20	23.20	Orifice Eqn.	OUTLET
37.75		43.50	23.51	23.51	Orifice Eqn.	OUTLET
38.00		44.10	23.88	23.88	Orifice Eqn.	OUTLET
38.25		44.80	24.20	24.20	Orifice Eqn.	OUTLET

Processing Time: 00.38 Seconds

Determination of Culvert Headwater and Outlet Protection

Project: **DAVES EX**
 Basin ID: **CULVERT #1**



Soil Type:
 Choose One:
 Sandy
 Non-Sandy

Design Information (Input):

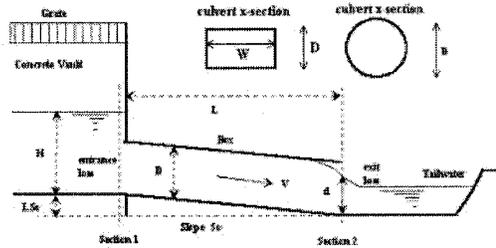
Design Discharge	Q =	<input type="text" value="11.62"/>	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	<input type="text" value="24"/>	inches
Inlet Edge Type (Choose from pull-down list)	Square End Projection	<input type="text"/>	
Box Culvert:			
Barrel Height (Rise) in Feet	Height (Rise) =	<input type="text"/>	ft
Barrel Width (Span) in Feet	Width (Span) =	<input type="text"/>	ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	No =	<input type="text" value="1"/>	
Inlet Elevation	Elev IN =	<input type="text" value="28.5"/>	ft
Outlet Elevation <u>OR</u> Slope	Elev OUT =	<input type="text" value="26.9"/>	ft
Culvert Length	L =	<input type="text" value="814"/>	ft
Manning's Roughness	n =	<input type="text" value="0.012"/>	
Bend Loss Coefficient	k_b =	<input type="text" value="0"/>	
Exit Loss Coefficient	k_x =	<input type="text" value="1"/>	
Tailwater Surface Elevation	Elev Y_t =	<input type="text"/>	ft
Max Allowable Channel Velocity	V =	<input type="text" value="7"/>	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	<input type="text" value="0.80"/>	ft
Flow Area at Max Channel Velocity	A_t =	<input type="text" value="1.66"/>	ft ²
Culvert Cross Sectional Area Available	A =	<input type="text" value="3.14"/>	ft ²
Entrance Loss Coefficient	k_e =	<input type="text" value="0.50"/>	
Friction Loss Coefficient	k_f =	<input type="text" value="8.57"/>	
Sum of All Losses Coefficients	k_s =	<input type="text" value="10.07"/>	
Culvert Normal Depth	Y_n =	<input type="text" value="1.80"/>	ft
Culvert Critical Depth	Y_c =	<input type="text" value="1.22"/>	ft
Tailwater Depth for Design	d =	<input type="text" value="1.61"/>	ft
Adjusted Diameter <u>OR</u> Adjusted Rise	U_a =	<input type="text" value="-"/>	ft
Expansion Factor	$1/(2*\tan(\theta))$ =	<input type="text" value="5.70"/>	
Flow/Diameter ^{2.5} <u>OR</u> Flow/(Span * Rise ^{1.5})	Q/D ^{2.5} =	<input type="text" value="2.05"/>	ft ^{0.2} /s
Froude Number	Fr =	<input type="text" value="0.43"/>	
Tailwater/Adjusted Diameter <u>OR</u> Tailwater/Adjusted Rise	Y _t /D =	<input type="text" value="0.40"/>	
Inlet Control Headwater	HW _i =	<input type="text" value="1.89"/>	ft
Outlet Control Headwater	HW _o =	<input type="text" value="2.15"/>	ft
Design Headwater Elevation	HW =	<input type="text" value="30.65"/>	ft
Headwater/Diameter <u>OR</u> Headwater/Rise Ratio	HW/D =	<input type="text" value="1.08"/>	
Minimum Theoretical Riprap Size	d_{50} =	<input type="text" value="3"/>	in
Nominal Riprap Size	d_{50} =	<input type="text" value="6"/>	in
UDFCD Riprap Type	Type =	<input type="text" value="VL"/>	
Length of Protection	L_p =	<input type="text" value="6"/>	ft
Width of Protection	T =	<input type="text" value="4"/>	ft

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: **Daves Ex**
 Basin ID: **Middle Storm Drain culvert #2 18" SECTION**
 Status:



Design Information (Input):

Circular Culvert: Barrel Diameter in Inches
 Inlet Edge Type (choose from pull-down list)

OR:

Box Culvert: Barrel Height (Rise) in Feet
 Barrel Width (Span) in Feet
 Inlet Edge Type (choose from pull-down list)

Number of Barrels
 Inlet Elevation at Culvert Invert
 Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)
 Culvert Length in Feet
 Manning's Roughness
 Bend Loss Coefficient
 Exit Loss Coefficient

D =	18	inches
Square End Projection		
Height (Rise) =		ft.
Width (Span) =		ft.
Square Edge w/ 90-15 Deg. Headwall		
No =	1	
Inlet Elev =	31.5	ft. elev.
Outlet Elev =	28	ft. elev.
L =	440	ft.
n =	0.012	
K _b =	0	
K _x =	1	

Design Information (calculated):

Entrance Loss Coefficient
 Friction Loss Coefficient
 Sum of All Loss Coefficients
 Orifice Inlet Condition Coefficient
 Minimum Energy Condition Coefficient

K _e =	0.50
K _f =	6.79
K _s =	8.29
C _d =	0.85
K _{E-low} =	0.0070

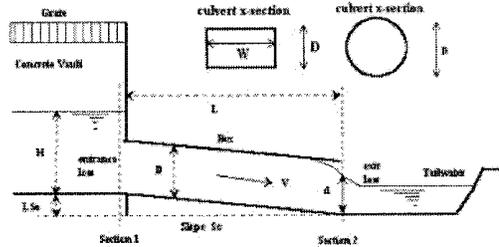
Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
34.00	30.00	10.80	9.90	9.90	Regression Eqn.	OUTLET
34.25	30.00	11.70	10.20	10.20	Regression Eqn.	OUTLET
34.50	30.00	12.50	10.45	10.45	Regression Eqn.	OUTLET
34.75	30.00	13.30	10.76	10.76	Regression Eqn.	OUTLET
35.00	30.00	14.00	11.01	11.01	Regression Eqn.	OUTLET
35.25	30.00	14.70	11.32	11.32	Regression Eqn.	OUTLET
35.50	30.00	15.30	11.57	11.57	Regression Eqn.	OUTLET
35.75	30.00	15.90	11.82	11.82	Regression Eqn.	OUTLET
36.00	30.00	16.50	12.08	12.08	Regression Eqn.	OUTLET
36.25		17.10	12.84	12.84	Orifice Eqn.	OUTLET
36.50		17.60	13.04	13.04	Orifice Eqn.	OUTLET
36.75		18.10	13.30	13.30	Orifice Eqn.	OUTLET
37.00		18.60	13.50	13.50	Orifice Eqn.	OUTLET
37.25		19.10	13.75	13.75	Orifice Eqn.	OUTLET
37.50		19.60	13.96	13.96	Orifice Eqn.	OUTLET
37.75		20.00	14.16	14.16	Orifice Eqn.	OUTLET
38.00		20.50	14.36	14.36	Orifice Eqn.	OUTLET
38.25		20.90	14.62	14.62	Orifice Eqn.	OUTLET
38.50		21.40	14.82	14.82	Orifice Eqn.	OUTLET
38.75		21.80	15.02	15.02	Orifice Eqn.	OUTLET
39.00		22.20	15.22	15.22	Orifice Eqn.	OUTLET
39.25		22.60	15.43	15.43	Orifice Eqn.	OUTLET
39.50		23.00	15.58	15.58	Orifice Eqn.	OUTLET
39.75		23.40	15.78	15.78	Orifice Eqn.	OUTLET
40.00		23.80	15.99	15.99	Orifice Eqn.	OUTLET
40.25		24.10	16.19	16.19	Orifice Eqn.	OUTLET
40.50		24.50	16.34	16.34	Orifice Eqn.	OUTLET
40.75		24.90	16.54	16.54	Orifice Eqn.	OUTLET
41.00		25.30	16.75	16.75	Orifice Eqn.	OUTLET
41.25		25.60	16.90	16.90	Orifice Eqn.	OUTLET

Processing Time: 00.38 Seconds

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: **Daves Ex**
 Basin ID: **CULVERT #2 24"**
 Status:



Design Information (Input):

Circular Culvert: Barrel Diameter in Inches
 Inlet Edge Type (choose from pull-down list)

OR:

Box Culvert: Barrel Height (Rise) in Feet
 Barrel Width (Span) in Feet
 Inlet Edge Type (choose from pull-down list)

Number of Barrels
 Inlet Elevation at Culvert Invert
 Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)
 Culvert Length in Feet
 Manning's Roughness
 Bend Loss Coefficient
 Exit Loss Coefficient

D =	24	inches
	Square End Projection	
Height (Rise) =		ft.
Width (Span) =		ft.
	Square Edge w/ 90-15 Deg. Headwall	
No =	1	
Inlet Elev =	27.2	ft. elev.
Outlet Elev =	27	ft. elev.
L =	44	ft.
n =	0.012	
K_b =	0	
K_e =	1	

Design Information (calculated):

Entrance Loss Coefficient
 Friction Loss Coefficient
 Sum of All Loss Coefficients
 Orifice Inlet Condition Coefficient
 Minimum Energy Condition Coefficient

K_b =	0.50
K_f =	0.46
K_e =	1.96
C_d =	0.85
KE_{low} =	0.1121

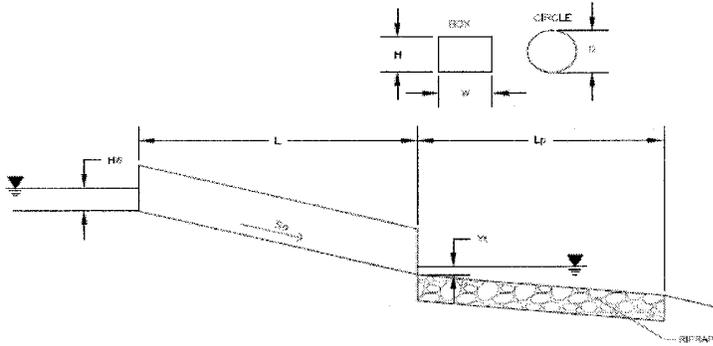
Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
33.25	30.00	34.00	32.47	32.47	Orifice Eqn.	OUTLET
33.50	30.00	34.80	33.71	33.71	Orifice Eqn.	OUTLET
33.75	30.00	35.70	34.86	34.86	Orifice Eqn.	OUTLET
34.00	30.00	36.50	36.02	36.02	Orifice Eqn.	OUTLET
34.25	30.00	37.20	37.18	37.18	Orifice Eqn.	OUTLET
34.50	30.00	38.00	38.25	38.00	Orifice Eqn.	INLET
34.75	30.00	38.70	39.24	38.70	Orifice Eqn.	INLET
35.00	30.00	39.50	40.32	39.50	Orifice Eqn.	INLET
35.25	30.00	40.20	41.31	40.20	Orifice Eqn.	INLET
35.50	30.00	40.90	42.22	40.90	Orifice Eqn.	INLET
35.75	30.00	41.60	43.21	41.60	Orifice Eqn.	INLET
36.00	30.00	42.30	44.12	42.30	Orifice Eqn.	INLET
36.25	30.00	42.90	45.03	42.90	Orifice Eqn.	INLET
36.50	30.00	43.60	45.93	43.60	Orifice Eqn.	INLET
36.75	30.00	44.20	46.76	44.20	Orifice Eqn.	INLET
37.00	30.00	44.90	47.67	44.90	Orifice Eqn.	INLET
37.25	30.00	45.50	48.50	45.50	Orifice Eqn.	INLET
37.50		46.10	52.54	46.10	Orifice Eqn.	INLET
37.75		46.80	53.29	46.80	Orifice Eqn.	INLET
38.00		47.40	54.03	47.40	Orifice Eqn.	INLET
38.25		48.00	54.77	48.00	Orifice Eqn.	INLET
38.50		48.60	55.52	48.60	Orifice Eqn.	INLET
38.75		49.10	56.26	49.10	Orifice Eqn.	INLET
39.00		49.70	56.92	49.70	Orifice Eqn.	INLET
39.25		50.30	57.67	50.30	Orifice Eqn.	INLET
39.50		50.90	58.33	50.90	Orifice Eqn.	INLET
39.75		51.40	59.07	51.40	Orifice Eqn.	INLET
40.00		52.00	59.73	52.00	Orifice Eqn.	INLET
40.25		52.50	60.39	52.50	Orifice Eqn.	INLET
40.50		53.10	61.05	53.10	Orifice Eqn.	INLET

Processing Time: 00.38 Seconds

Determination of Culvert Headwater and Outlet Protection

Project: **DAVES EX**
 Basin ID: **CULVERT #2 24"**



Soil Type:
 Choose One:
 Sandy
 Non-Sandy

Design Information (Input):

Design Discharge Q = cfs

Circular Culvert:
 Barrel Diameter in Inches D = inches
 Inlet Edge Type (Choose from pull-down list)

Box Culvert:
 Barrel Height (Rise) in Feet OR Height (Rise) = ft
 Barrel Width (Span) in Feet OR Width (Span) = ft
 Inlet Edge Type (Choose from pull-down list)

Number of Barrels No =
 Inlet Elevation Elev IN = ft
 Outlet Elevation OR Slope Elev OUT = ft
 Culvert Length L = ft
 Manning's Roughness n =
 Bend Loss Coefficient kb =
 Exit Loss Coefficient kv =
 Tailwater Surface Elevation Elev Y1 = ft
 Max Allowable Channel Velocity V = ft/s

Required Protection (Output):

Tailwater Surface Height Y1 = ft
 Flow Area at Max Channel Velocity At = ft²
 Culvert Cross Sectional Area Available A = ft²
 Entrance Loss Coefficient ke =
 Friction Loss Coefficient kf =
 Sum of All Losses Coefficients ks = ft
 Culvert Normal Depth Yn = ft
 Culvert Critical Depth Yc = ft

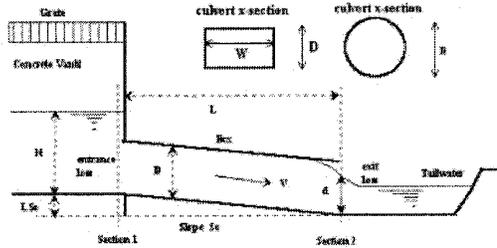
Tailwater Depth for Design d = ft
 Adjusted Diameter OR Adjusted Rise Ua = ft
 Expansion Factor 1/(2*tan(θ)) =
 Flow/Diameter^{2.5} OR Flow/(Span * Rise^{1.5}) Q/D^{2.5} = ft^{0.5}/s
 Froude Number Fr =
 Tailwater/Adjusted Diameter OR Tailwater/Adjusted Rise Y1/D =

Inlet Control Headwater HW1 = ft
 Outlet Control Headwater HW0 = ft
 Design Headwater Elevation HW = ft
 Headwater/Diameter OR Headwater/Rise Ratio HW/D =

Minimum Theoretical Riprap Size d50 = in
 Nominal Riprap Size d50 = in
 UDFCD Riprap Type Type =
 Length of Protection Lp = ft
 Width of Protection T = ft

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: **Daves Ex**
 Basin ID: **South Storm Drain (CULVERT #3)**
 Status: _____



Design Information (Input):

Circular Culvert: Barrel Diameter in Inches
 Inlet Edge Type (choose from pull-down list)

D = inches
 Square End Projection

OR:

Box Culvert: Barrel Height (Rise) in Feet
 Barrel Width (Span) in Feet
 Inlet Edge Type (choose from pull-down list)

Height (Rise) = ft.
 Width (Span) = ft.
 Square Edge w/ 90-15 Deg. Headwall

Number of Barrels
 Inlet Elevation at Culvert Invert
 Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)
 Culvert Length in Feet
 Manning's Roughness
 Bend Loss Coefficient
 Exit Loss Coefficient

No =
 Inlet Elev = ft. elev.
 Outlet Elev = ft. elev.
 L = ft.
 n =
 K_b =
 K_e =

Design Information (calculated):

Entrance Loss Coefficient
 Friction Loss Coefficient
 Sum of All Loss Coefficients
 Orifice Inlet Condition Coefficient
 Minimum Energy Condition Coefficient

K_e =
 K_f =
 K_o =
 C_d =
 K_{E,low} =

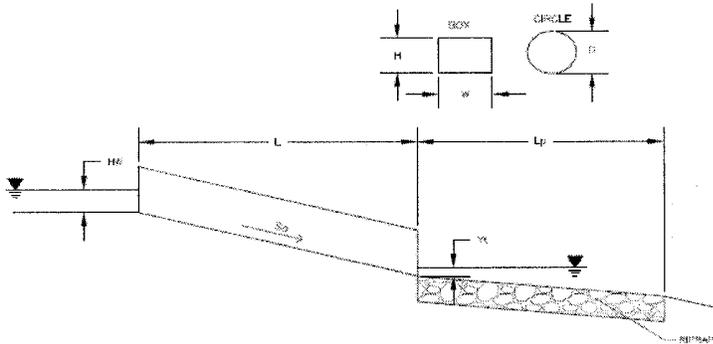
Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
31.50	29.00	9.60	13.35	9.60	Regression Eqn.	INLET
31.75	29.00	11.80	13.97	11.80	Regression Eqn.	INLET
32.00	29.00	14.00	14.60	14.00	Regression Eqn.	INLET
32.25	29.00	16.00	15.22	15.22	Regression Eqn.	OUTLET
32.50	29.00	17.80	15.76	15.76	Regression Eqn.	OUTLET
32.75	29.00	19.50	16.30	16.30	Regression Eqn.	OUTLET
33.00	29.00	21.10	16.85	16.85	Regression Eqn.	OUTLET
33.25	29.00	22.50	17.39	17.39	Regression Eqn.	OUTLET
33.50	29.00	23.90	17.93	17.93	Regression Eqn.	OUTLET
33.75	29.00	25.10	18.40	18.40	Regression Eqn.	OUTLET
34.00	29.00	26.30	18.87	18.87	Regression Eqn.	OUTLET
34.25	29.00	27.50	19.33	19.33	Regression Eqn.	OUTLET
34.50	29.00	28.60	19.80	19.80	Regression Eqn.	OUTLET
34.75	29.00	29.60	20.19	20.19	Regression Eqn.	OUTLET
35.00	29.00	30.60	20.65	20.65	Regression Eqn.	OUTLET
35.25	29.00	31.60	21.12	21.12	Regression Eqn.	OUTLET
35.50	29.00	32.50	21.51	21.51	Regression Eqn.	OUTLET
35.75	29.00	33.40	21.89	21.89	Regression Eqn.	OUTLET
36.00	29.00	34.40	22.28	22.28	Orifice Eqn.	OUTLET
36.25		35.20	22.67	22.67	Orifice Eqn.	OUTLET
36.50		36.00	23.06	23.06	Orifice Eqn.	OUTLET
36.75		36.80	23.45	23.45	Orifice Eqn.	OUTLET
37.00		37.50	23.83	23.83	Orifice Eqn.	OUTLET
37.25		38.30	24.22	24.22	Orifice Eqn.	OUTLET
37.50		39.00	24.61	24.61	Orifice Eqn.	OUTLET
37.75		39.80	24.92	24.92	Orifice Eqn.	OUTLET
38.00		40.50	25.31	25.31	Orifice Eqn.	OUTLET
38.25		41.20	25.62	25.62	Orifice Eqn.	OUTLET
38.50		41.90	26.01	26.01	Orifice Eqn.	OUTLET
38.75		42.50	26.32	26.32	Orifice Eqn.	OUTLET

Processing Time: 00.33 Seconds

Determination of Culvert Headwater and Outlet Protection

Project: **DAVES EX**
 Basin ID: **CULVERT #3**



Soil Type:
 Choose One:
 Sandy
 Non-Sandy

Design Information (Input):

Design Discharge Q = cfs

Circular Culvert:
 Barrel Diameter in Inches D = inches
 Inlet Edge Type (Choose from pull-down list)

Box Culvert:
 Barrel Height (Rise) in Feet Height (Rise) = ft
 Barrel Width (Span) in Feet Width (Span) = ft
 Inlet Edge Type (Choose from pull-down list)

Number of Barrels No =
 Inlet Elevation Elev IN = ft
 Outlet Elevation OR Slope Elev OUT = ft
 Culvert Length L = ft
 Manning's Roughness n =
 Bend Loss Coefficient k_b =
 Exit Loss Coefficient k_x =
 Tailwater Surface Elevation Elev Y_t = ft
 Max Allowable Channel Velocity V = ft/s

Required Protection (Output):

Tailwater Surface Height Y_t = ft
 Flow Area at Max Channel Velocity A_t = ft²
 Culvert Cross Sectional Area Available A = ft²
 Entrance Loss Coefficient k_e =
 Friction Loss Coefficient k_f =
 Sum of All Losses Coefficients k_s = ft
 Culvert Normal Depth Y_n = ft
 Culvert Critical Depth Y_c = ft

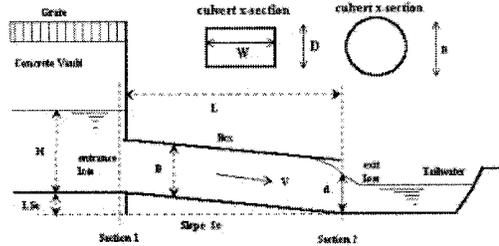
Tailwater Depth for Design d = ft
 Adjusted Diameter OR Adjusted Rise U_a = ft
 Expansion Factor $1/(2*\tan(\theta))$ =
 Flow/Diameter^{2.5} OR Flow/(Span * Rise^{1.5}) $Q/D^{2.5}$ = ft^{0.2}/s
 Froude Number Fr =
 Tailwater/Adjusted Diameter OR Tailwater/Adjusted Rise Y_t/D =

Inlet Control Headwater HW_i = ft
 Outlet Control Headwater HW_o = ft
 Design Headwater Elevation HW = ft
 Headwater/Diameter OR Headwater/Rise Ratio HW/D =

Minimum Theoretical Riprap Size d_{50} = in
 Nominal Riprap Size d_{90} = in
 UDFCD Riprap Type Type =
 Length of Protection L_p = ft
 Width of Protection T = ft

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: **Daves Ex**
 Basin ID: **West Culvert (#4)**
 Status: _____



Design Information (Input):

Circular Culvert: Barrel Diameter in Inches
 Inlet Edge Type (choose from pull-down list)

$D = 15$ inches

Square End Projection

OR:

Box Culvert: Barrel Height (Rise) in Feet
 Barrel Width (Span) in Feet
 Inlet Edge Type (choose from pull-down list)

Height (Rise) = _____ ft.

Width (Span) = _____ ft.

Square Edge w/ 90-15 Deg. Headwall

Number of Barrels
 Inlet Elevation at Culvert Invert
 Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)
 Culvert Length in Feet
 Manning's Roughness
 Bend Loss Coefficient
 Exit Loss Coefficient

$N_b = 1$

Inlet Elev = 29 ft. elev.

Outlet Elev = 28.8 ft. elev.

$L = 52$ ft.

$n = 0.012$

$K_b = 0$

$K_x = 1$

Design Information (calculated):

Entrance Loss Coefficient
 Friction Loss Coefficient
 Sum of All Loss Coefficients
 Orifice Inlet Condition Coefficient
 Minimum Energy Condition Coefficient

$K_e = 0.50$

$K_f = 1.02$

$K_{\Sigma} = 2.52$

$C_d = 0.85$

$KE_{low} = 0.0560$

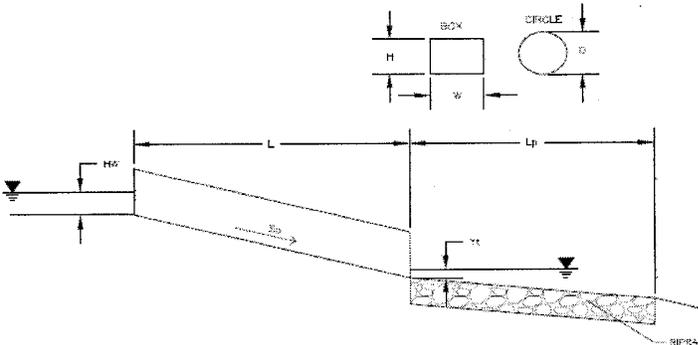
Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate (output) cfs	Inlet Equation Used:	Flow Control Used
29.00	30.00	0.00	0.00	0.00	No Flow (WS < inlet)	N/A
29.25	30.00	0.30	0.00	0.00	Min. Energy Eqn.	N/A
29.50	30.00	0.90	0.00	0.00	Min. Energy Eqn.	N/A
29.75	30.00	1.80	0.00	0.00	Regression Eqn.	N/A
30.00	30.00	2.80	0.00	0.00	Regression Eqn.	N/A
30.25	30.00	4.00	3.10	3.10	Regression Eqn.	OUTLET
30.50	30.00	5.00	4.25	4.25	Regression Eqn.	OUTLET
30.75	30.00	5.90	5.23	5.23	Regression Eqn.	OUTLET
31.00	30.00	6.60	6.05	6.05	Regression Eqn.	OUTLET
31.25	30.00	7.30	6.79	6.79	Regression Eqn.	OUTLET
31.50	30.00	7.90	7.46	7.46	Regression Eqn.	OUTLET
31.75	30.00	8.50	8.09	8.09	Regression Eqn.	OUTLET
32.00	30.00	9.10	8.66	8.66	Regression Eqn.	OUTLET
32.25	30.00	9.60	9.20	9.20	Regression Eqn.	OUTLET
32.50	30.00	10.00	9.72	9.72	Regression Eqn.	OUTLET
32.75	30.00	10.50	10.20	10.20	Regression Eqn.	OUTLET
33.00	30.00	11.00	10.65	10.65	Orifice Eqn.	OUTLET
33.25	30.00	11.40	11.11	11.11	Orifice Eqn.	OUTLET
33.50	30.00	11.70	11.52	11.52	Orifice Eqn.	OUTLET
33.75	30.00	12.10	11.94	11.94	Orifice Eqn.	OUTLET
34.00	30.00	12.50	12.33	12.33	Orifice Eqn.	OUTLET
34.25		12.80	12.72	12.72	Orifice Eqn.	OUTLET
34.50		13.20	13.09	13.09	Orifice Eqn.	OUTLET
34.75		13.50	13.45	13.45	Orifice Eqn.	OUTLET
35.00		13.80	13.80	13.80	Orifice Eqn.	INLET
35.25		14.10	14.15	14.10	Orifice Eqn.	INLET
35.50		14.40	14.47	14.40	Orifice Eqn.	INLET
35.75		14.70	14.82	14.70	Orifice Eqn.	INLET
36.00		15.00	15.13	15.00	Orifice Eqn.	INLET
36.25		15.30	15.45	15.30	Orifice Eqn.	INLET

Processing Time: 00.45 Seconds

Determination of Culvert Headwater and Outlet Protection

Project: **DAVES EX**
 Basin ID: **CULVERT #4**



Soil Type:
 Choose One:

- Sandy
 Non-Sandy

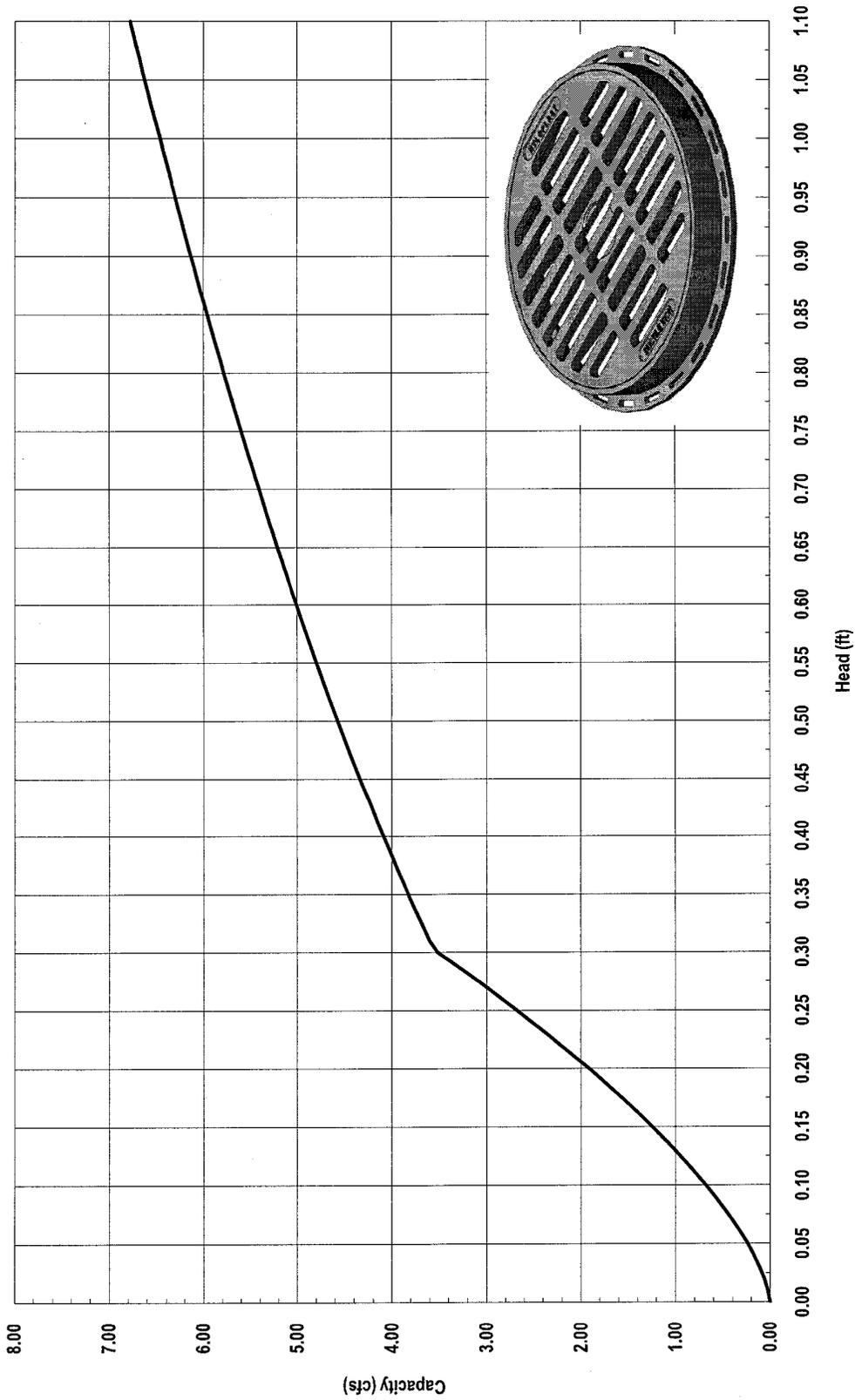
Design Information (Input):

Design Discharge	Q =	<input type="text" value="3.63"/>	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	<input type="text" value="15"/>	inches
Inlet Edge Type (Choose from pull-down list)		<input type="text" value="Square End Projection"/>	
Box Culvert:			
Barrel Height (Rise) in Feet	Height (Rise) =	<input type="text"/>	ft
Barrel Width (Span) in Feet	Width (Span) =	<input type="text"/>	ft
Inlet Edge Type (Choose from pull-down list)		<input type="text"/>	
Number of Barrels	No =	<input type="text" value="1"/>	
Inlet Elevation	Elev IN =	<input type="text" value="29"/>	ft
Outlet Elevation <u>OR</u> Slope	Elev OUT =	<input type="text" value="28.8"/>	ft
Culvert Length	L =	<input type="text" value="50"/>	ft
Manning's Roughness	n =	<input type="text" value="0.012"/>	
Bend Loss Coefficient	k _b =	<input type="text" value="0"/>	
Exit Loss Coefficient	k _x =	<input type="text" value="1"/>	
Tailwater Surface Elevation	Elev Y _t =	<input type="text"/>	ft
Max Allowable Channel Velocity	V =	<input type="text" value="7"/>	ft/s

Required Protection (Output):

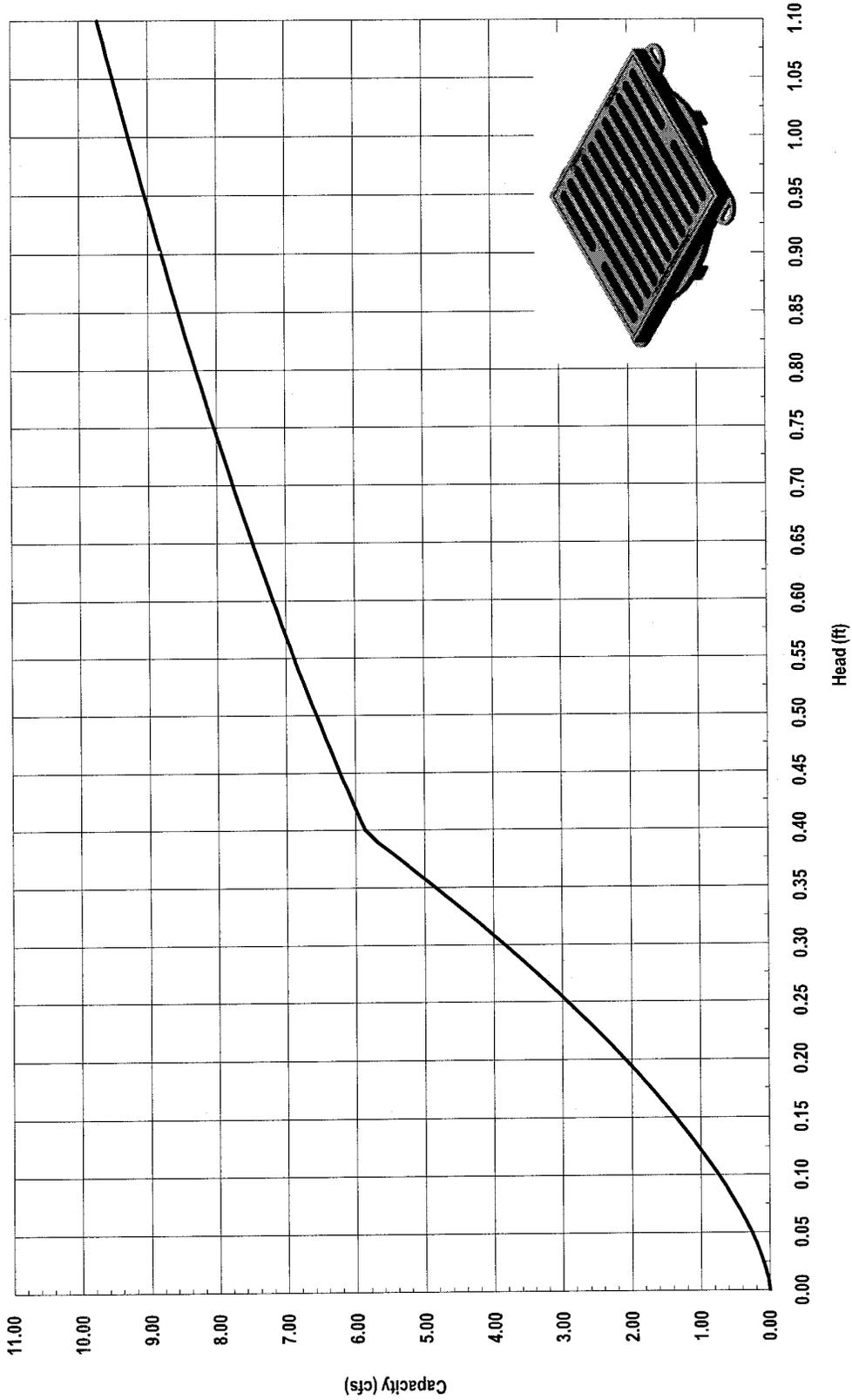
Tailwater Surface Height	Y _t =	<input type="text" value="0.50"/>	ft
Flow Area at Max Channel Velocity	A _v =	<input type="text" value="0.52"/>	ft ²
Culvert Cross Sectional Area Available	A =	<input type="text" value="1.23"/>	ft ²
Entrance Loss Coefficient	k _e =	<input type="text" value="0.50"/>	
Friction Loss Coefficient	k _f =	<input type="text" value="0.98"/>	
Sum of All Losses Coefficients	k _s =	<input type="text" value="2.48"/>	ft
Culvert Normal Depth	Y _n =	<input type="text" value="0.86"/>	ft
Culvert Critical Depth	Y _c =	<input type="text" value="0.77"/>	ft
Tailwater Depth for Design	d =	<input type="text" value="1.01"/>	ft
Adjusted Diameter <u>OR</u> Adjusted Rise	U _a =	<input type="text" value="-"/>	ft
Expansion Factor	1/(2*tan(θ)) =	<input type="text" value="5.66"/>	
Flow/Diameter ^{2.5} <u>OR</u> Flow/(Span * Rise ^{1.5})	Q/D ^{2.5} =	<input type="text" value="2.08"/>	ft ^{0.75} /s
Froude Number	Fr =	<input type="text" value="0.81"/>	
Tailwater/Adjusted Diameter <u>OR</u> Tailwater/Adjusted Rise	Y/D =	<input type="text" value="0.40"/>	
Inlet Control Headwater	HW _i =	<input type="text" value="1.19"/>	ft
Outlet Control Headwater	HW _o =	<input type="text" value="1.15"/>	ft
Design Headwater Elevation	HW =	<input type="text" value="30.19"/>	ft
Headwater/Diameter <u>OR</u> Headwater/Rise Ratio	HW/D =	<input type="text" value="0.95"/>	
Minimum Theoretical Riprap Size	d ₅₀ =	<input type="text" value="2"/>	in
Nominal Riprap Size	d ₅₀ =	<input type="text" value="6"/>	in
UDFCD Riprap Type	Type =	<input type="text" value="VL"/>	
Length of Protection	L _p =	<input type="text" value="4"/>	ft
Width of Protection	T =	<input type="text" value="2"/>	ft

Nyloplast 24" Standard Grate Inlet Capacity Chart




Nyloplast
 3130 Verona Avenue • Buford, GA 30518
 (866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490
 © Nyloplast Inlet Capacity Charts June 2012

Nyloplast 2' x 2' Road & Highway Grate Inlet Capacity Chart




Nyloplast
 3130 Verona Avenue • Buford, GA 30518
 (866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490
 © Nyloplast Inlet Capacity Charts June 2012

Total Site and Sub-Basin Weighted Imperviousness Calculations

ENTIRE SITE	AREAS	C VALUE	CXA	I VALUE	I X A
Proposed Building Area	12902	0.9	11611.8	90	1161180
CONCRETE/ASPHALT	29292	0.93	27241.56	100	2929200
GRAVEL	306668	0.65	199334.2	40	12266720
LANDSCAPE	87201	0.3	26160.3	2	174402
TOTAL	436063		264347.9		16531502
ACRES	10.01				
COMPC =			0.61	=	37.91

RETENTION VOLUME WORKSHEET

TIME minutes	INT(100)	Q(CFS)	STORM VOL	RELEASE VOL	NET VOL.
1440	0.26	1.58	136180.10	0.00	136,180.10
USE					

Urban Drainage Manual recommends Retention pond sizing for 1.5 times 100-yr 24 hr event

204,270.15 c.f. required

C(100) 0.61
 ACRES 10.00
 C*A 6.06

CONTOUR ELEVATIONS	AREA	DEPTH	AVG AREA	Volume Provided
25	21613	1	22914	22914
26	24215	1	25580.5	25580.5
27	26946	1	28374.5	28374.5
28	29803	1	31296.5	31296.5
29	32790	1	34592	34592
30	36394	1	41283.5	41283.5
31	46173	0.5	47444.5	23722.25
31.5	48716			
TOTAL OF			207763.25	C.F. PROVIDED

MAP SCALE 1" = 1000'

0 1000 2000 FEET

0 1000 2000 METERS

NFLIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2115E

FIRM

FLOOD INSURANCE RATE MAP

WELD COUNTY,

COLORADO

AND INCORPORATED AREAS

PANEL 2115 OF 2250
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT LUPTON, CITY OF	080183	2115	E
WELD COUNTY	080266	2115	E

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

MAP NUMBER
08123C2115E

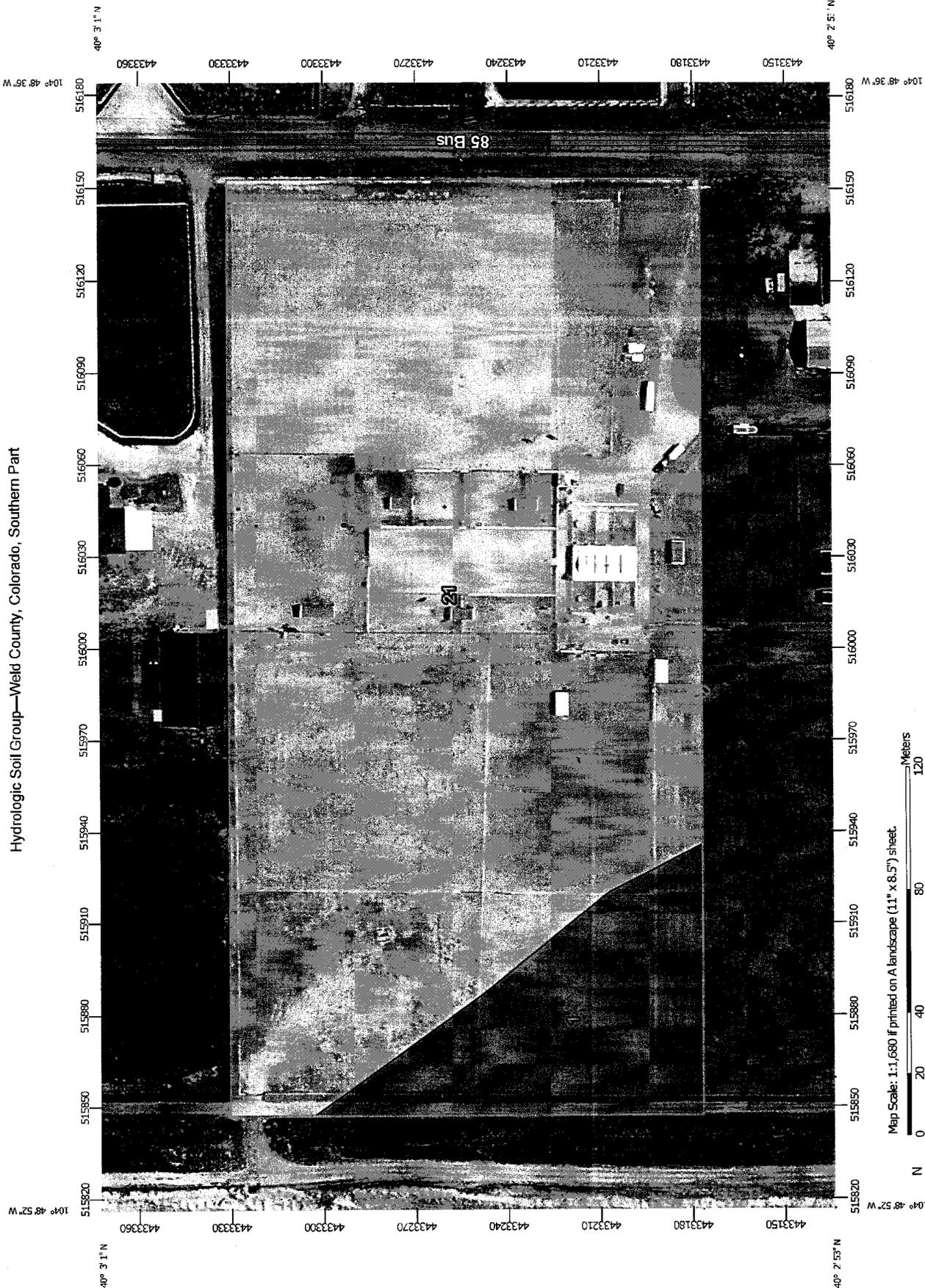
EFFECTIVE DATE
JANUARY 20, 2016

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



Hydrologic Soil Group—Weld County, Colorado, Southern Part



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

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



47

MAP INFORMATION

MAP LEGEND

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: <http://websoilsurvey.nrcs.usda.gov>
 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: Weld County, Colorado, Southern Part
 Survey Area Data: Version 14, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 13, 2012

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.

Area of Interest (AOI)	<input type="checkbox"/> C
Area of Interest (AOI)	<input type="checkbox"/> C/D
	<input type="checkbox"/> D
Soils	<input type="checkbox"/> Not rated or not available
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	
Water Features	
Streams and Canals	
Transportation	
Rails	
Interstate Highways	
US Routes	
Major Roads	
Local Roads	
Background	
Aerial Photography	

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Weld County, Colorado, Southern Part (CO618)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Altvan loam, 0 to 1 percent slopes	B	1.5	12.5%
21	Dacono clay loam, 0 to 1 percent slopes	C	10.2	87.5%
Totals for Area of Interest			11.7	100.0%

Description

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

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

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

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

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

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

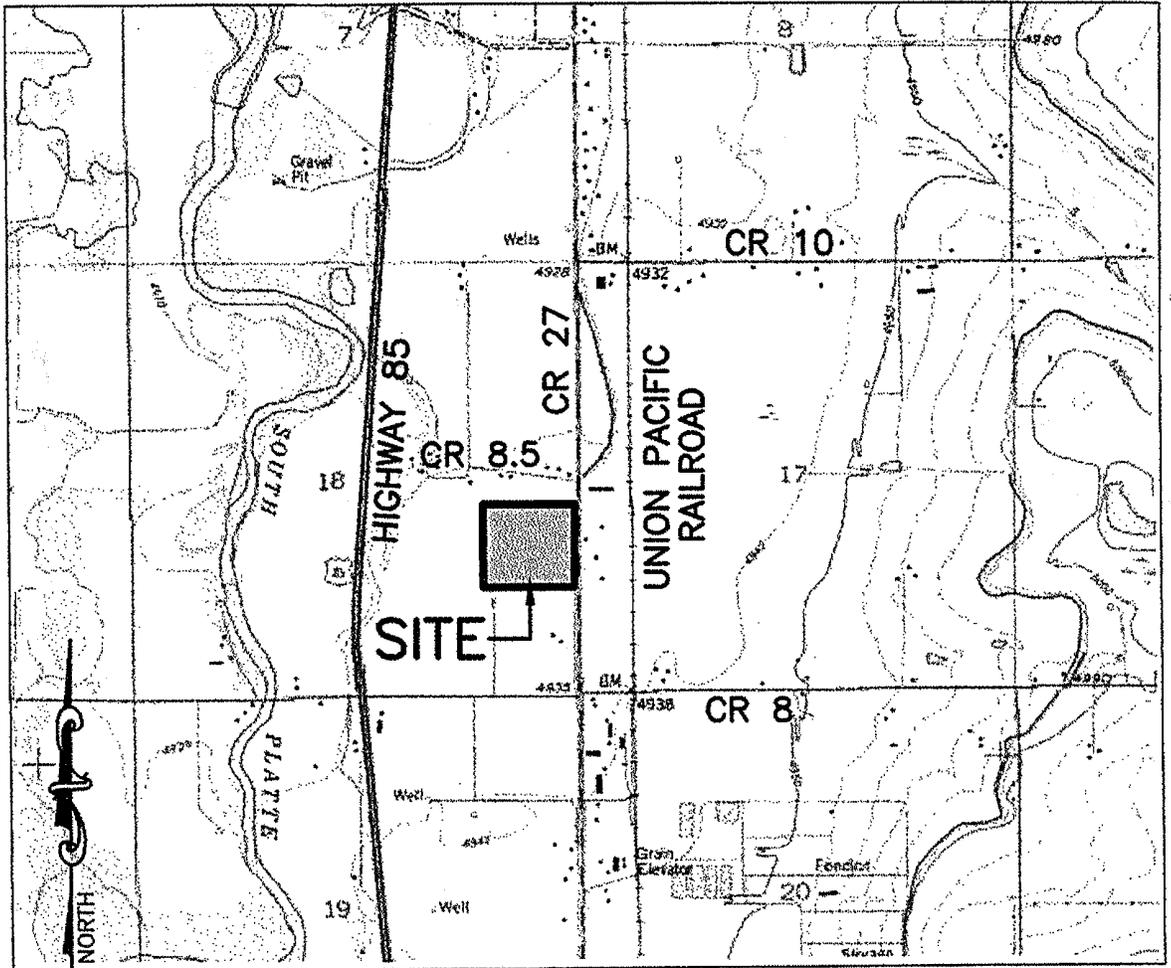
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

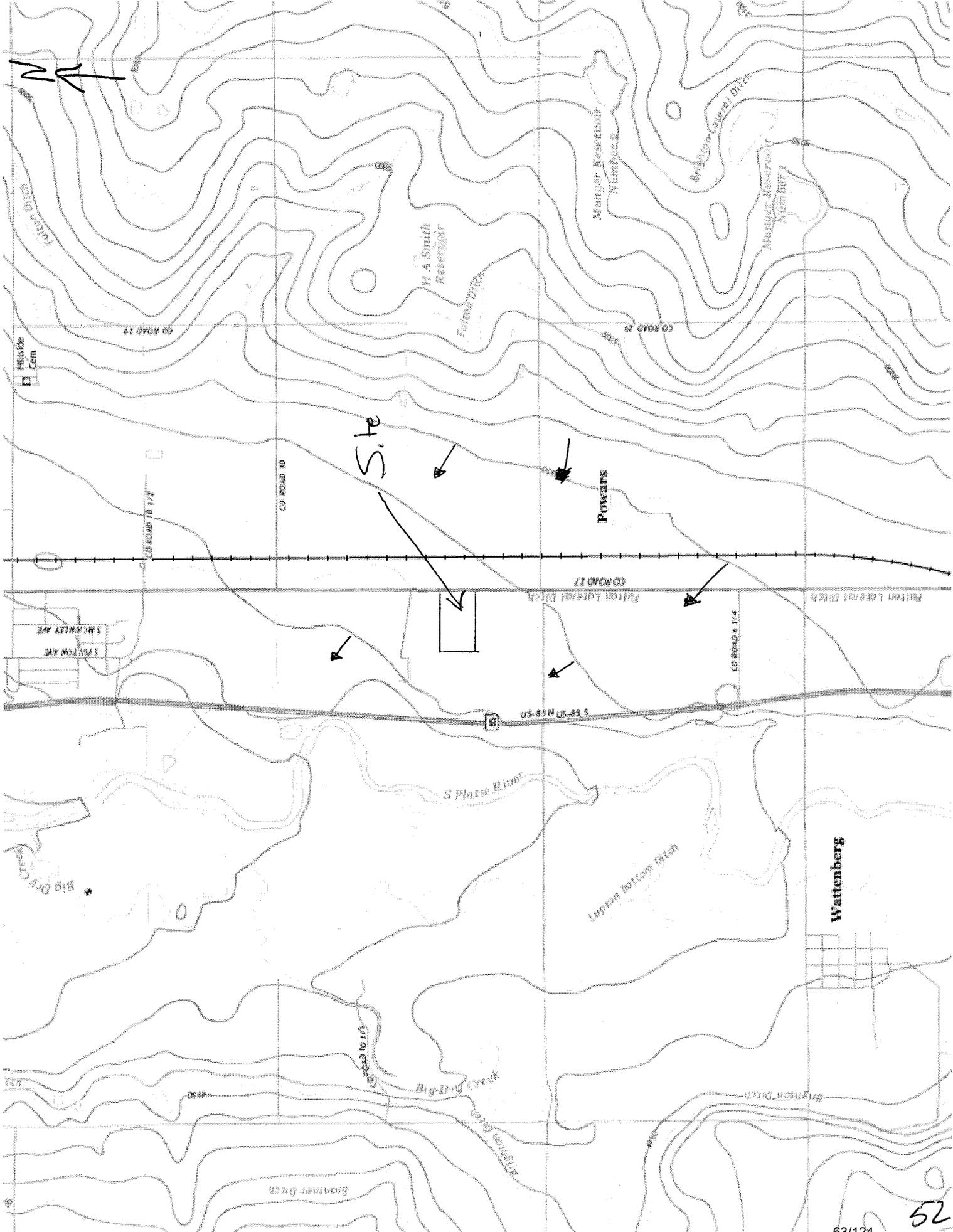
Component Percent Cutoff: None Specified

Tie-break Rule: Higher



VICINITY MAP

SCALE: 1" = 2000'



Site

POWERS

Wattenberg

S Platte River

Big Dry Creek

Lujan Bottom Ditch

REFERENCES

Urban Storm Drainage Criteria Manual, Volumes 1, 2 and 3 (June 2001 and November 2010, Urban Drainage and Flood Control District, Denver, Colorado)

STANDARD FORM SF-1

CHECKLIST

Item	Description	Received or not applicable	To Be Submitted
1.	Typed, Bound Report		
2.	Professional Engineers Certificate		
	Standard Statement 1		
	Standard Statement 2		
	Standard Form 2		
	Standard Form 3		
3.	General Location and Description		
A.	Location Map		
B.	Existing Site Description		
C.	Description of Existing Drainage Patterns and Facilities		
4.	Drainage Basins and Sub-Basins		
A.	Major Basin Description		
B.	Sub-Basin Description		
5.	Design Criteria		
A.	Development Master Plan Discussion		
B.	Hydrologic Criteria Discussion		
C.	Hydraulic Criteria Discussion		
6.	Drainage Facility Design		
A.	Discussion of Proposed Facilities		
B.	Discussion of Drainage Patterns		
C.	Impact on Offsite Facilities		
D.	Impact on Master Plan		
7.	Drainage Plan		
A.	Topographic Contours		
B.	ROW and Easements		
C.	Delineation of Basin and Sub-Basins		
D.	Existing Drainage Patterns & Facilities		
E.	Proposed Drainage Patterns & Facilities		
F.	Proposed Outfall Points		
G.	Routing of Offsite Drainage		
H.	Routing from Site to Major Drainageway		
I.			
J.			
K.			

Standard Statement 1

"I hereby affirm that this report and plan for the Phase ___ drainage design of the development, Dave Hunts, New Facility, was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Fort Lupton Storm Drainage Design and Technical Criteria for the owners thereof. I understand that the City of Fort Lupton does not and will not assume liability for drainage facilities designed by others. I am also aware of the provisions of the City CODE as it pertains to the City's review."

Registered Professional Engineer
State of Colorado No. 33371
(Affix Seal)

Standard Statement 2

_____ hereby affirms that the drainage facilities for the development, _____, shall be constructed according to the design presented in this report. I understand that the City of Fort Lupton does not and will not assume liability for drainage facilities designed and/or certified by my engineer. I understand that the City of Fort Lupton reviews drainage plans but cannot, on behalf of (Name of Developer) and/or their successors and/or assigns assume future liability for improper design. I am also aware of the provisions of the City CODE as it pertains to the City's review."

Name of Developer/Owner

Authorized Signature/Title

STANDARD FORM SF-2

DRAINAGE AGREEMENT DOCUMENT

_____, the owner of the property commonly known as _____, and _____, the owner of property commonly known as _____, do hereby covenant and agree, on with the other that:

WHEREAS, the development known as _____ has developed land from its natural state which may cause alteration of that land's natural drainage; and

WHEREAS, _____ has reviewed the Preliminary Drainage Study for _____ and concurs with the content, concept, and design details presented therein; and

WHEREAS, the drainage from _____ will flow onto the _____ property in a manner and quantity probably different from natural drainage flow, and _____ is the owner of drainage facilities downstream from _____; and

WHEREAS, the City of Fort Lupton requires alternately detention and release of drainage at historical flows, or acceptance of drainage by the downstream property owner, and holding the City harmless from claims resulting from drainage.

NOW, THEREFORE, in consideration of the sum of Ten Dollars (\$10.00), the mutual benefit of the parties, and other good and valuable consideration, the parties agree as follows:

1. That _____ does hereby accept and grant to _____, the right to release all drainage caused by said development, onto and across the property of _____, in accordance with the drainage study done by _____ and concurred in by _____.
2. _____ shall have the right to use the easement premises in any manner that will not prevent the exercise of the rights granted to _____, and _____ shall have the right to grant other non-exclusive easements over, along, or upon the easement premises, provided, however, that any such other easements shall be subject to the rights granted hereby;
3. That neither _____ nor _____ shall have any right or recourse against the City of Fort Lupton on account of any matter arising out of the subject drainage or the rights granted hereunder.
4. Grantor _____ hereby reserves the right to modify and change the location of the drainage easement premises providing that such relocated

easement shall be of appropriate character and subject to the same uses herein established and equally suitable for the drainage purposes created herein.

5. All rights, title, and privilege herein granted, including all benefits and burdens, shall run with the land and inure to the benefit of the parties and beneficiaries hereto, including the City of Fort Lupton, their respective heirs, executors, administrators, successors, assigns, and legal representatives.

IN WITNESS WHEREOF, the parties hereto have executed or have caused this instrument to be executed by their proper officers duly authorized to create the same.

By: _____

By: _____

ATTEST:

STANDARD FORM SF-3

INDEMNIFICATION STATEMENT

I am the Owner of _____, and as such am preparing to begin construction _____.

I hereby promise to indemnify and hold harmless the City of Fort Lupton for any liability the City may have on account of any change in the nature, direction, quantity, or quality of historical drainage flow resulting from the development of my property or from the construction of streets or storm sewers therein. In addition, I promise to reimburse the City for any and all costs including, but not limited to, attorney's fees, which the City incurs in acquiring or condemning any rights-of-way or easements which the City is required to acquire or condemn or which the City is held to have acquired or condemned, for drainage as a result of the development of my property.

I understand that I will be afforded a full opportunity to participate in the settlement and defense of any claims for which indemnity may be required under this paragraph.

By: _____

ATTEST:

Index

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11-12	IDF TABLE FOR SITE
13	BASIN AND SUB-BASIN IMPERVIOUSNESS CALCS
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15	PEAK RUNOFF FOR SUB-BASIN S2
16	PEAK RUNOFF FOR SUB-BASIN S3
17	PEAK RUNOFF FOR SUB-BASIN S4
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INTRODUCTION

Property Location and Description:

The site is located Lots 2 and 3 Yarbrough Acres Minor Subdivision, City of Fort Lupton which is part of the Northeast quarter of the Southeast quarter of Section 18, Township 1 North, Range 66 West of the 6th Principal Meridian, Fort Lupton, Weld County Colorado. The address for the site is 3355 CR 27, Fort Lupton CO. The site is bordered on the east by Weld County Road 27 which is also known as Denver Ave further north. There is an existing irrigation ditch along the west side of CR 27 (Fulton Lateral Ditch) which will have to be crossed with the access point to the property. The south border is Lot 1 of the same subdivision and it is currently a commercial facility that is mostly developed. The site has an existing retention pond towards the west end of the property. The west side of the lot is bordered by a gravel pit that is owned by the City and County of Denver. The north boundary is a residence that is mainly undeveloped. The project site has an existing barn that will be removed in the future.

The existing vegetation on the site consists of fairly dense weeds and grasses. The exiting soils on the site are classified as Altvan Loam and Dacono Clay Loam. The majority of the soils on the site are Hydrologic group "C". There are no wetlands on the property at this time. This report and design considers on and off-site storm water that is generated by the new construction surfaces. (See Grading and Drainage Plan for location)

The proposed commercial improvements to this project site include 12,800 square foot of metal buildings, concrete and asphalt paving, and gravel driveways. One retention pond will serve the retention requirements for both lots. The 2 lots combined contain 10 acres.

DRAINAGE BASINS AND SUB-BASINS

Major Basin Description

No major drainage ways exist on this property. There is an existing irrigation ditch east of the property (Fulton Lateral Ditch). The site lies within the South Platte River Basin, but does not appear to lie within the floodplain. The FEMA FIRM panel for the property is 08123C2155E . The panel became effective Jan 20, 2016

Existing Drainage Basin Conditions

The existing 10-acre site historically slopes to the northwest at 0.3% slope. Presently the site to the south of the site has a retention facility. The property along the north boundary appears to drain to the west and north west away from the site. The property along the west side of the project drains west towards the South Platte River. The property to the east mainly drains to the west but the combination of CR 27 being slightly elevated and the Fulton Lateral Ditch create a barrier that will in effect prevent offsite flows from entering the site. Therefore the basin considered for this design will consist of the site itself.

Proposed Drainage Basin Conditions

The site flows were calculated using thirteen on-site basins to determine the various requirements of the onsite swales, culverts and inlets.

Sub-Basin S1 which is in the north-east corner of the lot was used to determine the swale capacity along the north side of the property and the requirements of culvert #1 and the inlets. S1 has building, pavement, gravel and landscape surfaces within its boundaries. S1 contains 0.6 acres, has a developed imperviousness of 40% and produces 2.75 cfs in the 100-yr event.

Sub-Basin S2 is directly west of S1 along the north property boundary and was used to determine the swale capacity along the north side of the property and the requirements of culvert #1 and the inlets. S2 has gravel and landscape surfaces within its boundaries. S2 contains 0.79 acres, has a developed imperviousness of 38% and produces 2.55 cfs in the 100-yr event.

Sub-Basin S3 is directly west of S2 along the north property boundary and was used to determine the swale capacity along the north side of the property and the requirements of culvert #1 and the inlets. S3 has gravel and landscape surfaces within its boundaries. S3 contains 0.70 acres, has a developed imperviousness of 38% and produces 2.97 cfs in the 100-yr event.

Sub-Basin S4 is directly west of S3 along the north property boundary and was used to determine the swale capacity along the north side of the property and the requirements of culvert #1 and the inlets. S4 has gravel and landscape surfaces within its boundaries. S4 contains 0.79 acres, has a developed imperviousness of 38% and produces 3.34 cfs in the 100-yr event.

Sub-Basin S5 is directly west of S4 in the north-west corner of the site and was used to determine the swale capacity along the north side of the property and the requirements of the culvert #4 that drains the swale. S5 has gravel and landscape surfaces within its boundaries. S5 contains 0.91 acres, has a developed imperviousness of 32% and produces 3.63 cfs in the 100-yr event.

Sub-Basin S6 which is south of basins S1, S2 and S3 was used to determine the central swale capacity and the requirements of culvert #2 and inlets. S6 has building, pavement, gravel and landscape surfaces within its boundaries. S6 contains 1.57 acres, has a developed imperviousness of 56% and produces 6.92 cfs in the 100-yr event.

Sub-Basin S7 which is south of basins S3, S4 and S5 was used to determine the central swale capacity and the requirements of culvert #2 and inlets. S7 has pavement, gravel and landscape surfaces within its boundaries. S7 contains 0.98 acres, has a developed imperviousness of 41% and produces 4.02 cfs in the 100-yr event.

Sub-Basin S8 which is in the southeast corner of the property was used to determine the central swale capacity and the requirements of culvert #3 and inlets. S has building, pavement, gravel and landscape surfaces within its boundaries. S8 contains 0.7 acres, has a developed imperviousness of 55% and produces 3.09 cfs in the 100-yr event.

Sub-Basin S9 which is west of S8 along the south side of the property was used to determine the southern swale capacity and the requirements of culvert #3 and inlets. S9 has

building, gravel and landscape surfaces within its boundaries. S9 contains 0.49 acres, has a developed imperviousness of 55% and produces 2.05 cfs in the 100-yr event.

Sub-Basin S10 which is west of S9 along the south side of the property was used to determine the southern swale capacity and the requirements of culvert #3 and inlets. S10 has building, gravel and landscape surfaces within its boundaries. S10 contains 0.78 acres, has a developed imperviousness of 38% and produces 3.28 cfs in the 100-yr event.

Sub-Basin S11 which is west of S10 along the south side of the property was used to determine the southern swale capacity and the requirements of culvert #3 and inlets. S11 has gravel and landscape surfaces within its boundaries. S11 contains 0.45 acres, has a developed imperviousness of 37% and produces 1.91 cfs in the 100-yr event.

Sub-Basin S12 which is west of S11 along the south side of the property was used to determine the southern swale capacity and the requirements of culvert #3 and inlets. S12 has gravel and landscape surfaces within its boundaries. S12 contains 0.36 acres, has a developed imperviousness of 37% and produces 1.51 cfs in the 100-yr event.

Sub-Basin S13 which is in the south west corner of the property and west of S12 along the south side of the property. S13 has gravel and landscape surfaces within its boundaries. S13 contains 1.01 acres, has a developed imperviousness of 3% and produces 5.36 cfs in the 100-yr event.

The entire developed site contains 10.01 acres and has an imperviousness of 38%. The 100-yr developed runoff rate is 37.65 cfs.

DRAINAGE DESIGN CRITERIA

Development Criteria Reference and Constraints

The 100-year design rainfalls are used to analyze runoff rates and retention parameters, in accordance with the commercial requirements set forth in the Urban Drainage Manual. Due to the small basin size the Rational Method has been utilized to determine peak runoff rates and required detention pond volumes. The retention pond was designed volume with 150% of the 100-year 24 hour developed storm. The runoff coefficients used in the design are as follows.

SITE IMPERVIOUSNESS / RUNOFF VALUES

	Imperviousness	100 -yr Runoff Coefficient
Landscaping/ Existing	2%	0.3
Building Roofs	90%	0.9
Asphalt and Concrete	100%	0.93
Gravel	40%	0.65

Using the NOAA Atlas 14 Volume 8 Version 2 maps an IDF table was generated. A one hour rainfall depth of 1.31 inches and 2.81 inches was determined for a five-year and 100-year event. The rational method was used to calculate runoff and release rates. The retention pond was sized using the 100-yr 24 hour developed storm. The retention pond volume is required to have the capacity to hold 150% of the 100-yr 24 hour storm. The on site features (swales, culverts etc.) were sized to pass the 100-year events. The runoff for specific design points was calculated by inputting the area, imperviousness, soil type, one hour precipitation values, slope, length of travel and conveyance into the peak runoff spreadsheet. Please see the corresponding peak runoff and feature design for each point. The release rate and developed runoff amounts were calculated using the rational method.

Storm Water Quality Considerations

Storm water quality will be controlled with the installation of the retention pond. Sedimentation from the site to the retention pond is reduced by surfaces of gravel, concrete and asphalt surfaces. These surfaces will mitigate erosion by protecting the soils underneath. The remainder of the site is protected by vegetation, which mitigate erosion and reduce sedimentation.

During construction, erosion control features will be utilized and remain onsite until all surfaces are constructed and vegetation has been established. Structural features include the retention pond, a concrete washout area, a vehicle tracking control pad and silt fence. A concrete washout area will aid in maintaining water quality on-site by containing concrete material. A vehicle tracking control pad is located at the construction entrance to reduce sedimentation into the public right-of-way. Silt Fence is placed at all locations where on-site flows will sheet flow off of the property. Non-structural features, including roughening of soil stockpiles and re-vegetation of disturbed areas will also be included in the construction phase of this project. All stockpiles shall be roughened to reduce erosion and all areas that have been disturbed and aren't protected by solid surfaces shall be seeded and mulched.

DRAINAGE FACILITY DESIGN

The storm water retention is provided in the landscaped area in the south west corner of the property. The required volume was determined by multiplying the volume from the 24 HR 100-yr event by 150%. The retention volume required is 204,270 cubic feet. The retention volume provided will be approximately 207,763 cubic feet. Sheet flow, concrete pans and storm pipe will carry storm water to the retention pond. The elevation around the top of the retention pond shall have a minimum elevation of 4932.5. Once the water reaches an elevation that is higher than the existing ground the storm water will travel along the historical path to the north.

Swale Sec A-A is a typical section that collects flow from basins S1, S2, S3, S4, S5, S9, S10, S11 and S12 and conveys it to inlets and/ or other swale sections . At a minimum slope of

0.8% Sec A-A has the ability to pass 5.11 cfs when the flow depth is 0.5'. The velocity is 1.32 fps, and the Froude number is 0.46 with an "n" value of 0.04. The maximum runoff entering the swale is 3.34 cfs

Swale Sec B-B collects flow from S5 (3.63 cfs) Sec B-B has the ability to pass 3.94 cfs when the flow depth is 0.75'. The velocity is 1.75 fps, and the Froude number is 0.5 with an "n" value of 0.04.

Swale Sec C-C collects flow from S6 and S7 (6.92 cfs max) and empties into storm inlets. Sec C-C has the ability to pass 7.02 cfs when the flow depth is 0.37'. The velocity is 0.55 fps, and the Froude number is 0.56 with an "n" value of 0.025.

Swale Sec D-D collects flow from S8 (3.09 cfs) and empties into a storm inlet on culvert #3. Sec D-D has the ability to pass 3.26 cfs when the flow depth is 0.45'. The velocity is 0.87 fps, and the Froude number is 0.32 with an "n" value of 0.004.

Swale Sec E-E also collects flow from S8 (3.09 cfs) and empties into a storm inlet on culvert #3. Sec E-E has the ability to pass 3.12 cfs when the flow depth is 0.67'. The velocity is 1.76 fps, and the Froude number is 0.54 with an "n" value of 0.004.

Culvert #1 is a 24" ADS pipe that will collect flows from S1, S2, S3 and S4. The total combined flow from these basins is 11.61 cfs. Culvert #1 has the ability to pass this flow when the water elevation reaches 4931.25. This will induce approx. 6.5" of water above the farthest west inlet elevation. The outlet of the pipe is set 2' above the bottom of the retention pond so that in minor events the pipe is cleaned. At the discharge point of the culvert a 22' x 4' x 18" Type "L" rip rap pad is placed to prevent erosion. A single inlet will drain each basin. A 24" Nyoplast inlet Grate has the capacity to accept approximately 4.5 cfs when the sump condition reaches 6".

Culvert #2 is a 18" and a 24" ADS pipe that will collect flows from S6 and S7. The total combined flow from these basins is 10.94 cfs. Culvert #2 is an 18" diameter in between the inlets. The 18" section has the ability to pass this flow from S6 (6.92 cfs) when the water elevation reaches 4934, which is the rim elevation of the inlet. The western section of the pipe has the capacity to pass the combined flows when the elevation reaches 4933.25, which is the rim elevation of the inlet. The outlet of the pipe is set 2' above the bottom of the retention pond so that in minor events the pipe is cleaned. At the discharge point of the culvert a 16' x 4' x 18" Type "L" rip rap pad is placed to prevent erosion. A single inlet will drain each basin. A 2' square Nyoplast Roadway inlet Grate has the capacity to accept approximately 6.9 cfs when the sump condition reaches 6.5".

Culvert #3 is a 24" ADS pipe that will collect flows from S8, S9, S10, S11 and S12. The total combined flow from these basins is 11.84 cfs. Culvert #3 has the ability to pass this flow when the water elevation reaches 4931.75. This will induce approx. 4" of water above the farthest west inlet elevation. The outlet of the pipe is set 2' above the bottom of the retention pond so that in minor events the pipe is cleaned. At the discharge point of the culvert a 18' x 4' x 18" Type "L" rip rap pad is placed to prevent erosion. A single inlet will drain each basin. A

24" Nyoplast inlet Grate has the capacity to accept approximately 4.5 cfs when the sump condition reaches 6".

Culvert #4 is a 15" ADS pipe that will collect flows from S5. The flow from this basin is 3.63 cfs. Culvert #4 has the ability to pass this flow when the water elevation reaches 4930.75. The outlet of the pipe is set 3.8' above the bottom of the retention pond so that in minor events the pipe is cleaned. At the discharge point of the culvert a 17' x 3' x 18" Type "L" rip rap pad is placed to prevent erosion.

CONCLUSION

The attached calculations show that the developed condition imperviousness for the proposed development for a 100-yr storm is 38%. The corresponding runoff coefficient is 0.61. Based on an area of 10.01 Acres, 150% of the 24- hour 100-yr event a storm-volume of 204,270 cubic feet is required. A volume of 204,270 cubic feet is provided.

The project design for Dave Hunt's new facility is completed in compliance with the Urban Storm Drainage Criteria Manual and the City of Fort Lupton.

SITE MAINTENANCE

Drainage/ Site Maintenance Plan for Dave's Excavation

1. At all times any erosion that may occur shall be corrected as soon as possible to mitigate the chance of erosion leaving the site.
2. All culverts shall be inspected regularly and cleaned if necessary.
3. Any seeded areas that are not covered with vegetation shall be re-seeded and irrigated as necessary to establish permanent vegetation.
4. Snow should not be piled in swales or near detention pond outlet.



NOAA Atlas 14, Volume 8, Version 2
 Location name: Fort Lupton, Colorado, US*
 Latitude: 40.0491°, Longitude: -104.8120°
 Elevation: 4936 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk,
 Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

PF tabular

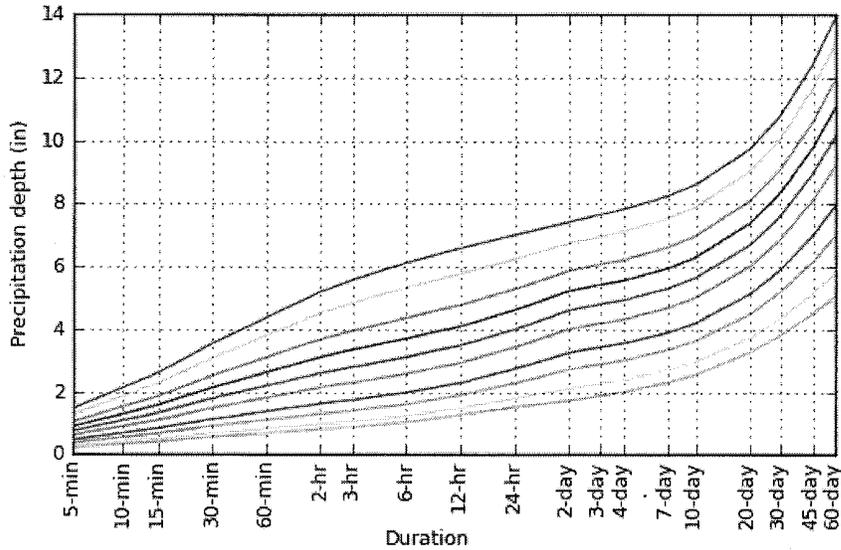
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.230 (0.177-0.299)	0.281 (0.216-0.365)	0.377 (0.289-0.492)	0.470 (0.358-0.615)	0.617 (0.464-0.859)	0.745 (0.544-1.04)	0.887 (0.627-1.27)	1.04 (0.709-1.53)	1.27 (0.832-1.91)	1.46 (0.925-2.20)
10-min	0.337 (0.259-0.438)	0.411 (0.316-0.535)	0.552 (0.423-0.720)	0.688 (0.524-0.901)	0.903 (0.679-1.26)	1.09 (0.797-1.53)	1.30 (0.918-1.86)	1.53 (1.04-2.24)	1.86 (1.22-2.80)	2.14 (1.35-3.22)
15-min	0.411 (0.316-0.534)	0.501 (0.385-0.652)	0.673 (0.515-0.878)	0.839 (0.639-1.10)	1.10 (0.829-1.53)	1.33 (0.972-1.86)	1.58 (1.12-2.27)	1.86 (1.27-2.73)	2.27 (1.49-3.41)	2.61 (1.65-3.92)
30-min	0.561 (0.432-0.730)	0.680 (0.523-0.885)	0.909 (0.696-1.19)	1.13 (0.862-1.48)	1.48 (1.12-2.07)	1.79 (1.31-2.52)	2.14 (1.51-3.06)	2.52 (1.71-3.69)	3.08 (2.01-4.62)	3.54 (2.24-5.32)
60-min	0.685 (0.527-0.891)	0.829 (0.637-1.08)	1.11 (0.849-1.45)	1.38 (1.05-1.81)	1.82 (1.37-2.54)	2.20 (1.61-3.08)	2.63 (1.86-3.76)	3.10 (2.11-4.55)	3.79 (2.48-5.70)	4.37 (2.77-6.57)
2-hr	0.809 (0.629-1.04)	0.978 (0.759-1.26)	1.31 (1.01-1.69)	1.63 (1.25-2.11)	2.15 (1.64-2.96)	2.60 (1.93-3.61)	3.11 (2.23-4.41)	3.68 (2.53-5.33)	4.51 (2.98-6.68)	5.20 (3.33-7.71)
3-hr	0.875 (0.684-1.12)	1.05 (0.824-1.35)	1.41 (1.09-1.80)	1.75 (1.36-2.25)	2.30 (1.77-3.16)	2.79 (2.08-3.85)	3.34 (2.40-4.69)	3.95 (2.73-5.67)	4.84 (3.22-7.11)	5.58 (3.59-8.20)
6-hr	1.04 (0.819-1.31)	1.23 (0.972-1.56)	1.61 (1.27-2.04)	1.99 (1.55-2.53)	2.59 (2.00-3.50)	3.12 (2.34-4.23)	3.71 (2.69-5.14)	4.37 (3.05-6.19)	5.33 (3.59-7.73)	6.13 (3.99-8.89)
12-hr	1.27 (1.02-1.59)	1.49 (1.19-1.86)	1.90 (1.51-2.38)	2.30 (1.82-2.89)	2.93 (2.29-3.90)	3.49 (2.65-4.66)	4.10 (3.01-5.59)	4.78 (3.38-6.67)	5.77 (3.92-8.24)	6.59 (4.34-9.42)
24-hr	1.52 (1.23-1.88)	1.79 (1.45-2.22)	2.29 (1.84-2.83)	2.74 (2.19-3.40)	3.42 (2.68-4.45)	4.00 (3.05-5.24)	4.62 (3.41-6.17)	5.29 (3.76-7.24)	6.24 (4.28-8.74)	7.01 (4.67-9.88)
2-day	1.73 (1.41-2.10)	2.10 (1.71-2.56)	2.72 (2.21-3.32)	3.25 (2.63-3.99)	4.00 (3.14-5.08)	4.61 (3.54-5.90)	5.22 (3.88-6.84)	5.86 (4.20-7.86)	6.74 (4.65-9.25)	7.42 (5.00-10.3)
3-day	1.88 (1.55-2.28)	2.26 (1.86-2.74)	2.90 (2.37-3.52)	3.44 (2.80-4.19)	4.20 (3.32-5.29)	4.81 (3.72-6.12)	5.43 (4.07-7.06)	6.08 (4.38-8.09)	6.97 (4.84-9.48)	7.65 (5.19-10.5)
4-day	2.01 (1.66-2.42)	2.39 (1.97-2.88)	3.01 (2.48-3.64)	3.55 (2.90-4.31)	4.32 (3.43-5.41)	4.93 (3.83-6.25)	5.57 (4.19-7.19)	6.23 (4.51-8.23)	7.13 (4.98-9.64)	7.83 (5.33-10.7)
7-day	2.31 (1.92-2.75)	2.69 (2.24-3.21)	3.34 (2.77-3.99)	3.89 (3.21-4.67)	4.68 (3.75-5.79)	5.31 (4.16-6.64)	5.95 (4.52-7.60)	6.62 (4.84-8.64)	7.53 (5.31-10.1)	8.24 (5.67-11.1)
10-day	2.56 (2.14-3.03)	2.96 (2.48-3.51)	3.64 (3.03-4.32)	4.21 (3.49-5.02)	5.02 (4.04-6.16)	5.66 (4.46-7.02)	6.31 (4.82-7.99)	6.99 (5.13-9.05)	7.90 (5.60-10.5)	8.61 (5.95-11.5)
20-day	3.27 (2.77-3.83)	3.73 (3.16-4.37)	4.50 (3.79-5.28)	5.13 (4.31-6.05)	6.02 (4.89-7.26)	6.70 (5.34-8.18)	7.39 (5.70-9.21)	8.09 (6.01-10.3)	9.03 (6.47-11.8)	9.74 (6.82-12.9)
30-day	3.83 (3.27-4.46)	4.36 (3.72-5.08)	5.23 (4.44-6.09)	5.94 (5.02-6.95)	6.91 (5.65-8.26)	7.65 (6.13-9.26)	8.39 (6.52-10.4)	9.14 (6.83-11.5)	10.1 (7.29-13.0)	10.8 (7.64-14.2)
45-day	4.51 (3.87-5.20)	5.15 (4.42-5.94)	6.17 (5.28-7.14)	7.00 (5.96-8.13)	8.12 (6.68-9.62)	8.96 (7.22-10.7)	9.79 (7.64-12.0)	10.6 (7.97-13.2)	11.7 (8.46-14.9)	12.4 (8.82-16.1)
60-day	5.06 (4.37-5.81)	5.80 (5.00-6.67)	6.99 (6.00-8.04)	7.94 (6.79-9.17)	9.21 (7.60-10.8)	10.2 (8.21-12.1)	11.1 (8.68-13.4)	12.0 (9.03-14.8)	13.1 (9.53-16.6)	13.9 (9.92-17.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

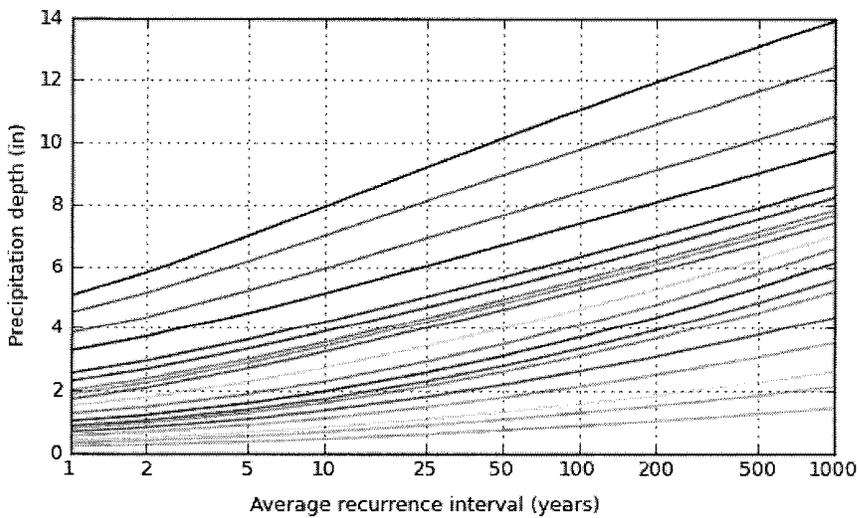
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PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 40.0491°, Longitude: -104.8120°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

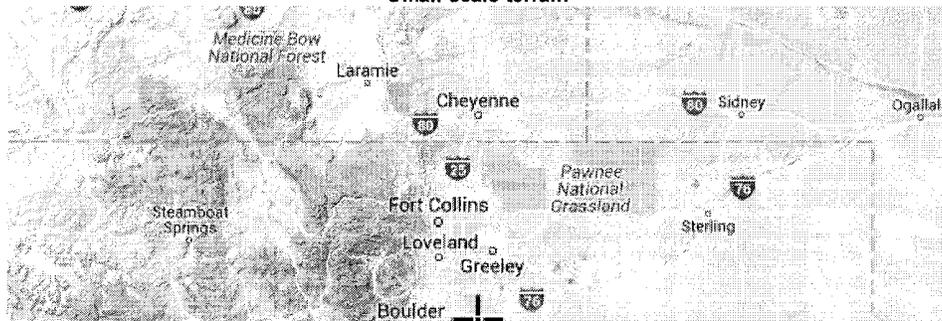


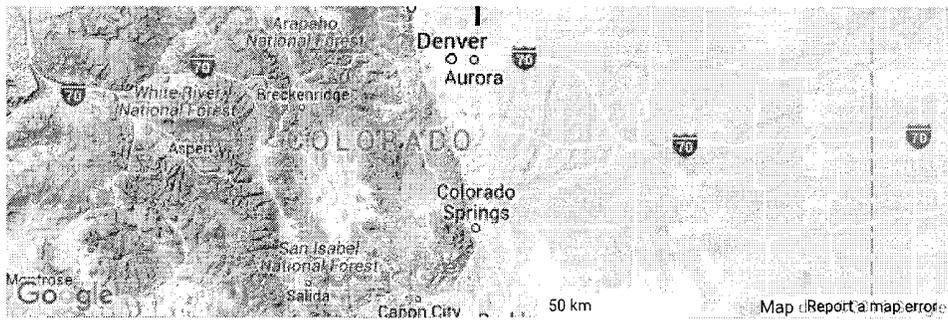
Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

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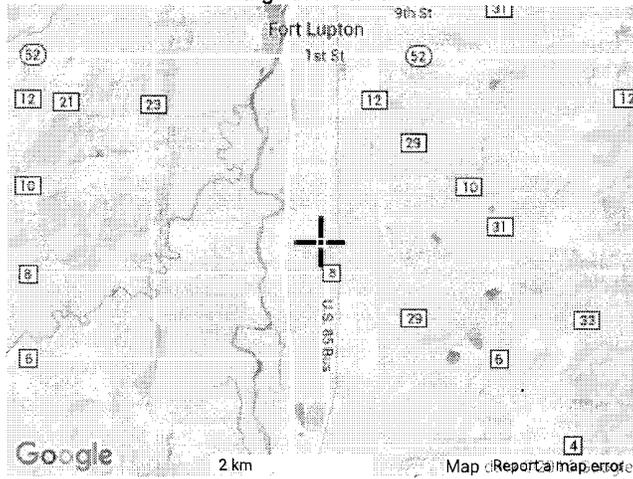
Maps & aerials

Small scale terrain

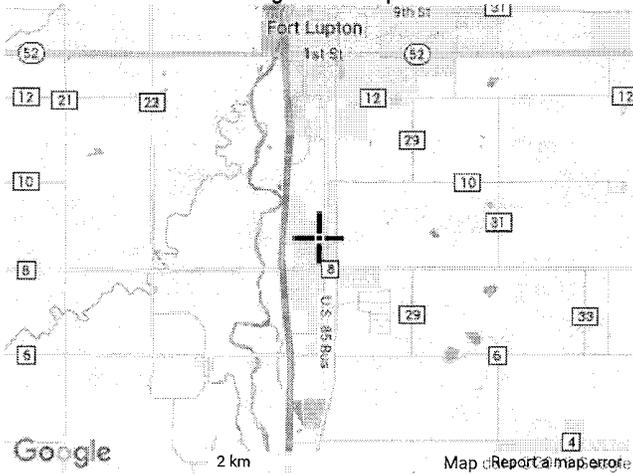




Large scale terrain



Large scale map



Large scale aerial





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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Depth-Duration-Frequency and Intensity-Duration-Frequency Tables for Colorado Hydrologic Zones 1 through 4

Blue cells are inputs.

Project: Daves

Where is the Watershed Located?

- Located within UDFCD Boundary
- Located outside of UDFCD Boundary

Hydrologic Zone (1, 2, 3, or 4) = (see map)
 Elevation at Center of Watershed = ft
 Watershed Area (Optional) = sq. mi.

(Optional) Select a location within the UDFCD boundary:

1. Rainfall Depth-Duration-Frequency Table

If within the UDFCD Boundary, Enter the 1-hour and 6-hour rainfall depths from the USDCM Volume 1.
 Otherwise, Enter the 6-hour and 24-hour rainfall depths from the NOAA Atlas 2 Volume III.

Return Period	Rainfall Depth in Inches at Time Duration								
	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	24-hr
2-yr	0.23	0.37	0.46	0.54	0.82	0.96	1.06	1.23	1.79
5-yr	0.37	0.59	0.75	0.86	1.31	1.42	1.49	1.61	2.29
10-yr	0.46	0.74	0.93	1.08	1.64	1.76	1.85	1.99	2.74
25-yr	0.58	0.93	1.17	1.35	2.06	2.24	2.37	2.59	3.42
50-yr	0.69	1.10	1.39	1.60	2.44	2.68	2.85	3.12	4.00
100-yr	0.79	1.27	1.59	1.84	2.81	3.12	3.35	3.71	4.62
500-yr	1.02	1.62	2.04	2.36	3.60	3.94	4.20	4.60	5.68

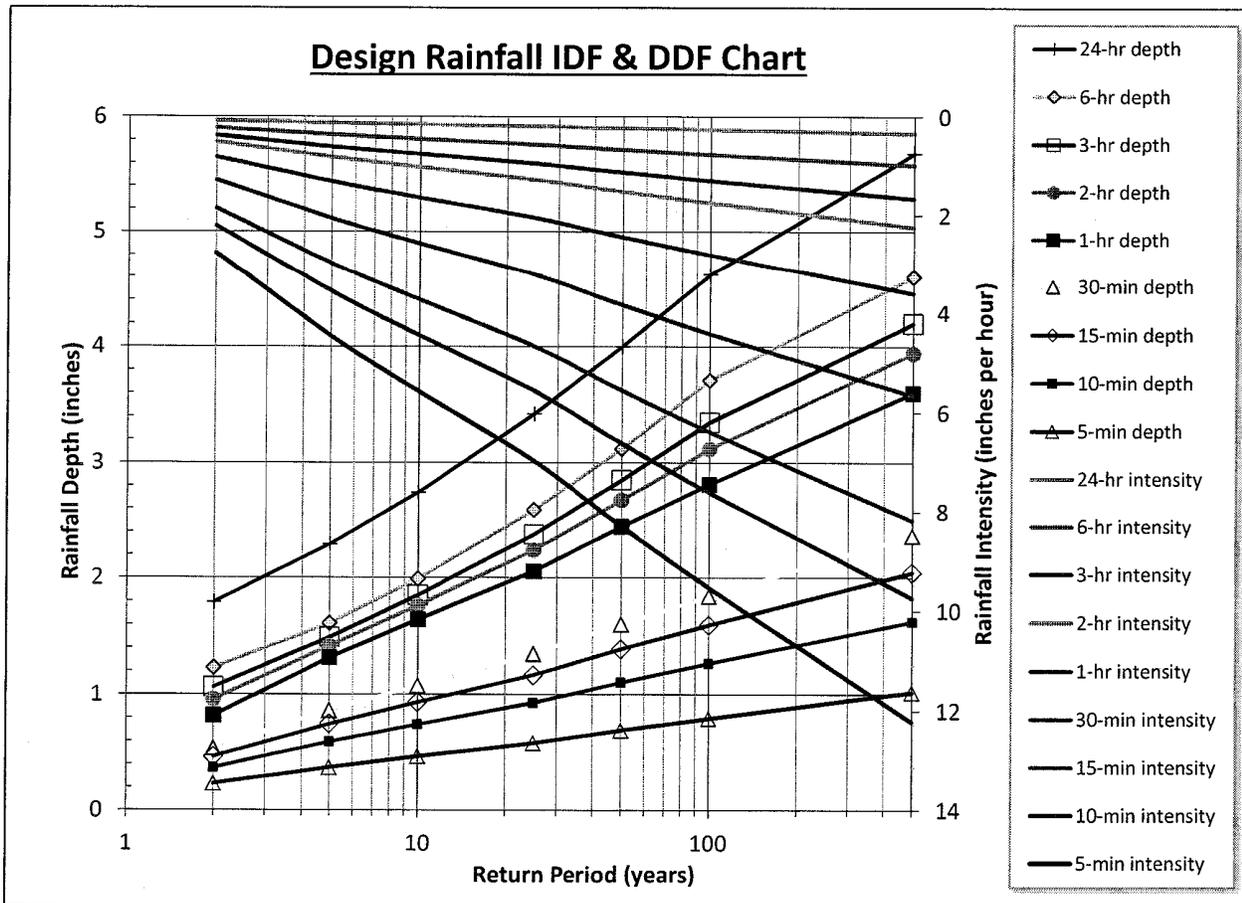
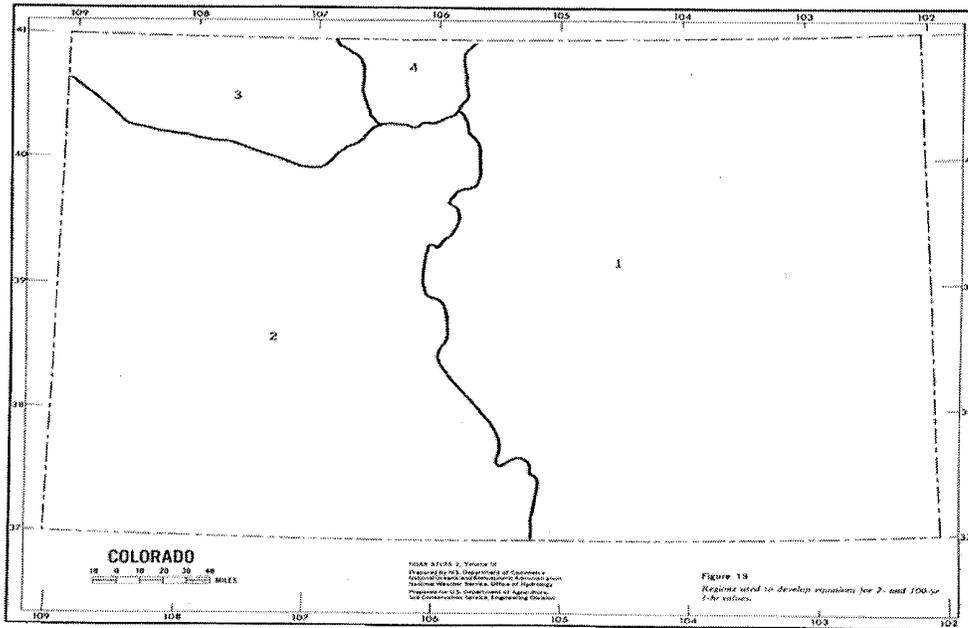
Note: Refer to Figures 4-1 through 4-12 of USDCM Volume 1 for 1-hr and 6-hr rainfall depths.
 Refer to NOAA Atlas 2 Volume III isopluvial maps for 6-hr and 24-hr rainfall depths.
 Rainfall depths for durations less than 1-hr are calculated using Equation 4-4 in USDCM Volume 1.

2. Rainfall Intensity-Duration-Frequency Table

Return Period	Rainfall Intensity in Inches Per Hour at Time Duration								
	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	24-hr
2-yr	2.77	2.21	1.86	1.28	0.82	0.51	0.38	0.22	0.08
5-yr	4.46	3.56	2.98	2.06	1.31	0.82	0.61	0.36	0.12
10-yr	5.57	4.44	3.73	2.58	1.64	1.02	0.76	0.45	0.15
25-yr	6.97	5.56	4.67	3.22	2.06	1.28	0.95	0.56	0.19
50-yr	8.29	6.61	5.55	3.83	2.44	1.52	1.13	0.67	0.23
100-yr	9.53	7.60	6.38	4.41	2.81	1.75	1.30	0.77	0.26
500-yr	12.21	9.74	8.17	5.65	3.60	2.24	1.66	0.98	0.34

Note: Intensity approximated using 1-hr rainfall depths and Equation 4-3 in USDCM Volume 1.

Depth-Duration-Frequency and Intensity-Duration-Frequency Tables for Colorado Hydrologic Zones 1 through 4



Sub-basin Imperviousness

Daves Earthworks

H1: HISTORIC

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	436063	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	0	40
Wghtd Avg & Total Area	436063	2
Acres	10.01	

ENTIRE SITE

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	87201	2
Roofs	12902	90
Concrete Surfaces	29292	100
Driveways, Gravel	306668	40
Wghtd Avg & Total Area	436063	38
Acres	10.01	

S1

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	4762	2
Roofs	1000	90
Concrete Surfaces	2213	100
Driveways, Gravel	18154	40
Wghtd Avg & Total Area	26129	40
Acres	0.600	

S2

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	1650	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	24591	40
Wghtd Avg & Total Area	26241	38
Acres	0.602	

S3

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	1947	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	28365	40
Wghtd Avg & Total Area	30312	38
Acres	0.696	

S4

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	2244	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	31948	40
Wghtd Avg & Total Area	34192	38
Acres	0.785	

S5

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	8752	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	30858	40
Wghtd Avg & Total Area	39610	32
Acres	0.909	

S6

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	3038	2
Roofs	6392	90
Concrete Surfaces	15351	100
Driveways, Gravel	43561	40
Wghtd Avg & Total Area	68342	56
Acres	1.569	

S7

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	924	2
Roofs	0	90
Concrete Surfaces	1285	100
Driveways, Gravel	40620	40
Wghtd Avg & Total Area	42829	41
Acres	0.983	

S8

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	8718	2
Roofs	3814	90
Concrete Surfaces	10183	100
Driveways, Gravel	7897	40
Wghtd Avg & Total Area	30612	55
Acres	0.703	

S9

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	2547	2
Roofs	1696	90
Concrete Surfaces	0	100
Driveways, Gravel	16930	40
Wghtd Avg & Total Area	21173	39
Acres	0.486	

S10

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	2111	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	31754	40
Wghtd Avg & Total Area	33865	38
Acres	0.777	

S11

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	1302	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	18441	40
Wghtd Avg & Total Area	19743	37
Acres	0.453	

S12

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	2324	2
Roofs	0	90
Concrete Surfaces	0	100
Driveways, Gravel	13549	40
Wghtd Avg & Total Area	15873	34
Acres	0.364	

S13

Land Use	Area (ft2)	I (%)
Impervious Area, Grass	43616	2
Roofs	0	90
Concrete Surfaces	260	100
Driveways, Gravel	0	40
Wghtd Avg & Total Area	43876	3
Acres	1.007	

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S1

I. Catchment Hydrologic Data

Catchment ID = S1
 Area = 0.60 Acres
 Percent Imperviousness = 40.00 %
 NRCS Soil Type = C A, B, C, or D

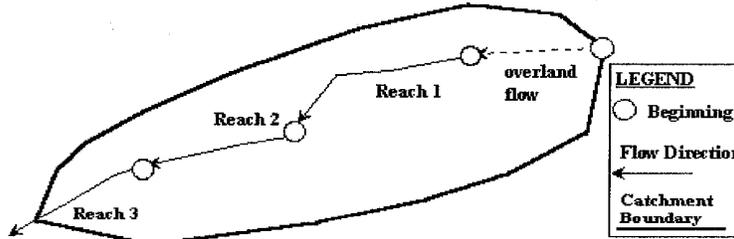
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.35
 Override 5-yr. Runoff Coefficient, $C-5$ = _____ (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
1	0.0349	109		20.00	3.74	0.49
2						
3						
4						
5						
Sum		171				

Computed T_c = 9.13
 Regional T_c = 10.95
 User-Entered T_c = 9.13

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 7.87 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.33 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.87 inch/hr

Peak Flowrate, Q_p = 2.75 cfs
 Peak Flowrate, Q_p = 2.56 cfs
 Peak Flowrate, Q_p = 2.75 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S2

I. Catchment Hydrologic Data

Catchment ID = S2
 Area = 0.60 Acres
 Percent Imperviousness = 38.00 %
 NRCS Soil Type = C A, B, C, or D

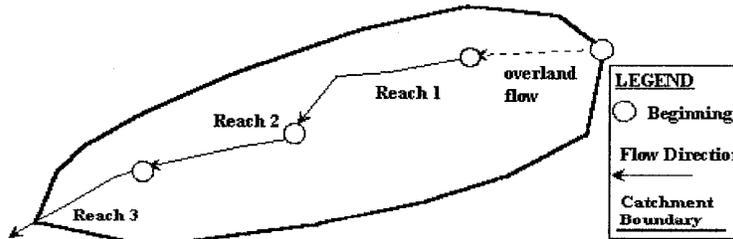
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, C = _____ (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
1						
2						
3						
4						
5						
Sum		174				

Computed T_c = 13.76
 Regional T_c = 10.97
 User-Entered T_c = 10.97

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 6.64 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.32 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.32 inch/hr

Peak Flowrate, Q_p = 2.31 cfs
 Peak Flowrate, Q_p = 2.55 cfs
 Peak Flowrate, Q_p = 2.55 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S3

I. Catchment Hydrologic Data

Catchment ID = S3
 Area = 0.70 Acres
 Percent Imperviousness = 38.00 %
 NRCS Soil Type = C A, B, C, or D

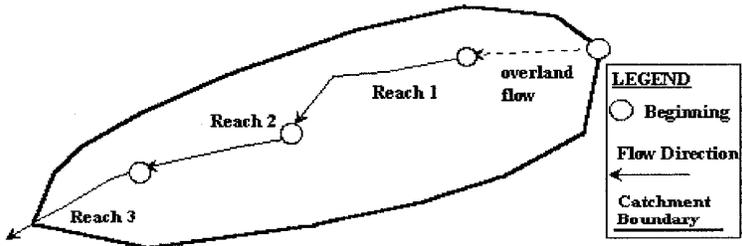
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, C = _____ (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
Overland	0.0240	183	0.34	N/A	0.22	13.91
1						
2						
3						
4						
5						
Sum		183				

Computed T_c = 13.91
 Regional T_c = 11.02
 User-Entered T_c = 11.02

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 6.61 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.31 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.31 inch/hr

Peak Flowrate, Q_p = 2.68 cfs
 Peak Flowrate, Q_p = 2.97 cfs
 Peak Flowrate, Q_p = 2.97 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S4

I. Catchment Hydrologic Data

Catchment ID = S4
 Area = 0.79 Acres
 Percent Imperviousness = 38.00 %
 NRCS Soil Type = C, A, B, C, or D

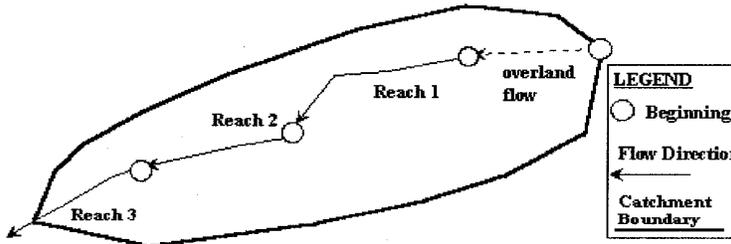
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, $C-5$ = (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff $C-5$	NRCS Conveyance	Flow Velocity V	Flow Time T_f
	ft/ft input	ft input	output		fps output	minutes output
Overland	0.0280	191	0.34	N/A	0.24	13.51
1						
2						
3						
4						
5						
Sum		191				

Computed T_c = 13.51
 Regional T_c = 11.06
 User-Entered T_c = 11.06

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c , I = 6.69 inch/hr
 Rainfall Intensity at Regional T_c , I = 7.30 inch/hr
 Rainfall Intensity at User-Defined T_c , I = 7.30 inch/hr

Peak Flowrate, Q_p = 3.06 cfs
 Peak Flowrate, Q_p = 3.34 cfs
 Peak Flowrate, Q_p = 3.34 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S5

I. Catchment Hydrologic Data

Catchment ID = S5
 Area = 0.91 Acres
 Percent Imperviousness = 32.00 %
 NRCS Soil Type = C A, B, C, or D

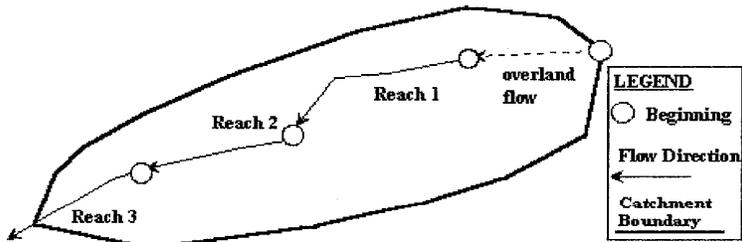
II. Rainfall Information $I \text{ (inch/hr)} = C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.57
 Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.31
 Override 5-yr. Runoff Coefficient, C = (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
Overland	0.0170	263	0.31	N/A	0.23	19.33
1	0.0085	135		15.00	1.38	1.63
2						
3						
4						
5						
Sum		398				
						Computed T _c = 20.96
						Regional T _c = 12.21
						User-Entered T _c = 12.21

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 5.39 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.00 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.00 inch/hr

Peak Flowrate, Q_p = 2.80 cfs
 Peak Flowrate, Q_p = 3.63 cfs
 Peak Flowrate, Q_p = 3.63 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S6

I. Catchment Hydrologic Data

Catchment ID = S6
 Area = 1.57 Acres
 Percent Imperviousness = 56.00 %
 NRCS Soil Type = C A, B, C, or D

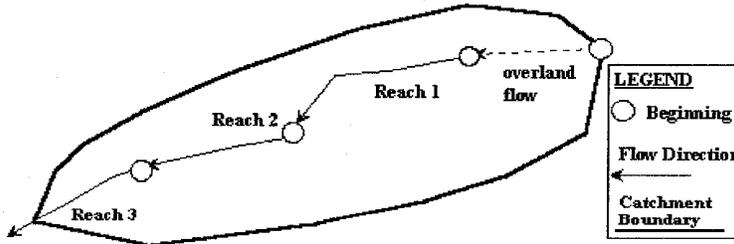
II. Rainfall Information $I (\text{inch/hr}) = C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.62
 Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.43
 Override 5-yr. Runoff Coefficient, C = (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
1	0.0050	270		20.00	1.41	3.18
2						
3						
4						
5						
Sum		316				

Computed T_c = 13.47
 Regional T_c = 11.76
 User-Entered T_c = 11.76

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 6.70 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.11 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.11 inch/hr

Peak Flowrate, Q_p = 6.52 cfs
 Peak Flowrate, Q_p = 6.92 cfs
 Peak Flowrate, Q_p = 6.92 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S7

I. Catchment Hydrologic Data

Catchment ID = S7
 Area = 0.98 Acres
 Percent Imperviousness = 41.00 %
 NRCS Soil Type = C A, B, C, or D

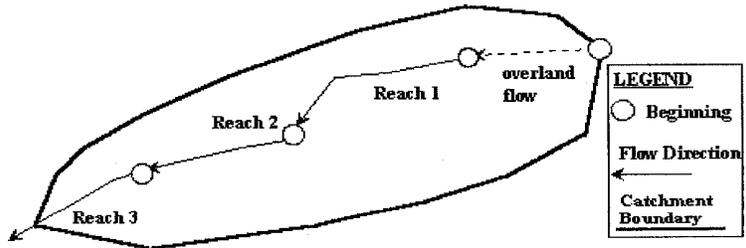
II. Rainfall Information $I (\text{inch/hr}) = C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of C1)
 $C2$ = 10.00 (input the value of C2)
 $C3$ = 0.786 (input the value of C3)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C.)
 5-yr. Runoff Coefficient, $C-5$ = 0.35
 Override 5-yr. Runoff Coefficient, $C-5$ = (enter an override C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5	NRCS Convey- ance input	Flow Velocity V fps output	Flow Time Tf minutes output
			output			
Overland	0.0200	68	0.35	N/A	0.13	8.84
1	0.0050	313		20.00	1.41	3.69
2						
3						
4						
5						
Sum		381				

Computed T_c = 12.53
 Regional T_c = 12.12
 User-Entered T_c = 12.12

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c , I = 6.92 inch/hr
 Rainfall Intensity at Regional T_c , I = 7.02 inch/hr
 Rainfall Intensity at User-Defined T_c , I = 7.02 inch/hr

Peak Flowrate, Q_p = 3.97 cfs
 Peak Flowrate, Q_p = 4.02 cfs
 Peak Flowrate, Q_p = 4.02 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S8

I. Catchment Hydrologic Data

Catchment ID = S8
 Area = 0.70 Acres
 Percent Imperviousness = 55.00 %
 NRCS Soil Type = C A, B, C, or D

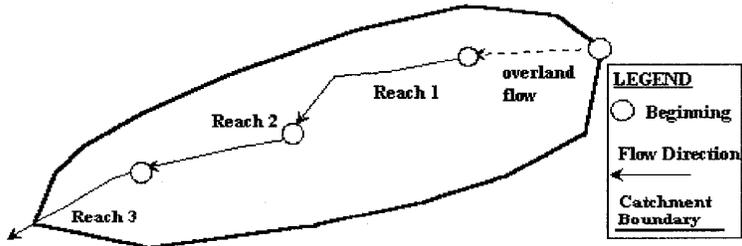
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.62
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.43
 Override 5-yr. Runoff Coefficient, C = _____ (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/ Field	Short Pasture/ Lawns	Nearly Bare Ground	Grassed Swales/ Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Convey- ance input	Flow Velocity V fps output	Flow Time Tf minutes output
Overland	0.0200	70	0.43	N/A	0.14	8.10
1	0.0050	75		15.00	1.06	1.18
2	0.0080	102		15.00	1.34	1.27
3	0.0100	100		15.00	1.50	1.11
4						
5						
Sum		347				

Computed T_c = 11.66
 Regional T_c = 11.93
 User-Entered T_c = 11.66

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c , I = 7.14 inch/hr
 Rainfall Intensity at Regional T_c , I = 7.07 inch/hr
 Rainfall Intensity at User-Defined T_c , I = 7.14 inch/hr

Peak Flowrate, Q_p = 3.09 cfs
 Peak Flowrate, Q_p = 3.06 cfs
 Peak Flowrate, Q_p = 3.09 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S9

I. Catchment Hydrologic Data

Catchment ID = S9
 Area = 0.48 Acres
 Percent Imperviousness = 39.00 %
 NRCS Soil Type = C A, B, C, or D

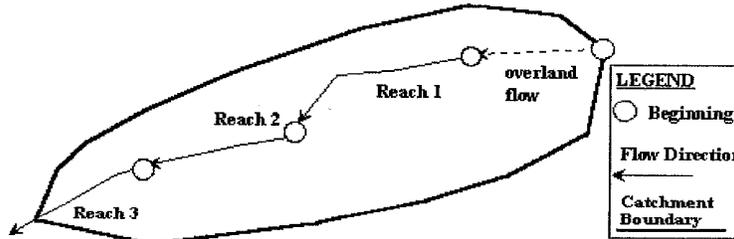
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, $C-5$ = _____ (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
Overland	0.0250	156	0.34	N/A	0.21	12.60
1						
2						
3						
4						
5						
Sum		156				
Computed T _c =						12.60
Regional T _c =						10.87
User-Entered T _c =						10.87

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 6.91 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.35 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.35 inch/hr

Peak Flowrate, Q_p = 1.93 cfs
 Peak Flowrate, Q_p = 2.05 cfs
 Peak Flowrate, Q_p = 2.05 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S10

I. Catchment Hydrologic Data

Catchment ID = S10
 Area = 0.78 Acres
 Percent Imperviousness = 38.00 %
 NRCS Soil Type = C A, B, C, or D

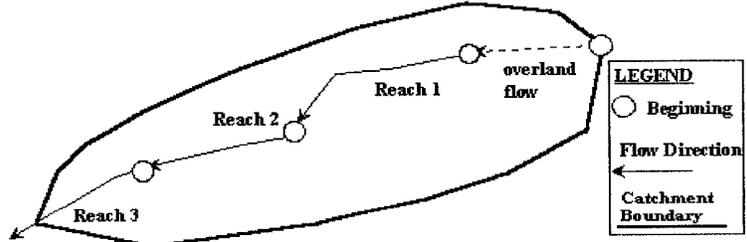
II. Rainfall Information $I \text{ (inch/hr)} = C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of C1)
 $C2$ = 10.00 (input the value of C2)
 $C3$ = 0.786 (input the value of C3)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C.)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, C = _____ (enter an override C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Convey- ance input	Flow Velocity V fps		Flow Time Tf minutes output
					output	output	
Overland	0.0200	213	0.34	N/A	0.22	15.94	
1							
2							
3							
4							
5							
Sum		213					

Computed T_c = 15.94
 Regional T_c = 11.18
 User-Entered T_c = 11.18

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c , I = 6.20 inch/hr
 Rainfall Intensity at Regional T_c , I = 7.27 inch/hr
 Rainfall Intensity at User-Defined T_c , I = 7.27 inch/hr

Peak Flowrate, Q_p = 2.80 cfs
 Peak Flowrate, Q_p = 3.28 cfs
 Peak Flowrate, Q_p = 3.28 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S11

I. Catchment Hydrologic Data

Catchment ID = S11
 Area = 0.45 Acres
 Percent Imperviousness = 37.00 %
 NRCS Soil Type = C A, B, C, or D

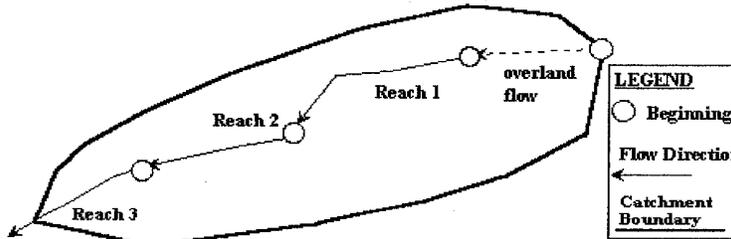
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, C = (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S	Length L	5-yr Runoff Coeff C-5	NRCS Conveyance	Flow Velocity V	Flow Time T _f
	ft/ft input	ft input	output	input	fps output	minutes output
Overland	0.0230	167	0.34	N/A	0.21	13.56
1						
2						
3						
4						
5						
Sum		167				

Computed T_c = 13.56
 Regional T_c = 10.93
 User-Entered T_c = 10.93

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 6.68 inch/hr
 Rainfall Intensity at Regional T_c, I = 7.34 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 7.34 inch/hr

Peak Flowrate, Q_p = 1.74 cfs
 Peak Flowrate, Q_p = 1.91 cfs
 Peak Flowrate, Q_p = 1.91 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S12

I. Catchment Hydrologic Data

Catchment ID = S12
 Area = 0.36 Acres
 Percent Imperviousness = 34.00 %
 NRCS Soil Type = C A, B, C, or D

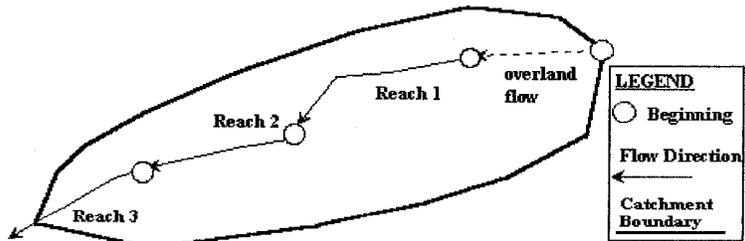
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, Tr = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.57
 Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.32
 Override 5-yr. Runoff Coefficient, C = (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time Tf minutes output
1						
2						
3						
4						
5						
Sum		175				

Computed Tc = 14.55
 Regional Tc = 10.97
 User-Entered Tc = 10.97

IV. Peak Runoff Prediction

Rainfall Intensity at Computed Tc , I = 6.47 inch/hr
 Rainfall Intensity at Regional Tc , I = 7.32 inch/hr
 Rainfall Intensity at User-Defined Tc , I = 7.32 inch/hr

Peak Flowrate, Qp = 1.34 cfs
 Peak Flowrate, Qp = 1.51 cfs
 Peak Flowrate, Qp = 1.51 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Ex
 Catchment ID: S13

I. Catchment Hydrologic Data

Catchment ID = S13
 Area = 1.01 Acres
 Percent Imperviousness = 3.00 %
 NRCS Soil Type = C A, B, C, or D

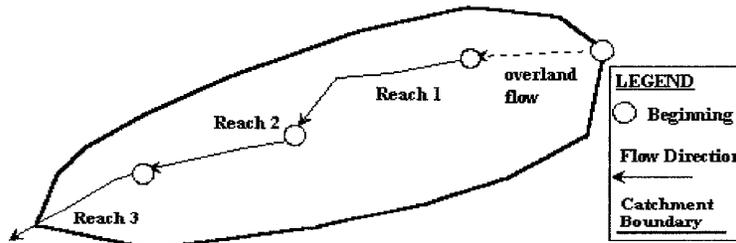
II. Rainfall Information $I \text{ (inch/hr)} = C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, $T_r =$ 100 years (input return period for design storm)
 $C1 =$ 28.50 (input the value of C1)
 $C2 =$ 10.00 (input the value of C2)
 $C3 =$ 0.786 (input the value of C3)
 $P1 =$ 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, $C =$ 0.51
 Override Runoff Coefficient, $C =$ (enter an override C value if desired, or leave blank to accept calculated C.)
 5-yr. Runoff Coefficient, $C-5 =$ 0.17
 Override 5-yr. Runoff Coefficient, $C =$ (enter an override C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft	Length L ft	5-yr Runoff Coeff		NRCS Conveyance	Flow Velocity V		Flow Time T _f	
			input	output		input	output	input	output
Overland	0.2500	35		0.17	N/A	0.17		3.44	
1									
2									
3									
4									
5									
Sum		35							
								Computed T _c =	3.44
								Regional T _c =	10.19
								User-Entered T _c =	5.00

IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, $I =$ 10.39 inch/hr
 Rainfall Intensity at Regional T_c, $I =$ 7.55 inch/hr
 Rainfall Intensity at User-Defined T_c, $I =$ 9.53 inch/hr

Peak Flowrate, $Q_p =$ 5.36 cfs
 Peak Flowrate, $Q_p =$ 3.89 cfs
 Peak Flowrate, $Q_p =$ 4.92 cfs

CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Daves Excavation
 Catchment ID: ENTIRE SITE

I. Catchment Hydrologic Data

Catchment ID = ENTIRE SITE
 Area = 10.01 Acres
 Percent Imperviousness = 38.00 %
 NRCS Soil Type = C, A, B, C, or D

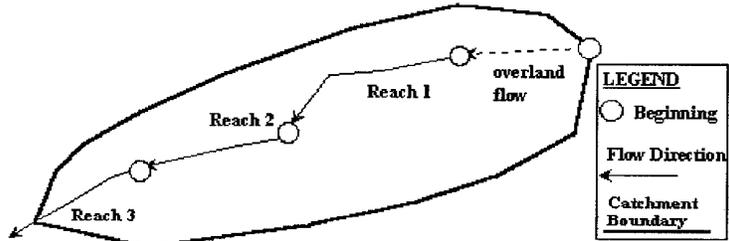
II. Rainfall Information I (inch/hr) = $C1 * P1 / (C2 + Td)^{C3}$

Design Storm Return Period, T_r = 100 years (input return period for design storm)
 $C1$ = 28.50 (input the value of $C1$)
 $C2$ = 10.00 (input the value of $C2$)
 $C3$ = 0.786 (input the value of $C3$)
 $P1$ = 2.81 inches (input one-hr precipitation--see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.58
 Override Runoff Coefficient, C = _____ (enter an override C value if desired, or leave blank to accept calculated C .)
 5-yr. Runoff Coefficient, $C-5$ = 0.34
 Override 5-yr. Runoff Coefficient, C = _____ (enter an override $C-5$ value if desired, or leave blank to accept calculated $C-5$.)

Illustration



NRCS Land Type	Heavy Meadow	Tillage/Field	Short Pasture/Lawns	Nearly Bare Ground	Grassed Swales/Waterways	Paved Areas & Shallow Paved Swales (Sheet Flow)
Conveyance	2.5	5	7	10	15	20

Calculations:

Reach ID	Slope S ft/ft input	Length L ft input	5-yr Runoff Coeff C-5 output	NRCS Conveyance input	Flow Velocity V fps output	Flow Time T _f minutes output
Overland	0.0200	37	0.34	N/A	0.09	6.64
1	0.0050	326		20.00	1.41	3.84
2	0.0079	440		20.00	1.78	4.13
3						
4						
5						
Sum		803				

Computed T_c = 14.61
 Regional T_c = 14.46
 User-Entered T_c = 14.46

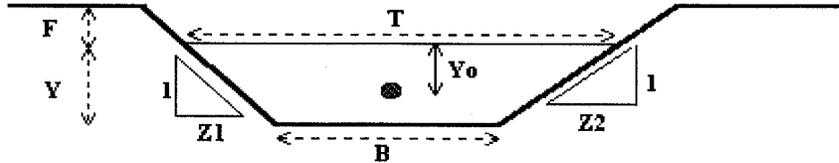
IV. Peak Runoff Prediction

Rainfall Intensity at Computed T_c, I = 6.46 inch/hr
 Rainfall Intensity at Regional T_c, I = 6.49 inch/hr
 Rainfall Intensity at User-Defined T_c, I = 6.49 inch/hr

Peak Flowrate, Q_p = 37.47 cfs
 Peak Flowrate, Q_p = 37.65 cfs
 Peak Flowrate, Q_p = 37.65 cfs

Normal Flow Analysis - Trapezoidal Channel

Project: Daves Ex
 Channel ID: Sec A-A



Design Information (Input)	
Channel Invert Slope	So = 0.0080 ft/ft
Manning's n	n = 0.040
Bottom Width	B = 0.00 ft
Left Side Slope	Z1 = 4.00 ft/ft
Right Side Slope	Z2 = 27.00 ft/ft
Freeboard Height	F = 1.00 ft
Design Water Depth	Y = 0.50 ft
Normal Flow Condition (Calculated)	
Discharge	Q = 5.11 cfs
Froude Number	Fr = 0.46
Flow Velocity	V = 1.32 fps
Flow Area	A = 3.88 sq ft
Top Width	T = 15.50 ft
Wetted Perimeter	P = 15.57 ft
Hydraulic Radius	R = 0.25 ft
Hydraulic Depth	D = 0.25 ft
Specific Energy	Es = 0.53 ft
Centroid of Flow Area	Yo = 0.17 ft
Specific Force	Fs = 0.05 kip

REFERRAL RESPONSES



Fort Lupton Fire Protection District

1121 Denver Avenue • Fort Lupton, Colorado 80621

Office: (303)857-4603 • Fax: (303)857-6619 • Website: www.fortluptonfire.org

Date: 10/4/2016

Project name: Dave's Earthworks Site Plan Review

Project address: 3355 CR 27, Fort Lupton, CO 80621

FLFPD Project # 2016-099

Plan reviewer: Randall S. Weigum

The Fire District has reviewed the submitted Site Plan for Dave's Earthworks located at 3355 CR 27. The plans were reviewed for compliance with *2012 International Fire Code (IFC)* as adopted by the Fort Lupton Fire Protection District and the City of Fort Lupton. The site plan is approved with the following comments and requirements:

1. A dedicated emergency access road 20' in width shall be delineated on the plans. The emergency access road shall extend to within 150' of all portions of the exterior walls of the first story of the buildings as measured by an approved route around the exterior of the building and fuel tank area (See Sheet SP2 for comments). *2012 IFC 503.1.1*
2. Fire Flow Requirements:

The fire flow test from the property to the south (3117 CR 27) on 11/17/2015 had a fire flow of 2,157gpm. The purposed building is listed at 10,780ft². Below are the requirements for each building construction classification:

The fire flow for a Type VB building classification at the above noted square footage would be 2,750gpm for two (2) hours. This building classification type would require a fire sprinkler system installed throughout the building to meet the fire flow requirement of 2,750gpm for two (2) hours.

If the building construction type is classified as Type IIB or IIIB, a 10,780ft² building shall have a fire flow of 2,250gpm for two (2) hours. This leaves a deficiency of 93gpm per minute or 11,260 gallons for two (2) hours. If either a IIB or IIIB construction type is used, I will use Appendix B Fire Flow Requirements for Buildings Section B103.1 Decreases to justify the reduced fire flow of 2,157gpm for two (2) hours. The water system is not looped at this time, but is planned when future development occurs. When the water line is looped, 93gpm should be able to be met and the building will be in compliance with the fire flow of 2,250gpm.

If the building construction type is classified as Type VA, IV, IIA, IIIA, IB or IA the site will have the required fire flow.

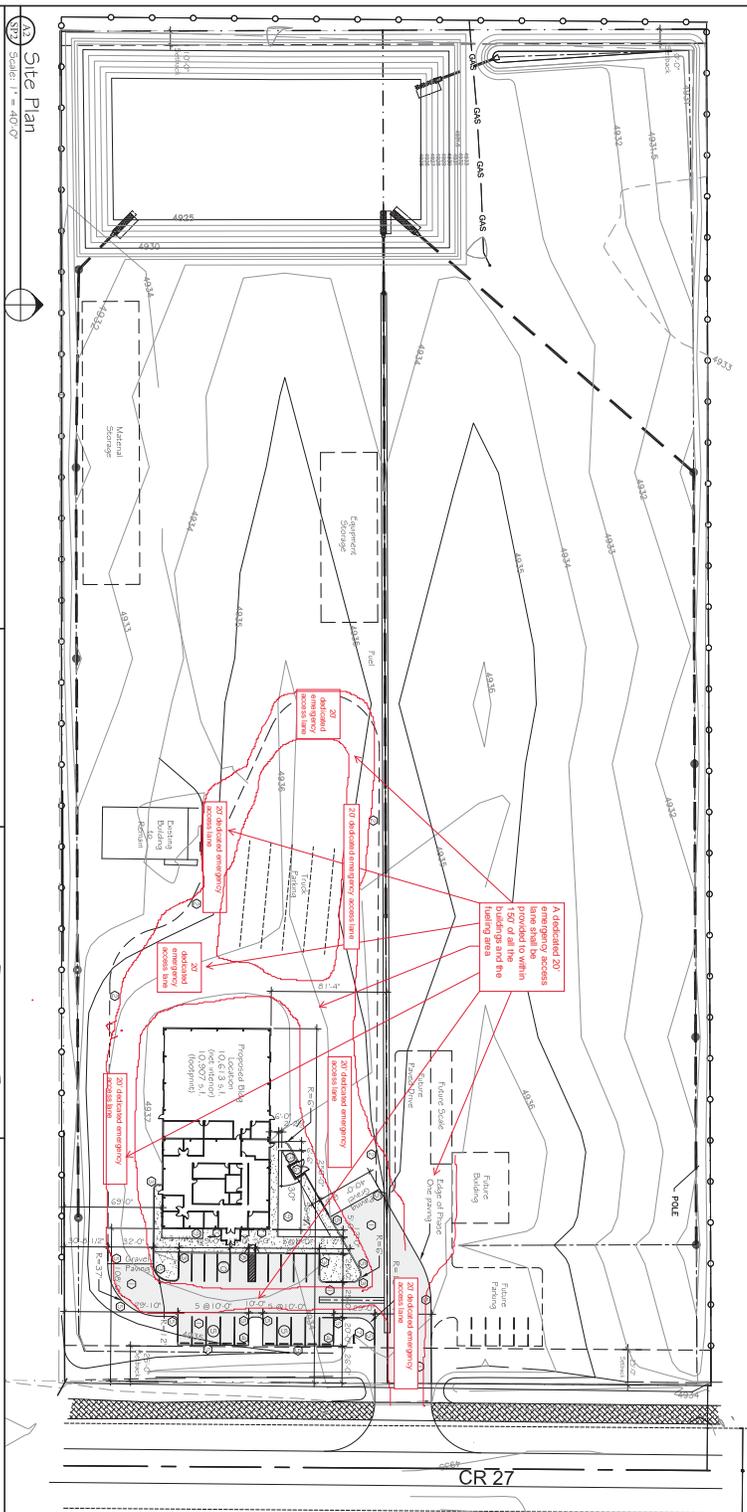
2012 IFC 507.3 and Appendix B

3. Fire Hydrants

With the existing building on the property, the purposed building, and the future building two (2) additional fire hydrants shall be added to meet the requirements of the required fire flows and a fire hydrant within 400 feet of all the exterior ground floor walls of the buildings.

Install one of the fire hydrants on the south side of the main entrance and the second fire hydrant at the southeast side of the building across the drive lane in the landscaped area. (See sheet C2 for location of additional fire hydrants). Any additional water lines and fire hydrants, shall be constructed in accordance with the City of Fort Lupton. *2012 IFC 507.5 and Appendix C*

4. A three (3) foot clear space shall be maintained around the circumference of fire hydrants (See Sheet L1 for comments). *2012 IFC 507.5.5*
5. The site plan does not show any gates associated with the fence that goes around the property. The installation of security gates across a fire apparatus access road shall be approved by the fire chief. Where security gates are installed, they shall have an approved means of emergency operation. The security gates and the emergency operation shall be maintained operational at all times. Electric gate operators, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F 2200. *2012 IFC 503.6*
6. New buildings shall have approved address numbers, building numbers or plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall be a minimum of four (4) inches high with a minimum stroke width of 0.5 inch. The address may be posted on the monument sign or on the building's east side. *2012 IFC 505.1*
7. Construction plans for the facility, building, and aboveground fuel tanks shall be submitted to the Fort Lupton Fire Protection District for review and comment prior to any construction commencing. The plan review process, plan review application, and plan review fee schedule for the Fort Lupton Fire Protection District may be found at: <https://fortluptonfire.org/directions-for-plan-review-submittals/>



- ### Site Legend
- Property Line
 - Setback Line
 - Existing Contours
 - Existing Water Line
 - New Water Service
 - Existing Sanitary Sewer Line
 - New Sanitary Sewer Service
 - New Telephone Service
 - New Electrical Service
 - Existing Gas Line
 - New Gas Service
- ### General Notes
- This project consists of work on two separate parcels to include Parcel #1471, 1040 003 and Parcel #1471, 1040 003 and Parcel #1471, 1040 003 and Parcel #1471, 1040 003. Parcels will remain separate no minor subdivision process is intended for this project.
 - Site plan shall be prepared for grading, drainage, and horizontal control.
 - Site Landscaping Drawings for planting and irrigation provisions are to the outside face of foundation.
 - Proposed structure is approximately 28' H, high from finished floor height to highest roof edge.
 - The proposed office and shop building will have ten full-time employees.
 - Officer floor shall be 5' 0" above the existing finished floor.
 - Officer floor shall be 5' 0" above the existing finished floor.
- ### Plan Key Notes
- Reinforce parking per Conditional Report.
 - Approximate edge of gravel paving, verify with Owner.
 - Concrete curb per CUL.
 - Concrete wheel stops in location shown.
 - Edge of asphalt paving.
 - Trash enclosure per Details, the Sheet.
 - Reinforce curb ramp per Detail E3092.
 - Reinforce curb ramp per Landscape Plans.
 - Reinforce curb ramp per Detail E3092.
 - Reinforce curb ramp per Detail E3092.
 - Reinforce curb ramp per Detail E3092.

Dave's Earthworks Inc. Shop & Office
Site Plan Review
 3355 County Rd 27
 Fort Lupton, Colorado 80621

104/124

Site Plan

Scale: 1" = 40'-0"

18) Bolland Detail

Scale: 1/2" = 1'-0"

Materials: 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign.

19) Trash Enclosure Dtl

Scale: 1/4" = 1'-0"

Materials: 3/4" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel.

20) Accessible Parking Sign

Scale: 3/8" = 1'-0"

Materials: 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign.

21) Monument Sign Details

Scale: 3/8" = 1'-0"

Materials: 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign, 1/2" x 1/2" x 1/2" aluminum sign.

22) Trash Enclosure Elevation

Scale: 1/4" = 1'-0"

Materials: 3/4" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel.

23) Accessible Ramp Detail

Scale: 1/4" = 1'-0"

Materials: 3/4" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel, 1/2" x 1/2" x 1/2" steel.

Halcyon Design LLC

PO Box 30
 Fort Lupton, CO 80621
 303.505.2617

DATE: 03.11.16

REVISIONS:

SHEET TITLE: Site Plan Map

SHEET NUMBER: SP2

Project No. 1607

From: [Hice-Idler - CDOT, Gloria](#)
To: [Alyssa Knutson](#); [Todd Hodges](#)
Subject: Dave's Earthworks, Inc. - Site Plan; Project No. SPR2016-001
Date: Monday, September 26, 2016 5:22:15 PM
Attachments: [image001.png](#)

CDOT has no comment regarding this proposal.

Gloria Hice-Idler
Region 4 Permits Manager
Region 4 Permits Unit - Traffic



P 970.350.2148 | C 970.381.2475 | F 970.350.2198

10601 W. 10th Street, Greeley, CO 80634

gloria.hice-idler@state.co.us | www.codot.gov | www.cotrip.org



On Fri, Sep 23, 2016 at 1:57 PM, Alyssa Knutson <AKnutson@fortlupton.org> wrote:

Good Afternoon,

The documentation located at the link <http://co-fortlupton.civicplus.com/577/Daves-Earthworks-Inc> is submitted to you for review and recommendation for a site plan review. Any comments you consider relevant to this request would be appreciated. Please reply by **October 14, 2016** so that we may give full consideration to your recommendation. Any response not received before or on this date may be deemed to be a favorable response to the Planning & Building Department. If you have any questions, you may either contact me or Todd A. Hodges, Planning Director, at thodges@fortlupton.org or [303-857-6694](tel:303-857-6694).

The hearings for this matter are scheduled for **Tuesday, November 1, 2016 at 6:00 P.M.** with the Fort Lupton Planning Commission and **Monday, November 7, 2016 at 7:00 P.M.** with the Fort Lupton City Council.

Comments may be sent via mail, faxed to [303.857.0351](tel:303.857.0351) or emailed to

thodges@fortlupton.org and aknutson@fortlupton.org.

Your time in this matter is greatly appreciated!

Best,

Alyssa Knutson

Planner

130 S. McKinley Ave.

Fort Lupton, CO 80621

Office: [303.857.6694](tel:303.857.6694)

Direct: [720.466.6128](tel:720.466.6128)

Mobile: [303.304.4498](tel:303.304.4498)



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MEMO

To: Alyssa Knutson
From: Mari Peña
Date: October 6, 2016
Subject: Review-Dave's Earthworks, Inc., Site Plan
SPR2016-001 & SUP 2016-002

1. A permit is required for the monument sign. Setbacks and requirements for the monument sign and any other signs shall be per Article VII of the Fort Lupton Municipal Code.

From: [Marilyn Conley](#)
To: [Alyssa Knutson](#)
Cc: [Todd Hodges](#); [Mari Pena](#)
Subject: RE: Dave's Earthworks, Inc. - Site Plan; Project No. SPR2016-001
Date: Monday, September 26, 2016 4:59:04 PM
Attachments: [image003.png](#)

Hello Alyssa

Thank you for sending over the attached information. Both of these parcels have been included within both the Northern Colorado Water Conservancy District and the Municipal Subdistrict, Northern Colorado Water Conservancy District boundaries.

If you have any questions, please let me know.

Have a great weekend.

Marilyn



Marilyn Conley | Inclusions Administrator
220 Water Ave | Berthoud, CO 80513
Direct 970-622-2216
Main 800-369-RAIN (7246) | Fax 877-851-0018
www.northernwater.org | [Find us on Facebook](#)

Disclaimer Notice: An allotment of Colorado-Big Thompson water is subject to the Water Conservancy Act, C.R.S 37-45-101 et seq, the authority of the Board of Directors of the Northern Colorado Water Conservancy District, and other relevant laws and regulations. The information provided in this email is not binding on Northern Water because the legal rights to Colorado-Big Thompson Project Allotments are subject to the continuing discretion of the Board of Directors of Northern Water and other legal limitations and requirements. Northern Water staff and counsel cannot provide you with legal advice, and you are advised to seek legal counsel with respect to the subject matter of this email. You also have an independent obligation to review and confirm the accuracy and completeness of any information provided to you by Northern Water, and to supplement or correct the records of Northern Water with respect to any errors or omissions.

From: Alyssa Knutson [mailto:AKnutson@fortlupton.org]
Sent: Friday, September 23, 2016 1:57 PM
Cc: Todd Hodges; Mari Pena
Subject: Dave's Earthworks, Inc. - Site Plan; Project No. SPR2016-001

Good Afternoon,

The documentation located at the link <http://co-fortlupton.civicplus.com/577/Daves-Earthworks-Inc> is submitted to you for review and recommendation for a site plan review. Any comments you consider relevant to this request would be appreciated. Please reply by **October 14, 2016** so that we may give full consideration to your recommendation. Any response not received before or on this date may be deemed to be a favorable response to the Planning & Building Department. If you have any questions, you may either contact me or Todd A. Hodges, Planning Director, at thodges@fortlupton.org or 303-857-6694.

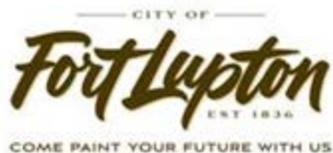
The hearings for this matter are scheduled for **Tuesday, November 1, 2016 at 6:00**

P.M. with the Fort Lupton Planning Commission and **Monday, November 7, 2016 at 7:00 P.M.** with the Fort Lupton City Council.

Comments may be sent via mail, faxed to 303.857.0351 or emailed to thodges@fortlupton.org and aknutson@fortlupton.org.

Your time in this matter is greatly appreciated!

Best,
Alyssa Knutson
Planner
130 S. McKinley Ave.
Fort Lupton, CO 80621
Office: 303.857.6694
Direct: 720.466.6128
Mobile: 303.304.4498



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MEMO

To: Todd Hodges
Alyssa Knutson

From: Roy Vestal

Date: September 26, 2016

Subject: Dave's Earthworks, Inc.
(SPR2016-001)
Public Works Review

Public Works has reviewed the submitted documents for the above referenced development project with the following comments:

1. Construction Drawings
 - a. Include survey basis of bearing and reference datum.
 - i. Is additional 30' ROW being dedicated for CR 27?
 - b. Sheet C2 – Waterline should show connection to existing water line. Existing utilities need to be shown. Waterline needs to be located within the ROW. If fire hydrant is to be located on the property, an easement is required. I would prefer to locate the fire hydrant in the ROW.
 - i. No design provided for storm drainage pipes. I would prefer to see profiles of storm pipes rather than the water line.
 - ii. No design provided for ditch culvert at entrance. If it is existing it should show that way on the plans. This must be coordinated with the ditch company.
 - c. Sheet C3 – Future Building pad FF elevation would require lowering the proposed grading and may create a sump condition at time of implementation. Should consider minimum FF of 38.5.
 - d. Sheet L1 – CR 27 frontage trees proposed may create sight issues at the drive when the road is widened in the future. Consider removing the closest trees to the drive access
 - e. Be advised, review of construction drawings is for general compliance with city standards. Final approval of drawings does not infer the drawings are error free and the design engineer and owner are still responsible for any erroneous or missing details.

2. Drainage Report

- a. Please provide a cover for the report
- b. Please revise report order to have text at front of the report and calculations as appendices.
- c. Please complete the Standard Statement 2 with developer's signature.
- d. Remove the Drainage agreement document, this is not needed.
- e. Complete the Standard Form 3 Indemnification Statement and have the owner sign.



WERNSMAN ENGINEERING, INC.

1011 42nd STREET ♦ EVANS, CO 80620
Phone (970) 353-4463 Fax (970) 353-9257

October 14, 2016

Roy Vestal
City of Fort Lupton
130 S. McKinley Ave.
Fort Lupton, CO 80621

RE: Dave Hunt Project on CR 27

Dear Mr. Vestal

Here are my written replies to the Public Works Comments

1. a. Survey Datum and Basis of Bearings will be provided on the next submittal site plan
 - i. There is already 60' of ROW dedicated on the west side of CR 27
 - b. A note will be added to water line drawing that states connect to existing valve at assumed location. Also please contact Roy Vestal at 720-966-3613 when the end of the existing water line is exposed.
 - i. The storm pipe design is provided in the drainage report. If profiles are required they can be provided
 - ii. We are currently working with Deere & Ault Consultants on the Crossing Design. We will provide that as it gets finalized
 - c. I will discuss this further with your office at a later time to clarify the comment
 - d. Trees can be moved
 - e. Noted
2. a. Cover sheet will be provided
 - b. Noted
 - c. Statement 2 will be provided with Developers signature
 - d. Drainage Agreement will be removed
 - e. Indemnification statement will be completed and signed.

Thank you for speaking with me on 10/14, I appreciate your time. If I can answer any further questions please feel free to contact me.

Sincerely

Eric Wernsman

From: [Marisa Dale](#)
To: [Alyssa Knutson](#)
Subject: RE: Dave's Earthworks, Inc. - Site Plan; Project No. SPR2016-001
Date: Tuesday, September 27, 2016 2:23:13 PM
Attachments: [image003.png](#)

Thank you for allowing United Power, Inc. to review and comment on the Dave's Earthworks, Inc. referral.

United Power, Inc. has no objection and looks forward to providing electric service to this site.

Developer must contact Brett Thomas at 303-1213 for any new installation or modification of existing electric service.

Thank you,
Marisa

Marisa Dale, RWA | [Engineering & Rates ROW](#)
500 Cooperative Way, Brighton, CO 80603 | O 303.637.1387 | C 720.334.5282

Schedule: M-T-W-F 7:00-4:30, Th 7:00-3:30
Off Friday Oct 7 & 21, Nov 4 & 18, Dec 2, 16 & 30



From: Alyssa Knutson [mailto:AKnutson@fortlupton.org]
Sent: Friday, September 23, 2016 1:57 PM
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Subject: Dave's Earthworks, Inc. - Site Plan; Project No. SPR2016-001

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thodges@fortlupton.org and aknutson@fortlupton.org.

Your time in this matter is greatly appreciated!

Best,

Alyssa Knutson

Planner

130 S. McKinley Ave.

Fort Lupton, CO 80621

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Right of Way & Permits
1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.571.3306**
Facsimile: 303. 571.3284
donna.l.george@xcelenergy.com

October 13, 2016

City of Fort Lupton Planning Department
130 South McKinley Avenue
Fort Lupton, CO 80621

Attn: Alyssa Knutson and Todd Hodges

Re: Dave's Earthworks, Case # SPR2016-001

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the site plans for **Dave's Earthworks** and has **no apparent conflict**.

The property owner/developer/contractor must contact the **Builder's Call Line** at 1-800-628-2121 **or** <https://xcelenergy.force.com/FastApp> (register, application can then be tracked) and complete the application process for any new gas service or modification to existing facilities. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details. Additional easements may need to be acquired by separate document for new facilities.

As a safety precaution, PSCo would like to remind the developer to call the **Utility Notification Center** at 1-800-922-1987 to have all utilities located prior to any construction.

If you have any questions about this referral response, please contact me at (303) 571-3306.

Donna George
Contract Right of Way Referral Processor
Public Service Company of Colorado

LEGAL NOTIFICATIONS

CERTIFICATE OF MAILING

I, the undersigned, hereby certify that on the 5th day of October 2016, a true and correct copy of the foregoing Notice of Public Hearings and site plan map for Dave's Earthworks, Inc was sent via United States Mail, postage pre-paid, to the following addresses:

27-SQ LLC
1137 Bridge Street
Brighton, CO 80601-2232

Maxum Enterprises LLC
P.O. Box 54446
Lexington, KY 40555-4446

City and Council of Denver
Board of Water Commissioners
1600 W 12th Avenue
Denver, CO 80204-3412

Leon A. & Linda L. Scheel
3429 County Road 27
Fort Lupton, CO 80621-8313

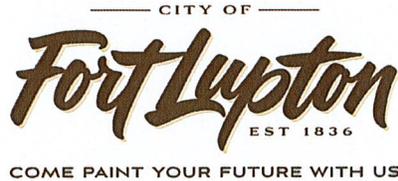
Anadarko Petroleum Corporation
Attn: Manager Land, Western
Division & Manager Property &
Rights of Way
P.O. Box 9149
The Woodlands, TX 77387-9147

Kerr-McGee Oil & Gas Onshore LP
Attn: Land Manager/Wattenburg
1099 18th Street, #1500
Denver, CO 80202

Noble Energy, Inc
Attn: Wattenberg Land Department
1625 Broadway, Suite 2000
Denver, CO 80202



City Official



**CITY OF FORT LUPTON
NOTICE OF PUBLIC HEARING**

Notice is hereby given that the City of Fort Lupton is in receipt of an application for a site plan for a proposed storage yard, maintenance shop and commercial office and special use permit for proposed above-ground fuel tanks, referred to as the Dave's Earthworks, Inc.'s Site Plan and Special Use Permit located west and adjacent to CR 27 and approximately one-half mile north of CR 8, Fort Lupton, Colorado in the I-1 Light Industrial Zone District, pursuant to the City of Fort Lupton Municipal Code Notice Requirements.

The public hearings are to be held before the Planning Commission on November 1, 2016, at 6:00 P.M., and before the City Council on November 7, 2016, at 7:00 P.M. or as soon as possible thereafter.

The public hearings shall be held in the City Hall, 130 South McKinley Avenue, Fort Lupton, Colorado, or at such other time or place in the event this hearing is adjourned. Further information is available through the City Planning and Building Department at (303) 857-6694, Extension 128.

ALL INTERESTED PERSONS MAY ATTEND.

LEGAL DESCRIPTION

**LOTS 2 AND 3 OF THE YARBROUGH ACRES MINOR SUBDIVISION, CITY OF FORT LUPTON,
COUNTY OF WELD, STATE OF COLORADO.**

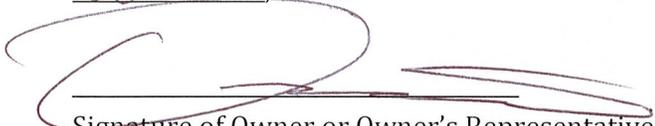
Sign Posting Affidavit

Dave's Earthworks, Inc. – Site Plan
Project No. SPR2016-001



County Road 27

I, Dave Hunt hereby acknowledge that the aforementioned property was posted in accordance with City Codes. Said public hearing notice was posted on this 13 day of Oct, 2016.


Signature of Owner or Owner's Representative

The foregoing instrument was acknowledged before me by Dave Hunt, this 19 day of October, 2016. Witness my hand and seal.

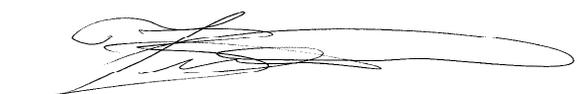
My commission expires 1-31-18.


Notary Public

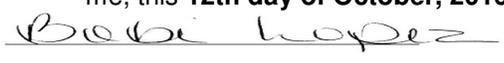
Amber Phillips
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20144004824
MY COMMISSION EXPIRES JANUARY 31, 2018

**PROOF OF PUBLICATION
FORT LUPTON PRESS
COUNTY OF WELD SS.
STATE OF COLORADO**

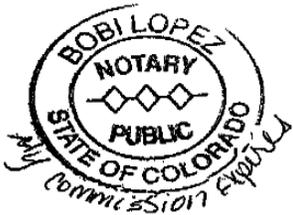
I, Tim Zeman, do solemnly swear that I am the Publisher of the **Fort Lupton Press** is a weekly newspaper printed and published in the County of Weld State of Colorado, and has a general circulation therein; that said newspaper has been published continuously and uninterruptedly in said county of Weld for a period of more than fifty-two consecutive weeks prior to the first publication of the annexed legal notice or advertisement; that said newspaper has been admitted to the United States mails as second-class matter under the provisions of the act of March 3, 1879, or any amendments thereof, and that said newspaper is a weekly newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the State of Colorado. That the annexed legal notice or advertisement was published in the regular and entire issue of every number of said weekly newspaper for the **period of ONE consecutive insertion(s)** and that the first publication of said notice was in the issue of newspaper, dated **12th day of October 2016** the last on the **12th day of October 2016**



Managing Editor, Subscribed and sworn before me, this **12th day of October, 2016**



Notary Public.
Notary ID No. 20024002511



My Commission Expires February 2, 2018

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**LOTS 2 AND 3 OF THE YARBROUGH
ACRES MINOR SUBDIVISION, CITY
OF FORT LUPTON, COUNTY OF
WELD, STATE OF COLORADO.**

Published in the Fort Lupton Press
October 12, 2016

**ANNUAL NOTICE OF ASBESTOS
INSPECTION AND MANAGEMENT
PLANS**

NOTICE is hereby given that St. Vrain Valley School District RE-1J, in accordance with the United States Environmental Protection Agency's Asbestos Hazard Emergency Response Act, has completed federally mandated asbestos inspections of its facilities and that Asbestos Management Plans are available for public review (including the public, parents of students, teachers, other school personnel, and parent organizations) at each school facility and at the Educational Support Center, 395 South Pratt Parkway, Longmont, CO 80501 without cost or restriction for inspection during normal business hours. Copies can be made of such Plans at the normal copying charges established by the District. This letter shall also serve as notification of any asbestos related efforts, which may be performed by

the District at anytime such as periodic surveillance, 3-Year Re-Inspections, Operations, and Abatement.

Contact information for any questions or concerns is as follows:

St. Vrain Valley School District RE-1J
Environmental Compliance Manager
Carey Jensen
Phone: (303)-702-7527
email: jensen_carey@svvdsd.org

**Published in the Fort Lupton Press
October 12, 2016**