ADAMS HILL CENTER

Chase Subdivision, Lot 2A-1
Anchorage, AK

DRAINAGE REPORT

June 10, 2015

STATE OF ALASKA
49th
MICHAEL E. ANDERSON
No. CE-4381
6-10-15
REGISTERED PROFESSIONAL ENGINEER

Completed By:

ANDERSON ENGINEERING
Michael E. Anderson, P.E.

Table of Contents

DRAINAGE STATEMENT OF COMPLIANCE

Applicant Name		**Contact Information** (Phone and/or email)	
Mailing Address	1118 E 70th Ave Suite 200		
Property Description (subdivision, lot(s), and block)	Chase Sub Lot 2A-1		
Plat Number	060170	**MOA Assessor's Office Property Identification Number**	014-294-53-000
MOA Tracking Number(s) (Indicate which provided)	C15 -		
Project Category (Check one)	Crossing ☐ Single-Lot Residential ☐ Class 1A ☐ Class 1B ☐ Class 1C ☐ Class 1D Small ☐ Simple ☑ Complex Large ☐ Simple ☐ Complex		
Project and/or Report Title	Adams Hill Center		

By signature below, I certify that I am legally responsibly for the drainage project described above and in the attached drainage report, and that it has been prepared in compliance with the MOA Project Management and Engineering Design Criteria Manual, the MOA Drainage Design Guidelines, the Anchorage Municipal Code, and other state and federal regulations and permits. I certify under penalty of law that the drainage report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are penalties, including the possibility of fine and imprisonment, for knowing violations.

Signed

Date

2. Project Description

a. Location

This project is located in south Anchorage. The legal description is Chase Subdivision, Lot 2A-1. The project is located on the west side of Lake Otis Parkway, just south of East 88th Ave. **Latitude 61.1397°, Longitude 149.8351°.**

b. Project Description

The project includes the minor clearing of an empty lot and construction of a commercial building with a parking lot. Currently the lot is very flat, sloping slightly toward the north and west at less than a 1% slope, although it steepens just a bit at the northwest corner with flow to Arlon Street. Storm drain available in Lake Otis Parkway, but no storm drain currently fronts the project on Arlon Street. The subsurface soils on the lot are relatively silty gravels that have a percolation rate of approximately 20 min/in. The standard rainfall curves in this area of Anchorage are multiplied by a factor of 1.09.

c. Category Determination

This project is commercial in nature, involves less than five acres, and has only one building site. The estimated runoff for the 10-year, 24-hour storm after development is above the threshold limit of 0.42 CFS/acre, so this is classified as a **Complex Small Project**.

3. Basin Characterization

a. Pre-development Conditions

Currently, the property is a vacant lot with no real vegetation and an exposed gravel surface. The lot is relatively flat, sloping slightly toward the north and a bit to the west. The soils are silty gravel, and will absorb much of the water that falls onto the lot. Excess runoff flows to the north end of the lot where it sheds off either onto the north property or into the ROWs for Lake Otis Parkway and Arlon Street.

b. Post-development Conditions

After development, there will be a commercial building on the center of the lot surrounded by parking areas. The entire property will be developed with either parking or landscaped planting areas. Water from the parking area and roof will be directed toward the landscaped portions of the lot where it will be filtered by vegetation before it flows into catch basin manholes that connect to the storm drain or to an underground absorption trench.

c. Contributing Off-site Drainage

N/A

d. Floodways, Floodplains, and Wetlands

N/A

e. Problem Areas

N/A

f. Pre-development Runoff Analysis

The EPA SWMM 5.0 program was used to analyze the runoff using the pre-construction conditions. The output is included in Appendix B. The entire project site was modeled as one subcatchment 250' wide, sloping 1% to the north. The following table shows the basic program values used.

Total area:	**Soils:**
1.00 acres	'Silt Loam': K=6.69, ψ=0.26, Initial Deficit = default (0.25)

	Pervious	**Impervious**	**Zero-Impervious**
Description	Compacted gravel	Paved area	Roof
Area	94.3%	5.7%	0.0% (of Impervious)
Manning's n	0.024	0.011	
Depression Storage	0.05"	0.05"	0.05"

According to this model, the total runoff for the 10-year storm is 1,152.4 ft3. The peak flow is 0.744 CFS. The total runoff for the 1-year storm is 407.6 ft3.

4. Post-Development Runoff Analysis

The EPA SWMM 5.0 program was used to analyze the runoff using the post-construction conditions. The output is included in Appendix B. The entire project site was modeled as one subcatchment 115' wide, sloping 1% to the south. The following table shows the basic program values used.

Total area:	**Soils:**
1.00 acres	'Silt Loam': K=6.69, ψ=0.26, Initial Deficit = default (0.25)

	Pervious	**Impervious**	**Zero-Impervious**
Description	Grass	Paved area	Roof
Area	6.2%	93.8%	27.3% (of Impervious)
Manning's n	0.24	0.011	
Depression Storage	0.05"	0.05"	0.05"

According to this model, the peak post-development runoff for the 10-year, 24-hour storm is 1.30 CFS, and a total runoff of 4,851.9 ft^3. The runoff for the 1-year storm is 2,316.6 ft^3.

5. Stormwater Conveyance Design

The storm water conveyance system will be pavement swales and grassy channels that will channel the water to the storm drain system or to the subsurface absorption trench.

6. Stormwater Management Design

a. Design Criteria

1. Conveyance Design

The contributing area for this project is far less than 40 acres, so the 10-year, 24-hour storm is used for sizing the storm drain system. However, the site is small enough that the additional flow could not affect the municipal storm drain. There is no need for additional conveyance design.

2. Project Flood Bypass

In the event of the 100-year, 24-hour storm, the excess water will overflow into the ROWs for Lake Otis Parkway and Arlon Street. There is no threat to additional properties resulting from such a storm.

3. Wetland Retention

N/A

4. Water Quality Protection

All of the water will be collected in grassy swales before it is channeled into the storm drain system. The first 1/2" of runoff will be filtered by the vegetation.

5. Extended Detention

The excess post-development runoff from the 1-year, 24-hour storm must be detained for 12-24 hours.

6. Flood Hazard Protection

This criterion limits the post-development runoff into a storm drain to a 5% increase over the pre-development peak flow.

7. Downstream Impact Control

This criterion also limits the post-development runoff into a storm drain to a 5% increase over the pre-development peak flow. Therefore, this is taken care of in the same way as the flood hazard protection.

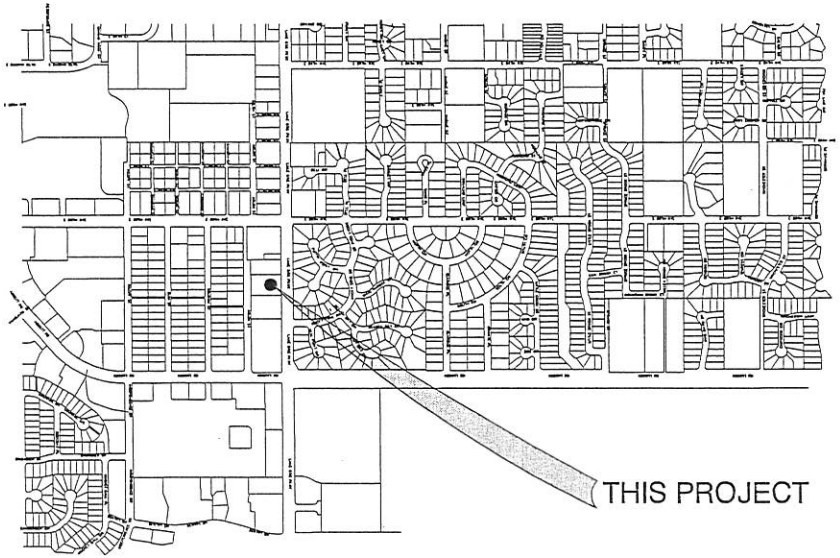
a. Infiltration/Detention/Retention Facilities

A 30' long x 3' wide x 4' effective depth absorption trench will be constructed at the northwest corner of the property. The runoff from the western portion of the parking area will be directed to a landscaped drainage swale along the western property line. Runoff water will filter through the landscaping and be absorbed into the ground. Excess runoff will be collected in a manhole in the northwest corner and directed to the absorption trench.

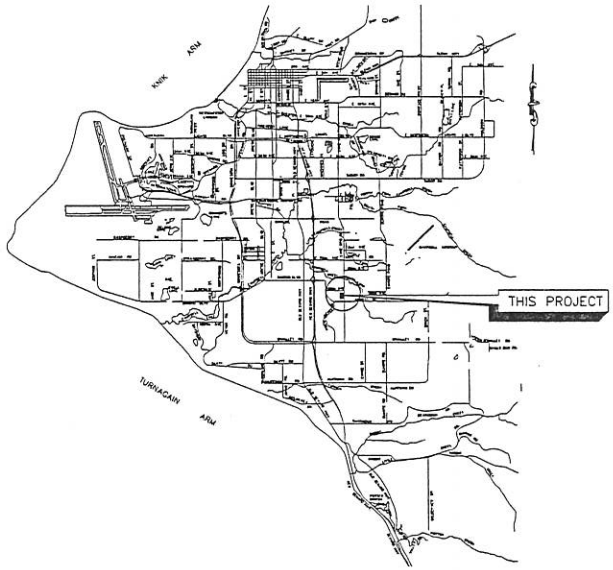
The trench has 33 0 square feet of absorption area including the sidewalls. With an absorption rate of 20 minutes per inch it will have the capacity to absorb 82.5 cubic feet of water per hour or 619 Gallons. Over a 24 hour period this equates to 1,980 cubic feet or nearly 14,850 gallons.

The vast majority of the runoff water will be directed to the front vegetated swale and the Municipal storm drain in Lake Otis Parkway. The roof drains will also be piped directly to the collection manhole prior to discharge.

Appendix A: Drawings



LOCATION MAP
1" = 500'



VICINITY MAP
NOT TO SCALE

NOTES:

1. Construction Shall Be In Accordance With the Municipality of Anchorage Standard Specifications (MASS), Most Recent Edition.

2. The Contractor Shall Notify All Area Utility Companies Prior to Commencement of Excavation.

3. Existing Organics And Non-Complying Soil Material Will Be Removed Before Backfill Placement. Ground Will Be Scarified To Provide Bond With New Fill.

4. Imported Backfill Must Be Type II And Placed In 12" Lifts And Compacted To 95% Of Maximum Theoretical Density. Maximum Slope Is 1V:2H. Maintain 2' Setback From Property Lines.

5. Backfill Will Not Contain Frozen Material, Organics, Or Rocks Greater Than 12".

6. All Disturbed Slopes Will Be Stabilized By Pavement Or Landscaping.

7. Surfaces Must Be Sloped Away From Building For 10': 2% For Impervious Surfaces, 5% For Pervious.

8. Existing Storm Drain and Manholes Have Been Verified As Adequate In Condition And Capacity By Engineer.

9. Install 4" Insulation 2' Wide Over All 12" CPEP.

10. Anderson Engineering will Perform the Required Civil Engineer Inspections Per Section AMCR 21.90.003.E.2-4 Which Include Observation and Review of Line, Grade, and Surface Drainage.

11. Northern Geotechnical and Terra Firma Will Perform the Required Soils Engineer Inspections Per IBC Table 1704.7. Inspections Shall Include Observations During Grading and Testing For Required Compaction as Well as Observations During Preparation of The Natural Ground Prior to Fill Operations.

12. No Snow Storage Is Provided On the Site. All Accumulated Snow Will Be Hauled From The Site.

13. 4" HDPE Roof Drain Must Have A Minimum of 4' of Cover Or 4" Of Insulation And 3' of Cover.

HAUL ROUTES:

1. Fill Material will be Hauled From AS&G East onto Minnesota Drive, then Continue East on O'Malley Road, then Turn North Onto Lake Otis, To the Site. The Return Trip Will be the Reverse.

2. Waste Material Will Be Hauled South onto Lake Otis Parkway, then West onto Abbott Road, then continue West Onto Dimond Boulevard, then North onto Sand Lake Road, To Lucy Pit. The Return Trip will be the Reverse.

OWNER AND EMERGENCY INFORMATION:

STEVEN ADAMS
SUBWAY OF ALASKA
SUBWAY AVENUE
ANCHORAGE, ALASKA 99XXX
PHONE: 666-6666

SUBWAY OF ALASKA
CHASE SUBDIVISION
LOT 2A-1
Anchorage, Alaska
CIVIL PLANS

ADDRESS: 8950 LAKE OTIS PARKWAY
GRID: SW2333

SHEET INDEX	
SHEET NO.	SUBJECT
C1	COVER SHEET
C2	SITE PLAN
C3	GRADING PLAN
C4	LAYOUT PLAN
C5	EROSION CONTROL PLAN
C6	SECTIONS 1
C7	SECTIONS 2
C8	DETAILS 1
C9	DETAILS 2

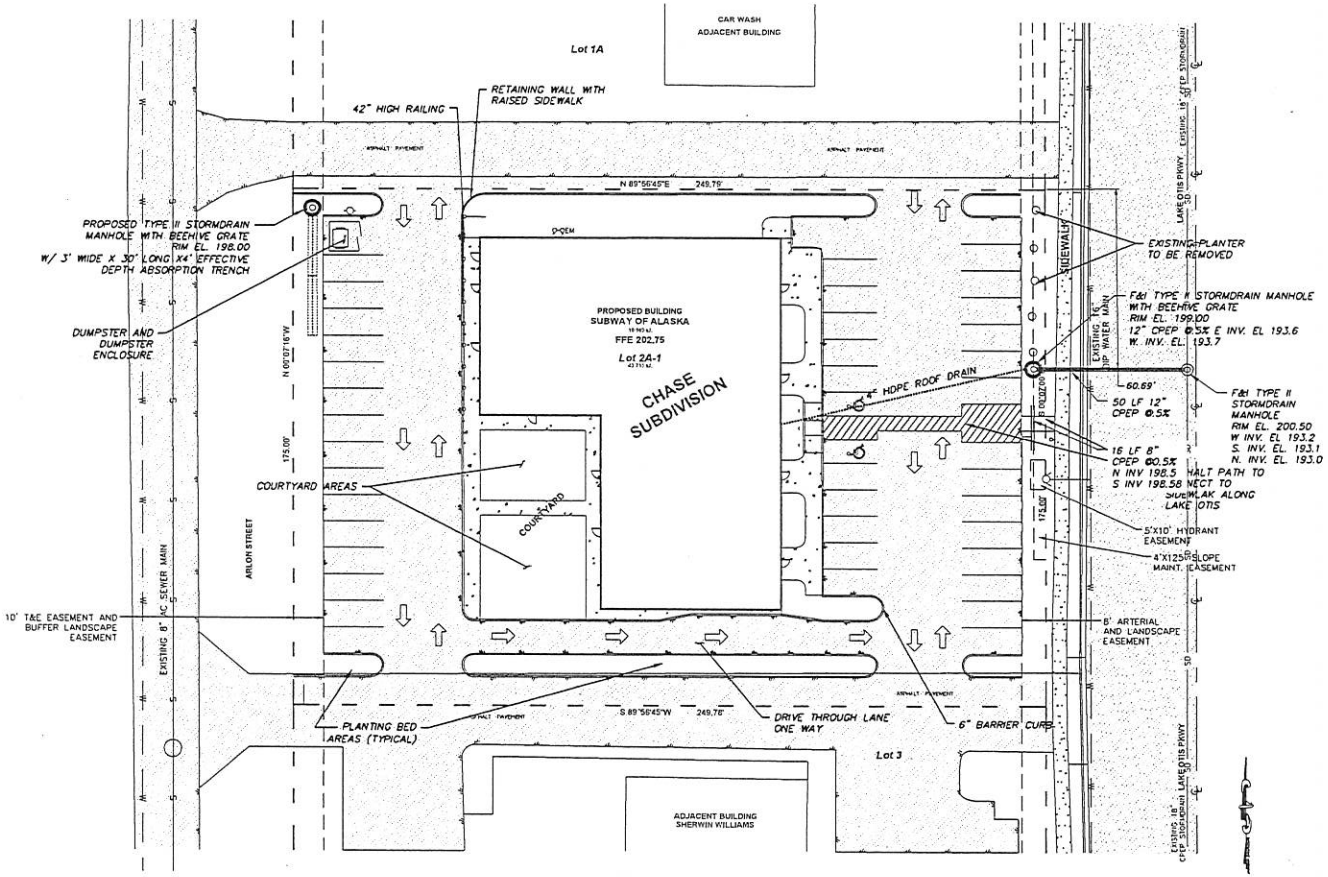
STATE OF ALASKA 49TH
Michael E. Anderson
43241-E
6-8-15
REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
800 E Dimond, Suite 350
T 907.522.1773
Anchorage, Alaska 9515
F 907.677.7344

CIVIL PLANS
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

NO.	REVISIONS	DATE

DRAWN MEA CHECKED MEA
DATE 6/8/2015
SCALE 100%
JOB NO. —
DRAWING TITLE TITLE SHEET
SHEET NO. C1



SITE PLAN
1" = 20'

PARKING CALCULATION:

9,960 S.F. Building Area
300 S.F Per Space = 32 Spaces Required
39 Spaces Shown and 2 Accessible Spaces

STATE OF ALASKA
49TH
Michael E. Anderson
4361E
6-8-15
REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
800 E Dimond, Suite 350 Anchorage, Alaska 99515
T 907.522.3773 F 907.4777744

SITE PLAN
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

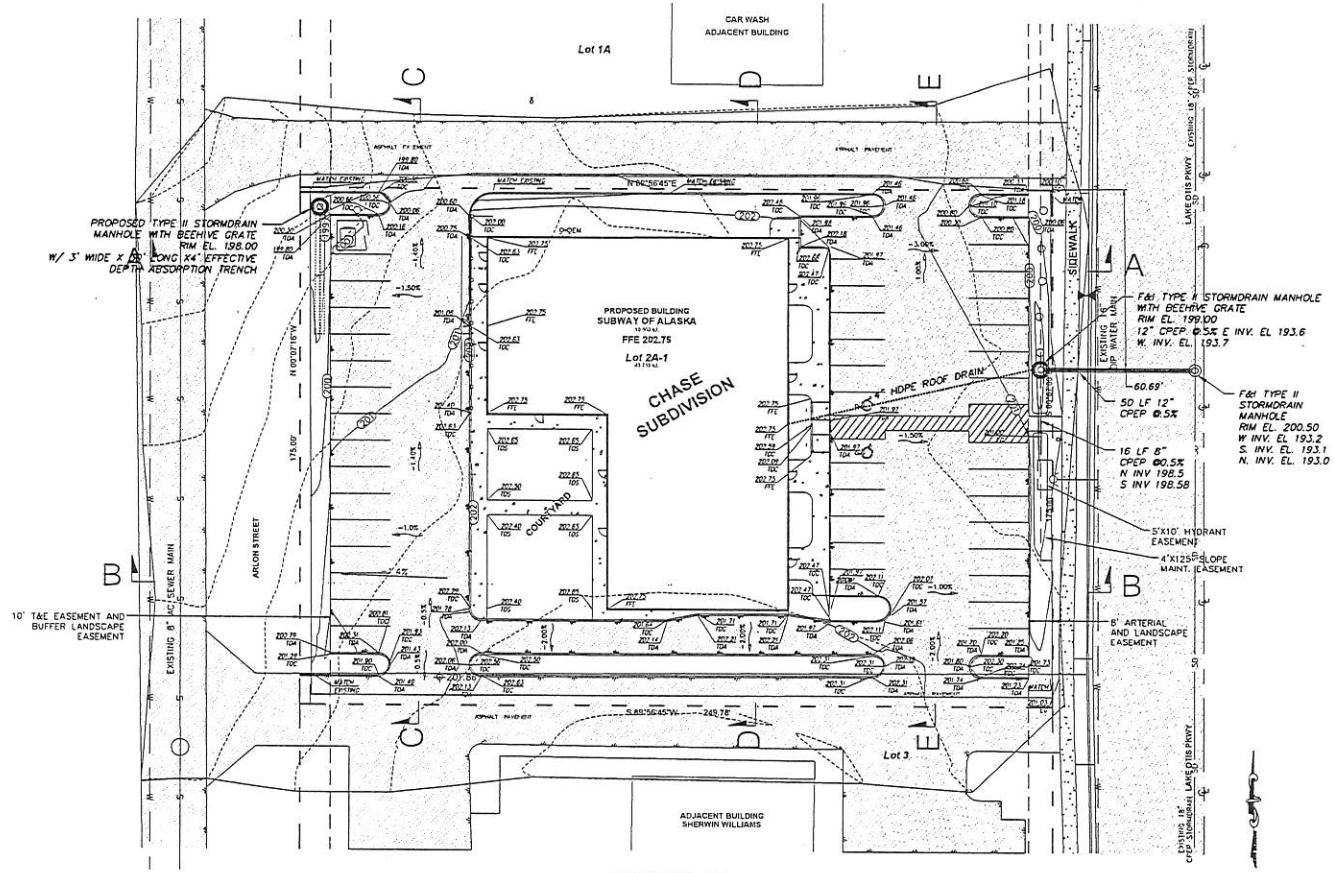
NO.	REVISIONS	DATE

DRAWN: MEA CHECKED: MEA
DATE: 6/8/2015
PHASE: 100%
JOB NO.: —
DRAWING TITLE: SITE PLAN
SHEET NO.: C2

LEGEND

- ROAD CENTERLINE
- EASEMENT
- PROPERTY/BOUNDARY LINE
- SILT FENCE
- DRAINAGE ARROW

EXISTING	NEW	
		SURVEY MONUMENT
TH 1A		TEST BORING OR PIT
OHE		OVERHEAD ELECTRIC
		POWER POLE W/ GUY ANCHOR
UGE		UNDERGROUND ELECTRIC
UT		UNDERGROUND TELEPHONE
D.U.T.		TELEPHONE PEDESTAL
G		GAS LINE
		EDGE OF TREES
204	152	ELEVATION CONTOUR
X175.8	X175.8	SPOT ELEVATION
		EDGE OF ASPHALT
		CURB & GUTTER
		SIDEWALK
W	W	WATERLINE W/ VALVE
		FIRE HYDRANT
S	S	SEWERLINE W/ MANHOLE
		STORM DRAIN CLEANOUT
SD	SD	STORM DRAIN W/ MANHOLE
		STORM DRAIN CATCH BASIN MANHOLE
		CATCH BASIN
		CULVERT
		WATER SERVICE
		SEWER SERVICE
		STORM SERVICE
		GROUND WATER TABLE
		STORM DRAIN CLEANOUT



GRADING PLAN
1" = 20'

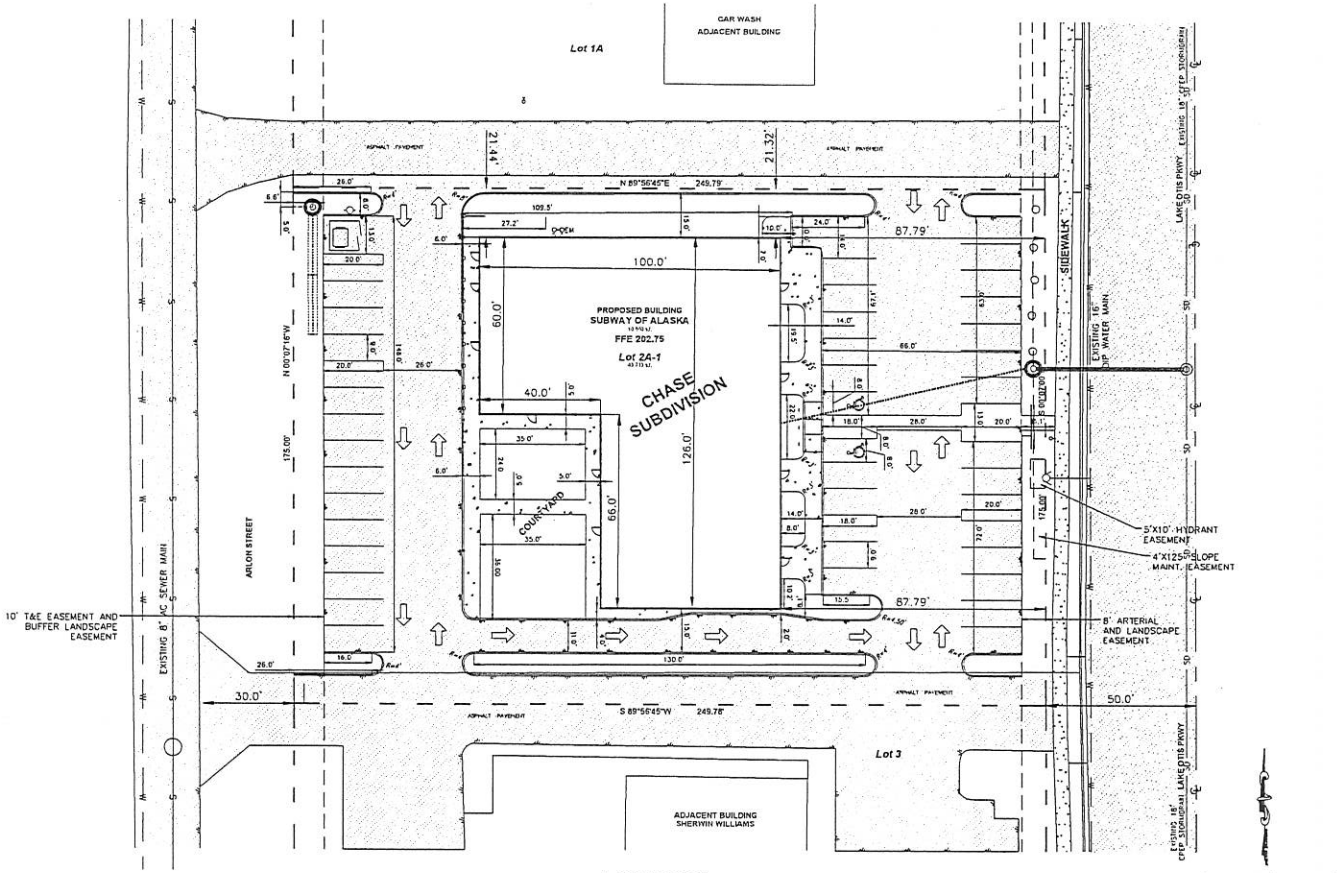
STATE OF ALASKA
49TH
Michael E. Anderson
4361-E
4-8-15
REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
895 E Dowd, Suite 350
T 907.332.7773
Anchorage, Alaska 99515
F 907.272.7344

GRADING PLAN
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

NO.	REVISIONS	DATE

DRAWN: MEA	CHECKED: MEA
DATE: 6/8/2015	
PHASE: 100%	
JOB NO. —	
DRAWING TITLE: GRADING PLAN	
SHEET NO. C3	



LAYOUT PLAN
1" = 20'

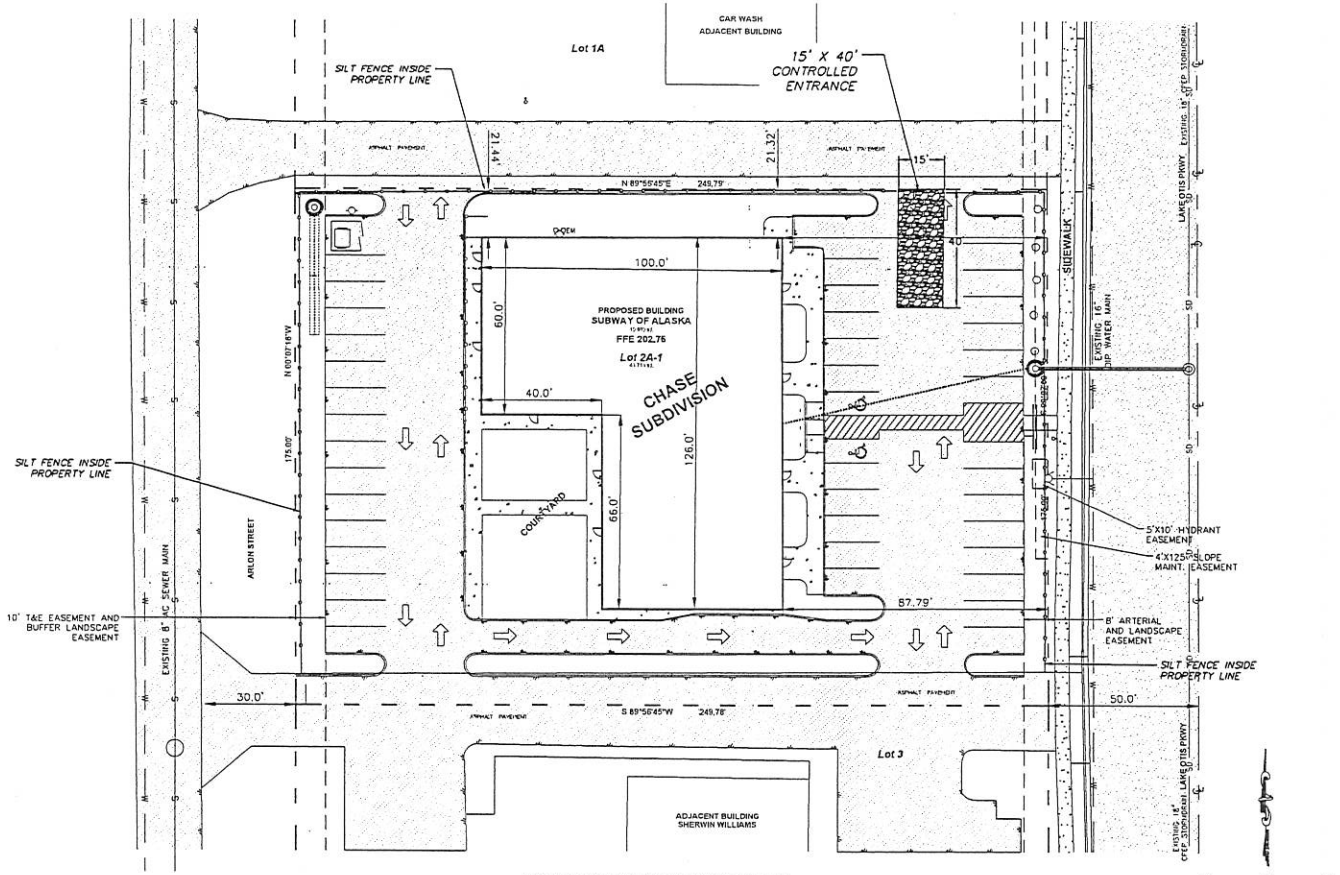
STATE OF ALASKA
49 TH
Michael E. Anderson
4361-E
C-8-15
REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
800 E Dimond, Suite 350
T 907.337.2775
Anchorage, Alaska 99515
F 907.337.2744

LAYOUT PLAN
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

No.	Revisions	Date

DRAWN: MEA CHECKED: MEA
DATE: 5/16/2015
PHASE: 100%
JOB NO.: —
DRAWING TITLE: LAYOUT PLAN
SHEET NO.: C4



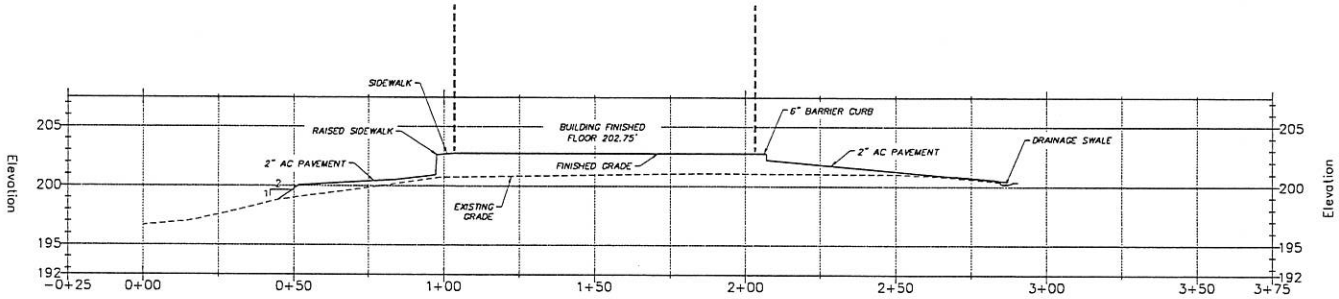
SEWER AND WATER SERVICES PLAN
1" = 20'

STATE OF ALASKA
49TH
Michael E. Anderson
6381-E
6-8-15
REGISTERED PROFESSIONAL ENGINEER

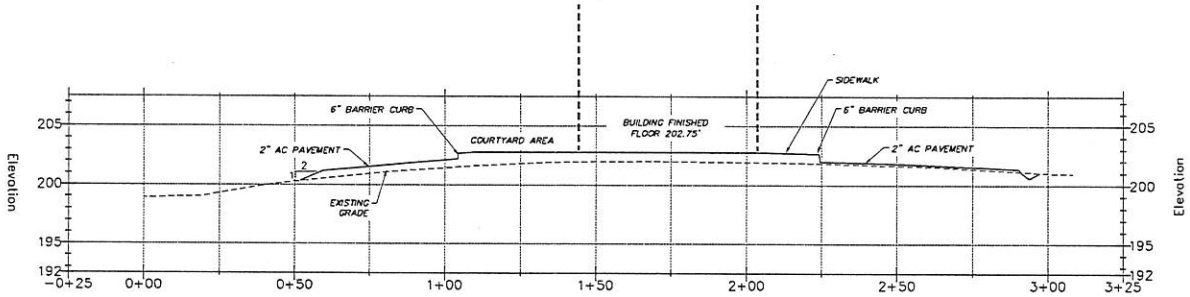
ANDERSON ENGINEERING
800 E Dimond, Suite 3-340
T 907.337.2773
Anchorage, Alaska 99515
F 907.337.2784

EROSION CONTROL PLAN
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

DRAWN	MEA	CHECKED MEA
DATE	6/8/2015	
PHASE	100%	
JOB NO.	—	
DRAWING TITLE	EROSION CONTROL PLAN	
SHEET NO.	C5	



WEST-EAST SECTION
THROUGH BUILDING NORTH
SECTION A-A
1" = 20'



WEST-EAST SECTION
THROUGH BUILDING SOUTH
SECTION B-B
1" = 20'

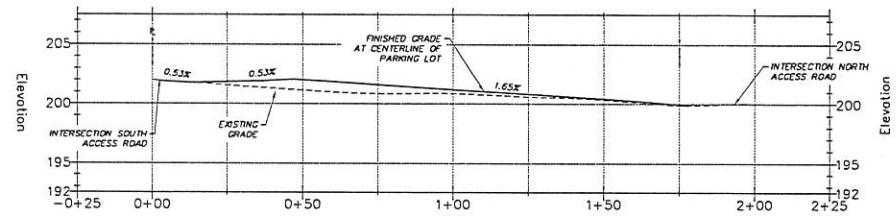
STATE OF ALASKA
49TH
Michael E. Anderson
CIVIL
2-6-15
REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
800 E Dimond, Suite 340 Anchorage, Alaska 99515
T 907.222.2773 F 907.277.7344

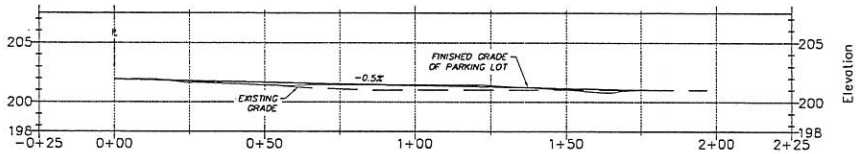
SITE SECTIONS 1
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

No.	Revisions	Date

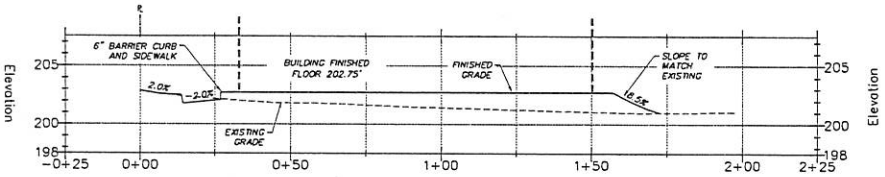
DRAWN: MEA CHECKED: MEA
DATE: 6/8/2015
PHASE: 100%
JOB NO.: —
DRAWING TITLE: SITE SECTIONS 1
SHEET NO.: C6



NORTH-SOUTH SECTION
THROUGH ROAD/PARKING LOT WEST SIDE
SECTION C-C
1" = 20'



NORTH-SOUTH SECTION
THROUGH ROAD/PARKING LOT EAST SIDE
SECTION E-E
1" = 20' HORIZONTAL
1"= 5' VERTICAL



NORTH-SOUTH SECTION
THROUGH BUILDING
SECTION D-D
1" = 20' HORIZONTAL
1"= 5' VERTICAL

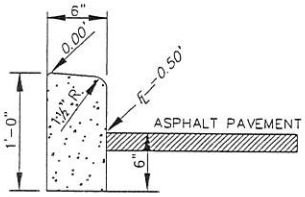
STATE OF ALASKA
49TH
Michael E. Anderson
4041-E
6-8-15
PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
800 E Dimond Suite 340
T 907.332.7773
Anchorage, Alaska 99515
T 907.337.7744

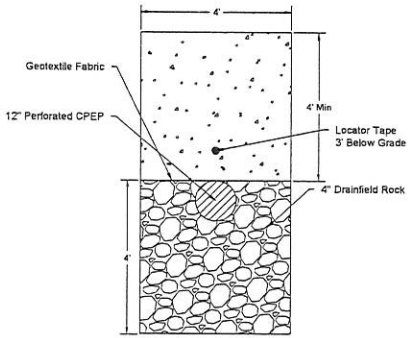
SITE SECTIONS 2
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

No.	Revision/Issue	Date

DRAWN: MEA	CHECKED: MEA
DATE: 6/8/2015	
PHASE: 100%	
JOB NO.: —	
DRAWING TITLE: SITE SECTIONS 2	
SHEET NO.: C7	



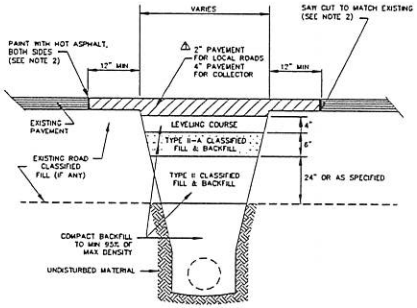
6" BARRIER CURB



ABSORPTION TRENCH DETAIL

NO SCALE - 3' Width

Provide 4" Insulation Where Bury < 4'



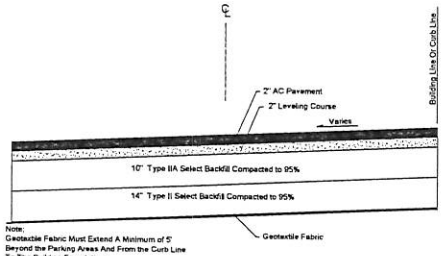
NOTES:

1. ENGINEER OR PERMITTING AGENCY MAY DIRECT ADDITIONAL AMOUNTS OF SURFACE REPLACEMENT MATERIALS AND/OR TYPE II CLASSIFIED FILL & BACKFILL, BASED UPON FIELD CONDITIONS.
2. AFTER TRENCH BACKFILL HAS BEEN COMPACTED, CONTRACTOR SHALL SAW CUT (REF. SECTION 40.02.5.J) AND REMOVE AN ADDITIONAL 12" FROM EACH EDGE OF THE ORIGINAL CUT. ENGINEER MAY REQUIRE ADDITIONAL REMOVAL IF THE EXISTING SURFACING HAS BEEN LIFTED IN THE REMOVAL PROCESS OR IF THE JOINT DOES NOT OCCUR ON UNDISTURBED MATERIAL. TRIM AND SQUARE THE EDGES OF EXISTING SURFACING, AND REMOVE LOOSE MATERIALS BEFORE PLACING PAVEMENT. CONTRACTOR SHALL PAINT SURFACES AND EDGES OF EXISTING PAVEMENT WITH HOT ASPHALT CEMENT AS SPECIFIED IN THE CONTRACT DOCUMENTS OR AS APPROVED BY THE ENGINEER.
3. MAXIMUM PAVEMENT LIFT THICKNESS IS 2" UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS OR APPROVED BY THE ENGINEER.
4. THIS DETAIL APPLIES TO ALL NON-GRAVEL SURFACES INCLUDING, BUT NOT LIMITED TO, PAVEMENT, RECYCLED ASPHALT PAVEMENT (RAP), AND BITUMINOUS SURFACE TREATMENT, ALSO KNOWN AS CHIP SEAL.

RIGHT-OF-WAY PAVEMENT CUT REPLACEMENT DETAIL

N.T.S.

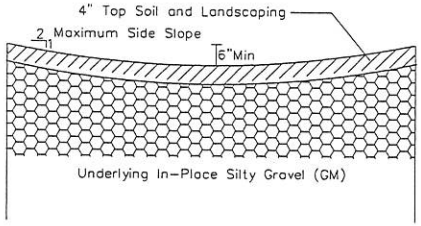
(MASS 40-2)



Note:
Geotextile Fabric Must Extend A Maimum of 5' Beyond the Parking Areas And From the Curb Line To The Building Foundation.

DRIVEWAY AND PARKING SECTION

NO SCALE

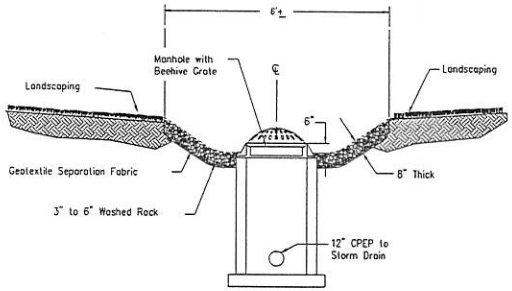


DRAINAGE SWALE DETAIL

NO SCALE

4' Min, 8' Max Width

1.5% Min Longitudinal Slope



BEEHIVE GRATE DETAIL

NO SCALE

STATE OF ALASKA 49TH Michael E. Andersen 4381-E 6-8-15 REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
8800 E Dowling, Suite 330
T 907.522.3773
Anchorage, Alaska 99515
F 907.522.3774

DETAILS 1
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

NO.	REVISIONS/ISSUE	DATE

DRAWN: MEA CHECKED: MEA

DATE: 6/8/2015

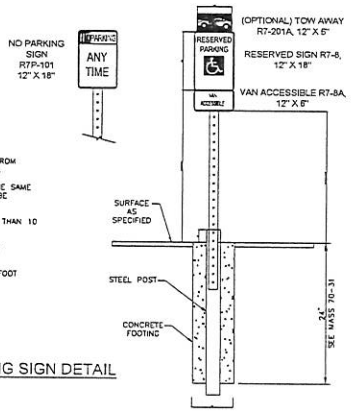
PHASE: 100%

JOB NO.: —

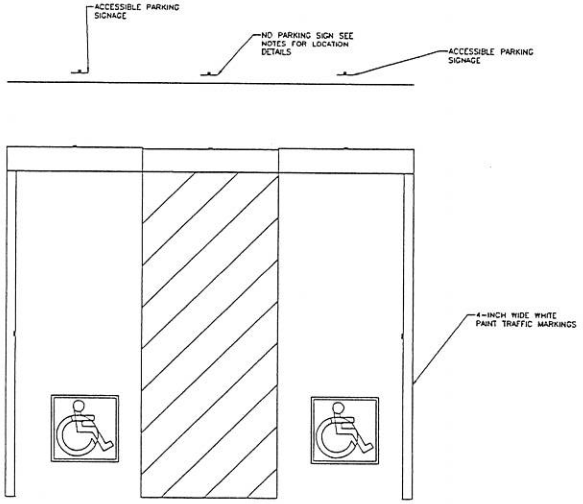
DRAWING TITLE: DETAILS 1

SHEET NO.: C8

1. SIGNS CAN BE MOUNTED ON A BUILDING PROVIDED THEY ARE NOT OBSTRUCTED FROM VIEW. MOUNTING HEIGHT ON BUILDINGS IS THE SAME AS POLE HEIGHT MOUNTING.
2. SIGNS CAN BE MOUNTED ON CHAIN LINK FENCE. MOUNTING HEIGHT SHALL BE THE SAME AS POLE HEIGHT IF FENCE PROVIDES SUCH HEIGHT. IF NOT, TOP OF SIGN MAY BE MOUNTED TO TOP OF FENCE. MINIMUM HEIGHT IS 4.5 FEET TO TOP OF FENCE.
3. SIGNS SHALL NOT BE MOUNTED ON DOORS OR WINDOWS AND CAN NOT BE MORE THAN 10 FEET FROM THE EDGE OF THE PARKING STALL.
4. ALL ACCESSIBLE SPACES SHALL HAVE A R7-8 SIGN. THE R7-8 SIGNS SHALL BE CENTERED ON 8 FOOT PARKING STALLS.
5. INSTALL A "NO PARKING" SIGN CENTERED AT LEAST 4 FEET IN FRONT OF THE 8-FOOT WIDE VAN ACCESSIBLE ACCESS AISLE.
6. AN ACCESSIBLE AISLE CAN BE SHARED BY 2 ACCESSIBLE SPACES.



ACCESSIBLE PARKING SIGN DETAIL



TYPICAL A.D.A. PARKING
N.T.S.

STATE OF ALASKA 49TH
Michael E. Anderson
49814
6-8-15
REGISTERED PROFESSIONAL ENGINEER

ANDERSON ENGINEERING
800 E Dimond, Suite 350 Anchorage, Alaska 99515
T 907.337.2775 F 907.337.2776

DETAILS 2
SUBWAY OF ALASKA
CHASE SUBDIVISION BLOCK 2, LOT 2A-1
8950 LAKE OTIS PARKWAY
Anchorage, Alaska

NO.	REVISION	DATE

DRAWN: MEA CHECKED: MEA
DATE: 6/8/2015
PHASE: 100%
JOB NO.: —
DRAWING TITLE: DETAILS 2
SHEET NO.: C9

Appendix B: Drainage Calculations

Section 1: Pre-Deveopment Drainage Calculations (EPA SWMM 5.0)

PREDEVELOPMENT 1 YEAR 24 HOUR TOTAL FLOW

```
S U M M A R Y   S T A T I S T I C S
====================================
Object  ............... System
Variable .............. Runoff  (CFS)
Event Period .......... Variable
Event Statistic ...... Total (ft3)
Event Threshold ...... Runoff > 0.0000  (CFS)
Event Threshold ...... Event Volume > 0.0000 (ft3)
Event Threshold ...... Separation Time >= 6.0  (hr)
Period of Record ..... 04/20/2013 to 04/21/2013

Number of Events ..... 1
Event Frequency*...... 0.888
Minimum Value ........ 407.635
Maximum Value ........ 407.635
Mean Value ........... 407.635
Std. Deviation ....... 0.000
Skewness Coeff. ...... 0.000

*Fraction of all reporting periods belonging to an event.
```

PREDEVELOPMENT 10 YEAR 24 HOUR PEAK FLOW

```
S U M M A R Y   S T A T I S T I C S
====================================
Object  ............... System
Variable .............. Runoff  (CFS)
Event Period .......... Variable
Event Statistic ...... Peak  (CFS)
Event Threshold ...... Runoff > 0.0000  (CFS)
Event Threshold ...... Event Volume > 0.0000 (ft3)
Event Threshold ...... Separation Time >= 6.0  (hr)
Period of Record ..... 04/20/2013 to 04/21/2013

Number of Events ..... 1
Event Frequency*...... 0.925
Minimum Value ........ 0.744
Maximum Value ........ 0.744
Mean Value ........... 0.744
Std. Deviation ....... 0.000
Skewness Coeff. ...... 0.000

*Fraction of all reporting periods belonging to an event.
```

PREDEVELOPMENT 10 YEAR 24 HOUR TOTAL FLOW

```
S U M M A R Y   S T A T I S T I C S
====================================
Object  ............. System
Variable ............ Runoff  (CFS)
Event Period ......... Variable
Event Statistic ...... Total (ft3)
Event Threshold ...... Runoff > 0.0000  (CFS)
Event Threshold ...... Event Volume > 0.0000 (ft3)
Event Threshold ...... Separation Time >= 6.0  (hr)
Period of Record ..... 04/20/2013 to 04/21/2013

Number of Events ..... 1
Event Frequency*...... 0.925
Minimum Value ........ 1152.384
Maximum Value ........ 1152.384
Mean Value ........... 1152.384
Std. Deviation ....... 0.000
Skewness Coeff. ...... 0.000

*Fraction of all reporting periods belonging to an event.
```

Section 2: Post-Deveopment Drainage Calculations (EPA SWMM 5.0)

POST DEVELOPMENT 1 YEAR 24 HOUR TOTAL

```
S U M M A R Y   S T A T I S T I C S
====================================
Object  .............. System
Variable ............. Runoff  (CFS)
Event Period ......... Variable
Event Statistic ...... Total (ft3)
Event Threshold ...... Runoff > 0.0000  (CFS)
Event Threshold ...... Event Volume > 0.0000 (ft3)
Event Threshold ...... Separation Time >= 6.0  (hr)
Period of Record ..... 04/20/2013 to 04/21/2013

Number of Events ..... 1
Event Frequency*...... 0.579
Minimum Value ........ 2316.617
Maximum Value ........ 2316.617
Mean Value ........... 2316.617
Std. Deviation ....... 0.000
Skewness Coeff. ...... 0.000

*Fraction of all reporting periods belonging to an event.
```

POST DEVELOPMENT 10 YEAR 24 HOUR PEAK FLOW

```
S U M M A R Y   S T A T I S T I C S
====================================
Object  ............. System
Variable ............ Runoff  (CFS)
Event Period ........ Variable
Event Statistic ...... Peak  (CFS)
Event Threshold ...... Runoff > 0.0000  (CFS)
Event Threshold ...... Event Volume > 0.0000 (ft3)
Event Threshold ...... Separation Time >= 6.0  (hr)
Period of Record ..... 04/20/2013 to 04/21/2013

Number of Events ..... 1
Event Frequency*...... 0.817
Minimum Value ........ 1.300
Maximum Value ........ 1.300
Mean Value ........... 1.300
Std. Deviation ....... 0.000
Skewness Coeff. ...... 0.000

*Fraction of all reporting periods belonging to an event.
```

POST DEVELOPMENT 10 YEAR 24 HOUR TOTAL FLOW

```
S U M M A R Y   S T A T I S T I C S
====================================
Object  ............. System
Variable ............ Runoff  (CFS)
Event Period ........ Variable
Event Statistic ..... Total (ft3)
Event Threshold ..... Runoff > 0.0000  (CFS)
Event Threshold ..... Event Volume > 0.0000 (ft3)
Event Threshold ..... Separation Time >= 6.0  (hr)
Period of Record ..... 04/20/2013 to 04/21/2013

Number of Events ..... 1
Event Frequency*...... 0.817
Minimum Value ........ 4851.906
Maximum Value ........ 4851.906
Mean Value ........... 4851.906
Std. Deviation ....... 0.000
Skewness Coeff. ...... 0.000

*Fraction of all reporting periods belonging to an event.
```