

WHEN RECORDED MAIL TO  
Utah Department of Transportation  
Right of Way Fourth Floor  
Box 148420  
Salt Lake City UT 84114-8240

12374845  
9/27/2016 2:12:00 PM \$46.00  
Book - 10480 Pg - 8358-8375  
Gary W. Ott  
Recorder, Salt Lake County, UT  
COALITION TITLE AGENCY  
BY: eCASH, DEPUTY - EF 18 P.

## UTAH DEPARTMENT OF TRANSPORTATION DRAINAGE AGREEMENT

26796

Salt Lake County Tax ID No. 08-34-331-040

This Drainage Agreement made and entered into this      day of August  
20 16 between Utah Department of Transportation ("Department") and  
West Station No. Apt. L22 ("Permittee"), who owns the property described in Exhibit A.

### RECITALS

The Permittee (property owner) desires to construct a drainage system and a drainage connection within the Department Right of Way subject to the requirements and conditions described in the Permit.

Department's Policy 08A-06 requires the Permittee to sign the Drainage Agreement as part of the permitting process for a drainage connection.

The parties agree as follows:

(1) **COMPLIANCE:** Permittee must comply with the conditions in the permit and applicable state and federal statutes, regulations and rules. The Department may perform inspection of Permittee's drainage system to monitor compliance with the Permit and with state and federal statutes, regulations, and rules. Permittee grants the Department access to the Permittee's property for inspection or to perform any repairs to prevent damage to the Department's Right of Way. The Department's inspection does not relieve the Permittee of its responsibilities in meeting the Permit conditions. The Permittee is responsible for the Department's inspection costs. Permittee's responsibilities include:

- a) Permittee is responsible for repairing and restoring any portion of the Department Right of Way and drainage systems located therein that may be damaged as a result of making the drainage connection or as the result of any subsequent drainage originating from the Permittee's property
- b) Permittee must not increase its drainage discharge into the Department's drainage system without the written permission of the Department.
- c) A bonded contractor must apply for the required permit to install drainage systems in the Department Right of Way prior to the commencement of any such work.
- d) The Permittee is responsible to obtain environmental clearances, permits, or other approvals from any other local, state or federal agency that may have regulatory jurisdiction or oversight.

(2) **MAINTENANCE:** Permittee's drainage system must at all times be maintained, repaired, constructed, and operated by and at the expense of the Permittee. The drainage system will be serviced without access from any interstate highway or ramp. The Department may notify the Permittee of any maintenance requirements if the Permittee fails to maintain the drainage system. The Department reserves the right, without relieving the Permittee of its obligations, to reconstruct or make repairs to the drainage system, as it may consider necessary, and the Permittee must reimburse the Department for its cost if the Permittee fails to comply with the Department's written notification and complete the required maintenance.

(3) **FUTURE IMPACTS:** The Department has the right to change its drainage system for any future transportation project. If the Department's drainage system is reconstructed or modified, the Department reserves the right to hold the Permittee responsible for the cost to reconnect to the Department's drainage system. The Department is not responsible for any costs the Permittee incurs due to the drainage system being reconstructed or modified.

(4) **LIABILITY:** Pursuant to R930-7-6(2)(b), the Permittee is required to guarantee satisfactory performance under this Permit. The Department may proceed against Permittee to recover all expenses incurred by the Department, its employees, or contractors in repairing the sections of roadway damaged by the Permittee or its drainage system, including the failure to restore the Right of Way to Department standards. The Permittee will be liable for all costs the Department incurs under this agreement.

The Permittee will indemnify, defend, and hold harmless the Department, its employees, and the State of Utah from responsibility for any damage or liability arising from Permittee's construction, maintenance, repair, or any other related operation of the drainage system pursuant to the Permit issued under this agreement.

The Permittee will not hold the Department liable for damages resulting from any back-up or flow into the Permittee's drainage system or property. The Permittee accepts all risks associated with the connection to the Department's drainage system. The Permittee is responsible for all liability resulting from the discharge of pollutants into the Department's drainage system from its property or drainage system.

(5) **CANCELLATION OF PERMIT:** Any failure on the part of Permittee to comply with the terms and conditions set forth in the Permit or this Agreement may result in cancellation of the Permit. Failure of the Permittee to pay any sum of money for costs incurred by the Department in association with inspection, reconstruction, repair, or maintenance of the drainage system may also result in cancellation of the Permit. Non-compliance with either the Permit or Agreement may result in the Department removing the drainage system and restoring the highway and Right of Way at the sole expense of the Permittee. The Department will notify the Permittee in writing prior to any cancellation, setting forth the violations, and will provide the Permittee a reasonable time to correct the violations to the satisfaction of the Department. The Department may order the Permittee to remove its drainage system if the violations are not corrected.

(6) **SUCCESSORS AND ASSIGNS:** All covenants, obligations and agreements will be binding upon the parties, their successors and assigns and run with the land as described in Exhibit A until the drainage connection is removed from the Department's Right of Way.

(7) **MISCELLANEOUS:**

- a) Each party agrees to undertake and perform all further acts that are reasonably necessary to carry out the intent and purpose of the Agreement at the request of the other party.
- b) This Agreement does not create any type of agency relationship, joint venture, or partnership between the Department and Permittee.
- c) The failure of either party to insist upon strict compliance of any of the terms and conditions, or failure or delay by either party to exercise any rights or remedies provided in this Agreement, or by law, will not release either party from any obligations arising under this Agreement.

- d) This Agreement shall be deemed to be made under and shall be governed by the laws of the State of Utah in all respects. Each person signing this Agreement warrants that the person has full legal capacity, power and authority to execute this Agreement for and on behalf of the respective party and to bind such party.
- e) If any portion of this Agreement is held to be invalid or unenforceable for any reason by a court of competent jurisdiction, such invalidity or unenforceability shall not affect any other provision, and this Agreement shall be construed as if such invalid or unenforceable provision had never been included.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

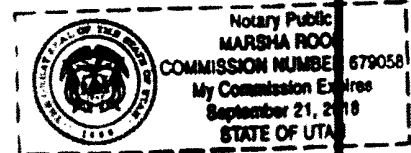
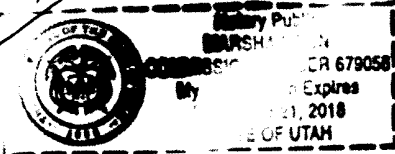
CURRENT PROPERTY OWNER/PERMITTEE	
Name Printed: <u>Babe Henderson</u>	Signature: <u>[Signature]</u>

State of Utah  
 County of Salt Lake  
 On this 21st day of September, in the year 2016.

Babe Henderson personally appeared before me and duly acknowledged to me that he/she executed this agreement as the current property owner of said property or was authorized to sign the agreement on behalf of the property owner. Witness my hand and official seal.

(NOTARY SEAL)

Notary Public



UTAH DEPARTMENT OF TRANSPORTATION - Region Permits Officer	
Name Printed: <u>Bradley Palmer</u>	Signature: <u>[Signature]</u>

State of Utah)  
 County of Salt Lake  
 On this 21st day of September, in the year 2016.

Bradley Palmer personally appeared before me, who duly acknowledged to me that he/she executed this agreement pursuant to the authority delegated to him/her for the Utah Department of Transportation. Witness my hand and official seal.

(NOTARY SEAL)

Notary Public




IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

CURRENT PROPERTY OWNER/PERMITTEE			
Name Printed:	Blake Henderson	Signature:	

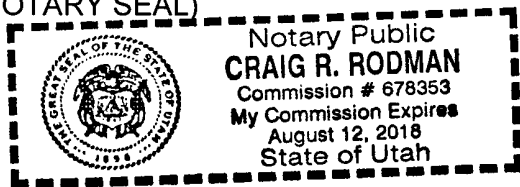
State of Utah )  
County of Summit )

On this 21 day of September, in the year 2016,

Blake Henderson personally appeared before me and duly acknowledged to me that he/she executed this agreement as the current property owner of said property or was authorized to sign the agreement ~~on behalf~~ of the property owner. Witness my hand and official seal.

  
\_\_\_\_\_  
Notary Public

(NOTARY SEAL)



UTAH DEPARTMENT OF TRANSPORTATION – Region Permits Officer			
Name Printed:		Signature:	

State of Utah )  
County of \_\_\_\_\_ )

On this \_\_\_\_ day of \_\_\_\_\_, in the year 20\_\_\_\_,

\_\_\_\_\_ personally appeared before me, who duly acknowledged to me that he/she executed this agreement pursuant to the authority delegated to him/her for the Utah Department of Transportation. Witness my hand and official seal.

\_\_\_\_\_  
Notary Public

(NOTARY SEAL)

**EXHIBIT A (Legal Description of Permittee's Property)**

Beginning at the Northeast corner of Lot 2, Chars S Desky'S Fourth Addition to Salt Lake City, Amended & Extended, according to the official plat thereof on file and of record in the office of the Salt Lake County Recorder (Entry No. 12130004, Book 2015, Page 211, filed September 10, 2015), said point being located North 00°00'00" East 1,947.43 feet and North 90°00'00" West 113.19 feet from the South Quarter Corner of Section 34, Township 1 North, Range 1 West, Salt Lake Base and Meridian (a found brass cap survey marker, Salt Lake County monument no 1n1w3402, located at 000 N. 1700 W ), said point also being on the Westerly Right of Way line of Redwood Road and on a 22,865.31 foot radius foot curve to the right, the center of which bears South 88° 48'57" West; thence along said Westerly Right of Way line and along the arc of said curve a distance of 231.72 feet through a central angle of 00°34'50"; thence leaving said Westerly Right of Way line South 89°58'38" West a distance 213.67 feet, thence South 00°01'22" East a distance of 151.68 feet; thence South 89°58'38" West a distance of 75.00 feet; thence North 00°01'22" West a distance of 151.68 feet; thence South 89° 58'38" West a distance of 45.50 feet ; thence North 00°01'22" West a distance of 15.00 feet; thence South 89°58'38" West a distance of 235.64 feet to the Easterly line of Morton Meadows Subdivision Plat B; thence along said Easterly line of Morton Meadows Subdivision Plat B, North 00°04'28" East a distance of 218.26 feet; thence leaving said Easterly boundary line of Morton Meadows Subdivision Plat B, South 89°51'50" East a distance of 565.92 feet to the point of beginning

"EXHIBIT A" Department Drainage Agreement (per UDOT Policy 08A-06)

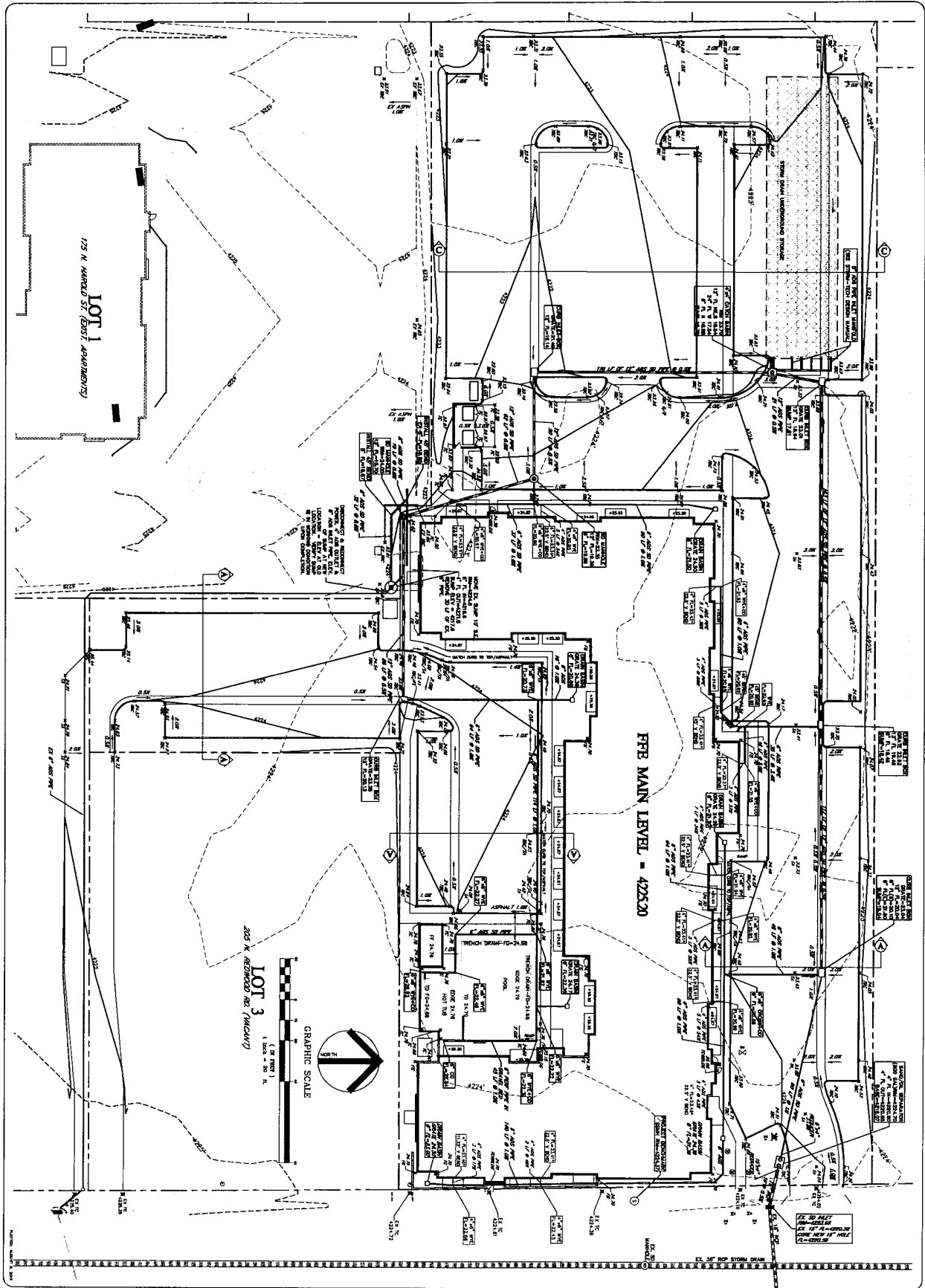
**EXHIBIT B**



(include drainage plan showing state route, mile post and location of all drainage systems and drainage calculations)

"EXHIBIT B"---Department Drainage Agreement (per UDOT Policy 08A-06)



# EXHIBIT B



C204	<b>GRADING / DRAINAGE PLAN</b> <b>UDOT CONDITIONAL ACCESS PERMIT</b> <b>WEST STATION APARTMENTS, PHASE 2</b>	DESIGNED BY: ADJ: _____ CHECKED BY: ADJ: _____ CDR: _____		REVISIONS COMMENTS DATE BY: _____	<b>Evergreen Engineering, Inc.</b>  <small>           Civil Engineering • Land Surveying • Land Planning            1970 Belmont Street • Suite 100            P.O. Box 2881 • Park City • Utah • 84060            Phone: (435) 648-8877 • Fax: (435) 648-2200            E-mail: office@evergreen-engineering.com         </small>
RENDERSON DEVELOPMENT	FILE NO. 122	© 2015 Evergreen Engineering, Inc.			

# **WEST STATION APARTMENTS PHASE 2**

## **FINAL SURFACE WATER RUNOFF CONTROL PLAN**

July 2016

Prepared for:

### **Henderson Development**

P.O. Box 682925

Park City, Utah 84060

Phone: 435-658-3545

Prepared by:

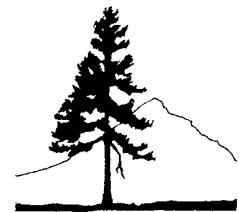
Andrew Moran, P.E.

### **Evergreen Engineering, Inc.**

Civil Engineering \* Land Surveying \* Land Planning

1670 Bonanza Dr., Suite 104 \* P.O. Box 2861 \* Park City \* Utah \* 84060

phone: 435-649-4667 \* fax: 435-649-9219 \* email: office@evergreen-eng.com



## **LOCATION OF PROPERTY**

The project is located in Section 34, Township 1 North, Range 1 West, Salt Lake Base and Meridian approximately two blocks north of North Temple on Redwood Road in Salt Lake City. West Station Apartments (Phase 1) and Lot 3 of Chars S. Deskys Fourth Addition to Salt Lake City, Amended & Extended (undeveloped) border the site to the south. Morton Meadows Subdivision Plat B lies to west, and some older Apartments lie to the north.

## **DESCRIPTION OF PROPERTY**

The project sits on 3.21 acres of undeveloped land. Vegetation includes natural grasses, some brush and several old unhealthy trees. Topography consists of mostly flat slopes of 2% or less. There are no significant ditches or canals running through the site. Redwood Road is an improved public street with curb and gutter, but it flows to the north away from the project. It appears to have served several homes and small multi-family housing units in the past, but those homes have since been removed, leaving some deteriorated foundations and driveways. The proposed use of the site is a 4-story, 148-unit apartment building with off-street parking.

## **OFF-SITE DRAINAGE DESCRIPTION**

There are minimal off-site flows which enter the property. No Local, Regional, or County Facilities discharge into the property. There is an existing storm drain system in Redwood Road.

## **ON-SITE DRAINAGE DESCRIPTION**

Due to the negligible off-site discharge onto the site, there are no significant drainage patterns on-site. As previously stated, the site is relatively flat, so any surface runoff must infiltrate into the ground as the site sits currently. The surrounding developments all drain away from the site, so the historic drainage patterns of upstream runoff is irrelevant. The historic discharge points downstream to the north are also irrelevant because all of the surrounding developments have been built up around the site.

## **MASTER PLANNING INFORMATION – N/A**

## **FLOODPLAIN INFORMATION – Unshaded Zone X**

## **PREVIOUS DRAINAGE STUDIES - N/A**

## **GENERAL DESCRIPTION**

The proposed On-Site drainage system will consist of a series of surface flow drainage facilities. The parking lot will be asphalt with curb & gutter or concrete waterways sloping at minimal grades (3% or less) to two catch basins. The storm runoff

will be piped from the catch basins to an underground storage system with enough capacity to contain the runoff for a 100-year, 3 hour storm event. Once the storm water reaches a critical depth in the underground storage, the allowable discharge of 0.2 cfs/acre (0.64 cfs for the 3.21 acre site) to the nearest off-site catch basin, located in Redwood Road. In the event of a larger storm event, storm water will overflow into Phase 1 parking lot, which has a catch basin with an overflow elevation adjacent to Morton Meadows Subdivision.

## **COMPLIANCE WITH REGULATIONS AND ADOPTED PLANS - N/A**

### **HYDROLOGIC ANALYSIS**

Under current conditions, assuming a Time of Concentration of 1 hour, and a CN of 81, the peak discharge from the site is 0.38 cfs. Since the storm water runoff will be detained within the underground storage, the peak flow leaving the site will be the allowable 0.64 cfs.

### **FACILITY DESIGN**

All of the storm runoff will be routed to an underground storage facility (using the Storm-Tech SC-740 chamber system). Several catch basins located in the parking lots will direct the storm runoff to the chamber system. The chamber system will consist of 7 rows of 24 SC-740 chambers laid out over an 18 inch deep gravel bed. The allowable 0.2 cfs/acre (0.64 cfs) will drain to a sand / oil separator, which will then drain to an existing catch basin in Redwood Road. The existing pipe exiting the catch basin in Redwood Road is a 15" diameter reinforced concrete pipe with a capacity of 6.47 cfs – more than enough to accommodate the 0.62 cfs from this site.

The geotechnical report for this site indicated that the ground water depth ranged from approximately 8-12 feet below natural grade. The gravel bed below the chambers will be approximately 5.5 feet below natural grade, so there should be no problem with groundwater infiltrating the chamber system.

### **FACILITY MAINTENANCE**

The property owner or on-site manager will be responsible for maintaining all of the drainage facilities, including the costs associated with the maintenance. The "Snout" and "Bio-Skirt" shall be maintained per the manufacturer's recommendations (BMP). The anti-siphon vent and access hatch of the "Snout" should be inspected and cleaned annually. "Bio-Skirts" should be serviced or replaced annually. Servicing the "Bio-Skirt" consists of wringing out accumulated oils and washing in an industrial washing machine in warm water. Generally, they should be monitored monthly or after each significant storm event. The sumps in the catch basins and manholes should be cleaned out with a vacuum truck when sumps are half full.

The SC-740 Underground chamber system should also be maintained per the manufacturer's recommendations (StormTech). The Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection

should be adjusted based upon previous observation of sediment deposition. Maintenance of the isolator row is accomplished with the JetVac process, using a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. Captured pollutants are flushed back to the access manhole and removed via a vacuum truck.

## METHODOLOGY

### DESIGN PRECIPITATION DEPTHS

The impact of the proposed development was analyzed using the 10-Year, 3-Hour and 100-Year, 3-Hour Storm Events. Then, using the SCS Curve Number Method, the accumulated excess (Q) was calculated using the following equations:

$$Q = \frac{(P - IA)^2}{(P - IA + S)}$$

$$CN = \frac{1000}{10+S}$$

Where:

- Q = direct runoff depth (inches)
- P = storm rainfall depth (inches)
- S = maximum infiltration depth (inches)
- CN = curve number (dimensionless)

### HYDROLOGIC CONDITIONS

This site only has one drainage basin (i.e. all of the runoff will flow to the underground detention basin). The types of cover used in the analysis are 1) Landscaped areas (CN = 85), 2) Pavement (CN = 98), 3) Buildings (CN = 98). A Summary of the developed hydrologic conditions (Weighted CN), including values for the design rainfall depths (P) and accumulated excess (Q) under the developed conditions are shown below in Table 1.

**TABLE 1**  
Design Storm Depths

<i>Return Period (years)</i>	<i>Weighted CN (unitless)</i>	<i>Rainfall Depth (inches)</i>	<i>Accumulated Excess (inches)</i>
<b>10</b>	<b>95.8</b>	<b>1.05</b>	<b>0.66</b>
<b>100</b>	<b>95.8</b>	<b>1.84</b>	<b>1.40</b>

## CONCLUSIONS

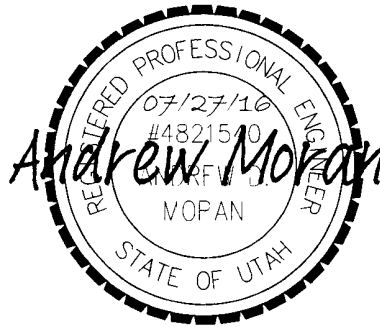
The hydrologic conditions of the proposed West Station Apartments site have been designed to comply with all applicable drainage laws, Master Plans (none on record), FEMA requirements (not applicable – site is in “unshaded zone X”), and the Salt Lake

City Design Standards and Processes Manual. The proposed design will effectively control the storm runoff, assuming it is installed per plan and per manufacturer's recommendations. There is minimal impact on any of the surrounding properties.

### **PROFESSIONAL CERTIFICATION**

This report for the drainage design of West Station Apartments was prepared by me in accordance with the provisions of the Salt Lake City Design Standards and Processes Manual, and was designed to comply with the provisions thereof.

Andrew Moran, P.E.  
State of Utah No. 4821540



West Station Apartments  
Drainage Analysis  
Appendix

**Runoff Calculations**  
Pre-Development Conditions

SITE	CN	A
Natural	81	139905
Bldgs	98	0
Pavement/SW	98	0
<b>TOTAL</b>	<b>81.00</b>	<b>139905</b>

$T_i = 1.8 * (1.1 - K) * L_o * .5 * S * .33$       59.36 min.  
 $K = .0132 * CN - .39$       0.68  
 $L_o$       475 ft  
 $S$       1 %  
 $Q = (P - IA)^2 / ((P - IA) + S)$   
 $Q_{10}$       0.10 in  
 $Q_{100}$       0.46 in  
 $P_{10}$       1.05 in  
 $P_{100}$       1.84 in  
 $S = (1,000 / CN) - 10$       2.346 in  
 $IA = 0.2 * S$       0.469 in  
 $IA/P$       0.447  
 $Q_p = q_u * A * Q$       0.384 cfs  
 $A$  (sf)      139905  
 $A$  (sq mi)      0.005018401

**Runoff Calculations**  
Post-Development Conditions

SITE	CN	A	%
Lscape	85	23901	17%
Bldgs	98	31122	22%
Pavement/SW	98	84882	61%
<b>TOTAL</b>	<b>95.78</b>	<b>139905</b>	<b>100%</b>

$T_c = T_i + T_t$       5 minutes (minimum)  
 $T_i = 1.8 * (1.1 - K) * L_o * .5 * S * .33$       1.34  
 $K = .0132 * CN - .39$       0.87  
 $L_o$  (Length of Flow)      20  
 $S$  (Slope)      1  
 $T_t$  (400 @ 1% slope)      3 (V=2 ft/sec)  
 $Q = (P - IA)^2 / ((P - IA) + S)$   
 $Q_{10}$       0.66 in  
 $Q_{100}$       1.40 in  
 $P_{10}$       1.05 in  
 $P_{100}$       1.84 in  
 $S = (1,000 / CN) - 10$       0.441 in  
 $IA = 0.2 * S$       0.088 in  
 $IA/P$       0.084 0.1 minimum  
 $Q_p = q_u * A * Q$       3.310 cfs  
 $A$  (sf)      139905  
 $A$  (sq mi)      0.005018401

West Station Apartments  
Drainage Analysis  
Appendix

**Storage Calculations**

**10 Year, 3 Hour Storm**

Time (Min.)	Q-10 yr In.	A sf	Vol. in (cu. Ft.)	Q out (cfs)	Vol. out (cu. Ft.)	Stor. Req'd (cu. Ft.)
75	0.013	139905	146	0.640	0	146
90	0.024	139905	285	0.640	0	285
105	0.399	139905	4,653	0.640	576	4077
120	0.515	139905	5,999	0.640	1152	<b>4847</b>
135	0.559	139905	6,522	0.640	1728	4794
150	0.586	139905	6,829	0.640	2304	4525
165	0.598	139905	6,975	0.640	2880	4095
180	0.611	139905	7,121	0.640	3456	3665
195	0.623	139905	7,260	0.640	4032	3228
210	0.635	139905	7,406	0.640	4608	2798
225	0.647	139905	7,544	0.640	5184	2360
240	0.660	139905	7,691	0.640	5760	1931

Max

**Storage Calculations**

**100 Year, 3 Hour Storm w/ pump**

Time (Min.)	Q-100 yr In.	A sf	Vol. in (cu. Ft.)	Q out (cfs)	Vol. out (cu. Ft.)	Stor. Req'd (cu. Ft.)
75	0.027	139905	310	0.640	0	310
90	0.052	139905	604	0.640	0	604
105	0.847	139905	9,873	0.640	576	9297
120	1.092	139905	12,729	0.640	1152	11577
135	1.187	139905	13,839	0.640	1728	12111
150	1.243	139905	14,492	0.640	2304	<b>12188</b>
165	1.270	139905	14,802	0.640	2880	11922
180	1.296	139905	15,112	0.640	3456	11656
195	1.321	139905	15,405	0.640	4032	11373
210	1.348	139905	15,716	0.640	4608	11108
225	1.373	139905	16,009	0.640	5184	10825
240	1.400	139905	16,319	0.640	5760	10559

Max



West Station Apartments  
Drainage Analysis  
Appendix

**Unit Hydrograph**

Precipitation Values P(10) and P(100) taken from NOAA Atlas 14  
 Unit Hydrograph values taken from "Salt Lake City Design Standards and Processes Manual"  
 Total Rain=Unit Hydrograph\*P  
 Q(10) & Q(100) taken from Runoff Calculations  
 Total Runoff=Unit Hydrograph\*Q

15 Min Interval		Unit	P (10)	Total	Q(10)	Total	P (100)	Total	Q(100)	Total
		Hydrograph		Rain		Runoff		Rain		Runoff
			in	in	in	in	in	in	in	in
1:00	1:15	0.019	1.05	0.020	0.66	0.013	1.84	0.035	1.40	0.027
1:15	1:30	0.037	1.05	0.039	0.66	0.024	1.84	0.068	1.40	0.052
1:30	1:45	0.605	1.05	0.635	0.66	0.399	1.84	1.113	1.40	0.847
1:45	2:00	0.780	1.05	0.819	0.66	0.515	1.84	1.435	1.40	1.092
2:00	2:15	0.848	1.05	0.890	0.66	0.559	1.84	1.560	1.40	1.187
2:15	2:30	0.888	1.05	0.932	0.66	0.586	1.84	1.634	1.40	1.243
2:30	2:45	0.907	1.05	0.952	0.66	0.598	1.84	1.669	1.40	1.270
2:45	3:00	0.926	1.05	0.972	0.66	0.611	1.84	1.704	1.40	1.296
3:00	3:15	0.944	1.05	0.991	0.66	0.623	1.84	1.737	1.40	1.321
3:15	3:30	0.963	1.05	1.011	0.66	0.635	1.84	1.772	1.40	1.348
3:30	3:45	0.981	1.05	1.030	0.66	0.647	1.84	1.805	1.40	1.373
3:45	4:00	1.000	1.05	1.050	0.66	0.660	1.84	1.840	1.40	1.400

West Station Apartments  
 Drainage Analysis  
 Appendix

**Provided Storage Calculations**

**Volume Required**

12188 cu. ft. (See Page A-2)

**Volume Provided**

**STORM-TECH SC-740 chambers**

Based on 74.9 cu ft per chamber

chambers needed: 134

chambers used: 133

Total Storage in chambers: 9961.7 cu ft

**Gravel Around Sump & Under Storm-Tech Chambers**

	<b>Area</b> (Sq. Ft.)	<b>Depth</b> (Feet)	<b>Volume</b> (cu. ft.)
Chambers	4320.0	1.0	1440

**Storage Volume in ADS Pipes (See Utility Plan C102)**

<b>Dia of pipe</b> (Feet)	<b>Area</b> (Sq. Ft.)	<b>Length</b> (Feet)	<b>Volume</b> (cu. ft.)
0.50	0.20	600.0	118
1.00	0.79	620.0	487

**Catch Basins (5)**

<b>3'x4'</b> ea	<b>AREA</b> (Sq. Ft.)	<b>DEPTH</b> (Feet)	<b>VOLUME</b> (cu. ft.)
5.0	12.0	4.0	96

**Manholes (3)**

<b>Dia</b> (Feet)	<b>AREA</b> (Sq. Ft.)	<b>DEPTH</b> (Feet)	<b>VOLUME</b> (cu. ft.)
4.0	12.6	5.0	377

**Total Volume Provided**

12479 cu. ft. > 12188