

**RECEIVED**  
 SEP 16 2020  
 Kittitas County CDS

**PRIVATE ROAD NETWORK DRAWINGS FOR PALOMINO MAJOR PLAT, PHASE 4**  
**WESTERN PACIFIC ENGINEERING & SURVEY**  
 Prepared By



**BENCH MARK LISTING**

T1841 - Found monument marking the northwest corner of Section 28 (T1841-1842-80)  
 T1842 - Found monument marking the southeast corner of Section 28 (T1841-1842-80)  
 T1843 - Found monument marking the southeast corner of the southeast quarter of  
 T1844 - Section 28 (T1841-1842-80)

**NOTES:**

The engineer who has prepared these plans, by selection and/or each owner's consent, has been provided with the specifications and conditions of the project and has accepted the same. The engineer and/or each owner's consent, has been provided with the specifications and conditions of the project and has accepted the same. The engineer and/or each owner's consent, has been provided with the specifications and conditions of the project and has accepted the same.

**ADDITIONAL NOTES:**

1. Inspection of construction shall not begin until the owner has received a copy of the final construction plans and the engineer has approved the same. The engineer shall not be responsible for any construction work in the improvement if no inspection is made by the engineer.
2. Paying shall not start until the site design is accepted by the County Engineer.
3. All easements shall be shown on the plans unless otherwise noted. Kittitas County Resolution Chapter 5, Page 50 (2/25/2012).
4. The vertical datum for the project is equal to the datum of the Palomino Major Plat.
5. The engineer and/or each owner's consent, has been provided with the specifications and conditions of the project and has accepted the same.

**LEGEND**

- Existing Centerline
- Design Centerline
- Proposed Edge of Pavement
- Existing Edge of Pavement
- Centerline
- Grade Break
- Existing Grade Break
- Existing Easement
- Right of Way Line
- Top of Pavement
- Centerline
- Centerline to be installed by Surveyor's Field Notes
- Centerline
- Centerline



**SHEET INDEX**

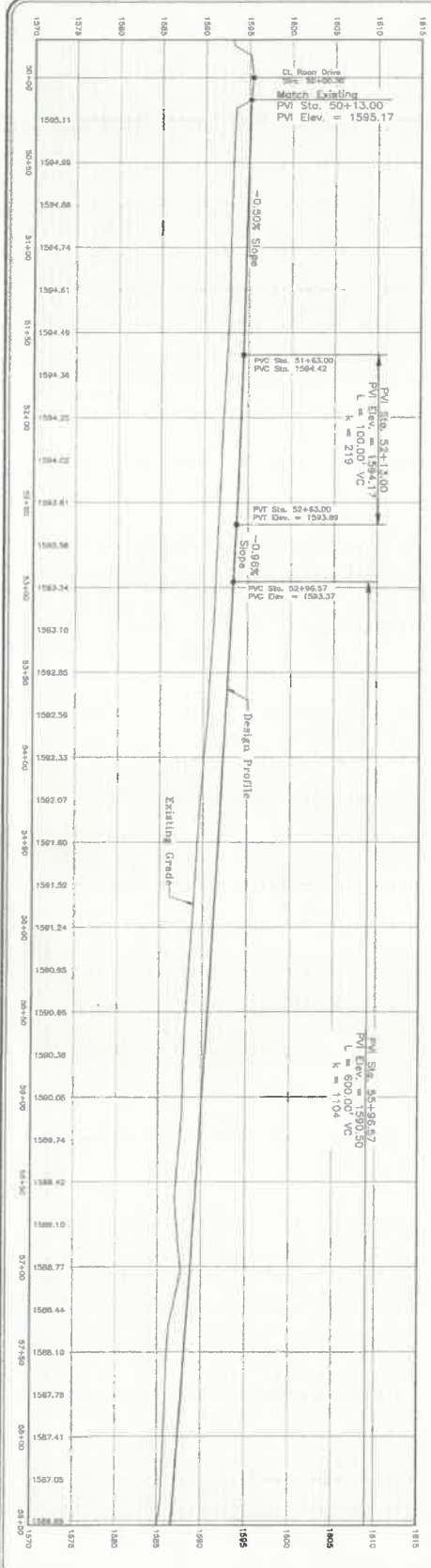
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C1.1	Plan and Profile	012000 to 024000
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C1.4	Plan and Profile	048000 to 060000
C1.5	Plan and Profile	060000 to 072000
C1.6	Plan and Profile	072000 to 084000
C1.7	Plan and Profile	084000 to 096000
C1.8	Plan and Profile	096000 to 108000
C1.9	Plan and Profile	108000 to 120000
C1.10	Plan and Profile	120000 to 132000
C1.11	Plan and Profile	132000 to 144000
C1.12	Plan and Profile	144000 to 156000
C1.13	Plan and Profile	156000 to 168000
C1.14	Plan and Profile	168000 to 180000
C1.15	Plan and Profile	180000 to 192000
C1.16	Plan and Profile	192000 to 204000
C1.17	Plan and Profile	204000 to 216000
C1.18	Plan and Profile	216000 to 228000
C1.19	Plan and Profile	228000 to 240000
C1.20	Plan and Profile	240000 to 252000
C1.21	Plan and Profile	252000 to 264000
C1.22	Plan and Profile	264000 to 276000
C1.23	Plan and Profile	276000 to 288000
C1.24	Plan and Profile	288000 to 300000
C1.25	Plan and Profile	300000 to 312000
C1.26	Plan and Profile	312000 to 324000
C1.27	Plan and Profile	324000 to 336000
C1.28	Plan and Profile	336000 to 348000
C1.29	Plan and Profile	348000 to 360000
C1.30	Plan and Profile	360000 to 372000
C1.31	Plan and Profile	372000 to 384000
C1.32	Plan and Profile	384000 to 396000
C1.33	Plan and Profile	396000 to 408000
C1.34	Plan and Profile	408000 to 420000
C1.35	Plan and Profile	420000 to 432000
C1.36	Plan and Profile	432000 to 444000
C1.37	Plan and Profile	444000 to 456000
C1.38	Plan and Profile	456000 to 468000
C1.39	Plan and Profile	468000 to 480000
C1.40	Plan and Profile	480000 to 492000
C1.41	Plan and Profile	492000 to 504000
C1.42	Plan and Profile	504000 to 516000
C1.43	Plan and Profile	516000 to 528000
C1.44	Plan and Profile	528000 to 540000
C1.45	Plan and Profile	540000 to 552000
C1.46	Plan and Profile	552000 to 564000
C1.47	Plan and Profile	564000 to 576000
C1.48	Plan and Profile	576000 to 588000
C1.49	Plan and Profile	588000 to 600000
C1.50	Plan and Profile	600000 to 612000
C1.51	Plan and Profile	612000 to 624000
C1.52	Plan and Profile	624000 to 636000
C1.53	Plan and Profile	636000 to 648000
C1.54	Plan and Profile	648000 to 660000

These plans have been reviewed by Kittitas County Department of Public Works and have been accepted for construction. The requirements of Kittitas County Road Standards.

**M.A. Rook**  
 County Engineer

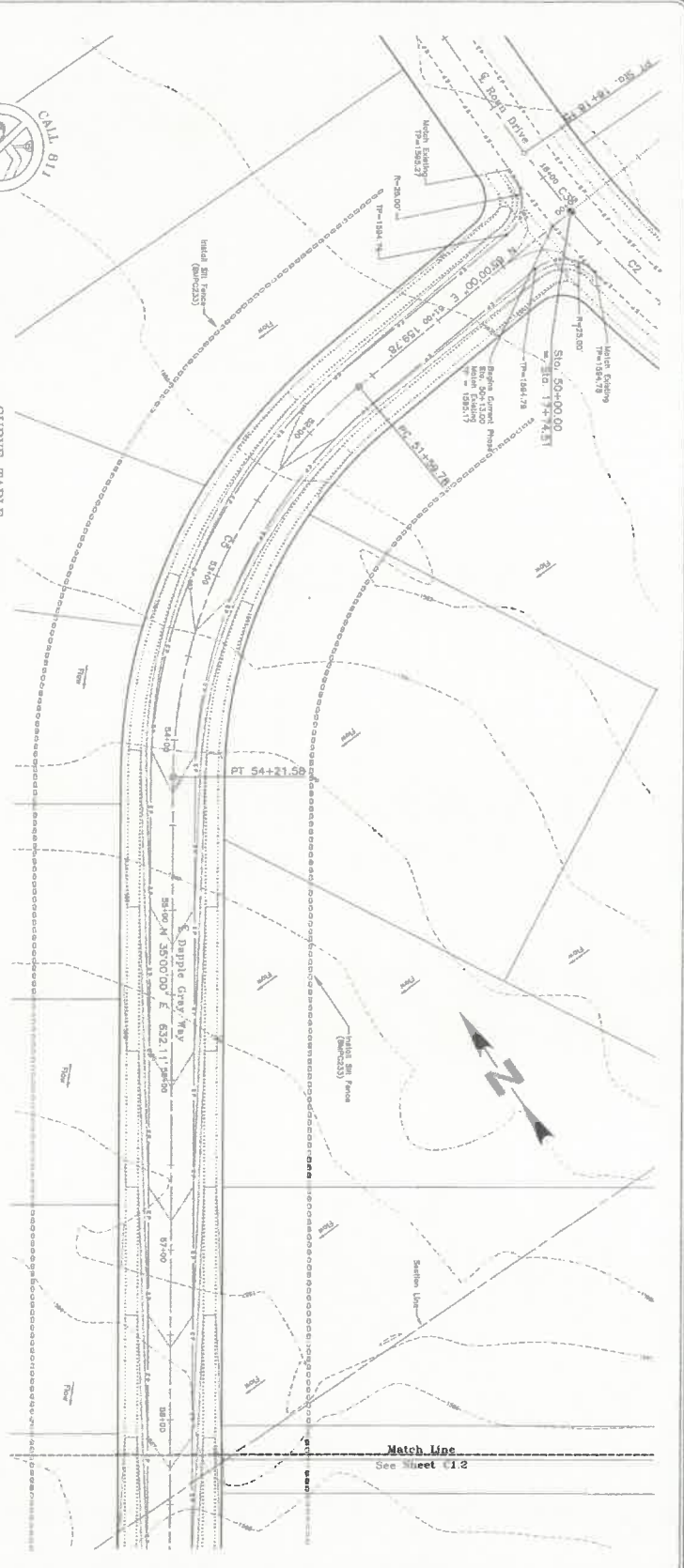
**al.k.w.2020**  
 Date

SHEET NO. <b>C1.0</b> 181827	LCU, INC. PALOMINO MAJOR PLAT, PHASE 4 DAPPLE GRAY WAY IMPROVEMENTS Cover Sheet	WESTERN PACIFIC ENGINEERING & SURVEY A TERRA DEVELOPMENT SERVICES CORPORATION 1228 E. Hurley Plaza, Moses Lake, Washington 1:509/785-1123 F:509/785-1288 Offices in Bellingham and Reno	



**CURVE TABLE**

LINE	BEARING	DELTA	ARC	CHORD	CHORD BEARING	CHORD	TANGENT
CA	S 89° 00' 00" E	90° 00' 00"	100.00'	100.00'	N 89° 00' 00" E	100.00'	159.85'
CB	S 89° 00' 00" E	90° 00' 00"	100.00'	100.00'	N 89° 00' 00" E	100.00'	159.85'
CC	S 89° 00' 00" E	90° 00' 00"	100.00'	100.00'	N 89° 00' 00" E	100.00'	159.85'



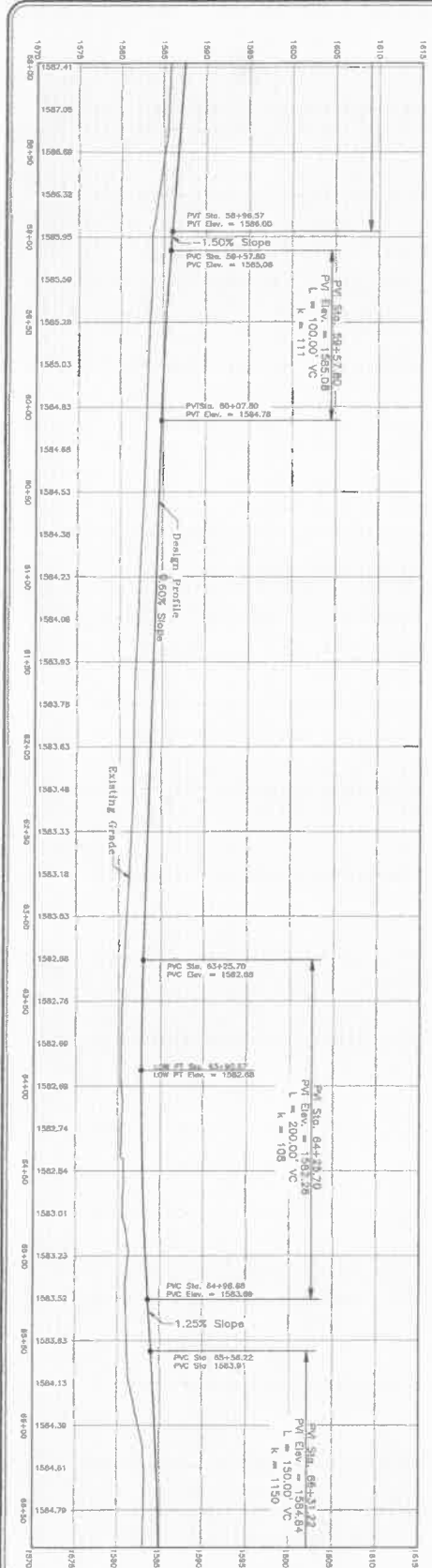
**SHEET NO.**  
**1-16-140**  
**C1.1**  
 181887

**LCU, INC.**  
**PALOMINO MAJOR PLAT, PHASE 4**  
**DAPPLE GRAY WAY IMPROVEMENTS**  
 Plan and Profile Sta. 50+00 to Sta. 59+00  
 Killis County Washington

No.	Revision	Date	By

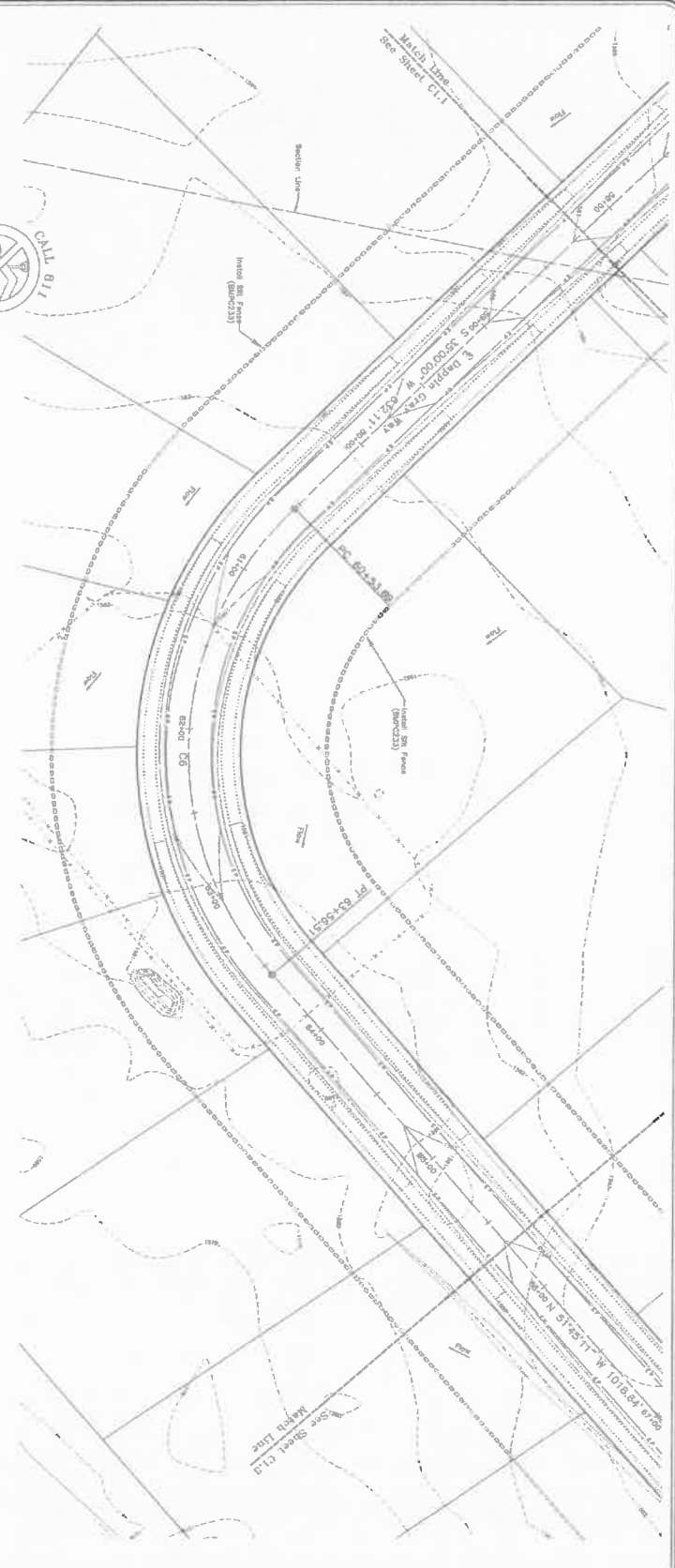
**WESTERN PACIFIC**  
**ENGINEERING & SURVEY**  
 A TERRA DEVELOPMENT SERVICES CORPORATION  
 1318 E. Hubler Place, Shore Lake, Washington  
 T: (509) 765-1025 F: (509) 765-1298  
 Service to Washington and Idaho





**CURVE TABLE**

STATION	TYPE	LENGTH	GRADE	VERT. CURVE	VERT. CURVE	VERT. CURVE
59+00	VERT.	100.00	1.50%	1585.00	1585.00	1585.00
60+00	VERT.	400.00	6.00%	1584.78	1584.78	1584.78
64+00	VERT.	150.00	1.25%	1582.68	1582.68	1582.68



SHEET NO.  
C1.2  
181857

LCU, INC.  
PALOMINO MAJOR PLAT, PHASE 4  
DAPPLE GRAY WAY IMPROVEMENTS  
Plan and Profile Sta. 59+00 to Sta. 66+00  
KULWA County  
Washington

No.	Revision	Date	By

**WESTERN PACIFIC  
ENGINEERING & SURVEY**  
A TERRA DEVELOPMENT SERVICES CORPORATION  
1328 E. Hamber Place, Moses Lake, Washington  
TEL: 509-765-1023 FAX: 509-765-1226  
Services in Washington and Idaho







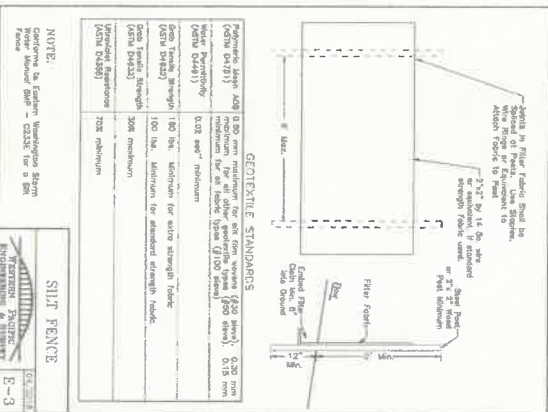


**NOTES:**

- \* Final Clearing Limits
- To protect and preserve the area of soil exposed to construction, the limits of general, natural vegetation and native topsoils shall be retained in an undisturbed state. The limits of general, natural vegetation and native topsoils shall be retained in an undisturbed state. The limits of general, natural vegetation and native topsoils shall be retained in an undisturbed state.
- \* Erosion Control Measures
- Construction activities on exposed areas shall be minimized, and where necessary, access points shall be established to minimize soil erosion. All exposed areas shall be stabilized with the application of effective erosion control measures. The specific BMPs to be used for controlling sediment on this project shall be determined by the project engineer in consultation with the project engineer.
- \* Sediment Control Measures
- Construction activities on exposed areas shall be minimized, and where necessary, access points shall be established to minimize soil erosion. All exposed areas shall be stabilized with the application of effective erosion control measures. The specific BMPs to be used for controlling sediment on this project shall be determined by the project engineer in consultation with the project engineer.



**CONSTRUCTION ENTRANCE**  
E-1



**SILT FENCE**  
E-3

**\* Control Area**

- 1. All construction activities shall be contained within the designated control area.
- 2. The control area shall be established by the project engineer in consultation with the project engineer.
- 3. The control area shall be maintained throughout the life of the project.
- 4. The control area shall be stabilized with the application of effective erosion control measures.
- 5. The control area shall be stabilized with the application of effective erosion control measures.

**\* Physical Erosion**

- 1. All soil and fill slopes will be eroded, controlled and protected in a manner that meets the requirements of the project engineer.
- 2. The physical erosion control measures shall be established by the project engineer in consultation with the project engineer.
- 3. The physical erosion control measures shall be maintained throughout the life of the project.
- 4. The physical erosion control measures shall be stabilized with the application of effective erosion control measures.
- 5. The physical erosion control measures shall be stabilized with the application of effective erosion control measures.

Drawn by: NBN  
Checked by: NBN  
Project No: 18841  
Scale: 1" = 8'-0"  
Date: 11/18/18  
SHEET NO. C2.2  
of 1 - K-2018  
181887

LCU, INC.  
PALOMINO MAJOR PLAT, PHASE 4  
DAPPLE GRAY DRIVE IMPROVEMENTS  
Best Management Practices  
Washington

No.	Revisions	Date	By

**WESTERN PACIFIC ENGINEERING & SURVEY**  
A TERRA DEVELOPMENT SERVICES CORPORATION  
1328 E. Hanter Place, Moses Lake, Washington 99020  
TEL: 509-765-5200 FAX: 509-765-5201  
www.westernpac.com



August 1, 2019

LCU, Inc.  
Attn: Pat Deneen  
P.O. Box 394  
Cle Elum, Washington 98922

**SUBJECT:** Stormwater Management Plan for Phase IV of the Palomino Major Plat located in Ellensburg, Washington.  
**WPES Project No. 18540**

Dear Mr. Deneen:

The purpose of this letter is to outline the stormwater management plan for Phase IV of the Palomino Major Plat in Ellensburg, Washington. The scope of Phase IV of the Palomino Major Plat development, includes the construction of Dapple Gray Way to service 45 additional residential lots. It is expected that each of the lots will contain newly constructed single family homes. The development is located approximately three miles northwest of downtown Ellensburg, Washington. The site can be accessed to the northwest from Bowers Road or from the southeast from Reecer Creek Road. More particularly, the site is located in the Northwest quarter of Section 27, Township 18 North, Range 18 East, W.M., on Kittitas County's Tax Parcel No. 491033

The area in which the Palomino Fields Development is located, is known to have seasonal high ground water during the summer months. Due to the high groundwater, the traditional trenches and swales used to manage stormwater runoff are highly unlikely to function properly. Problems with the high ground water were encountered during the construction of Phase I of this development. At that time, we worked closely with Kittitas County to come up with a solution that would best manage the stormwater runoff from this development. As a result, the road design for this development calls for raising the road bed above the existing native grade. In raising grade of the road, the stormwater will be able to run off the roadway. In order to handle the runoff from the roadway, as well as the lots themselves, the area located along the roadbed will be reserved to be used as infiltration areas. By minimizing compaction and allowing only drought resistant low growing grasses to be planted in these infiltration areas, the stormwater runoff will be able to properly infiltrate into the ground.

Attached to this letter is an exhibit showing a typical cross section of the stormwater infiltration areas located along the roadway. Within the infiltration area, one foot tall rock check dams will be installed at every foot of vertical grade drop. These check dams are intended to decrease the stormwater flow, minimize channel scour, and promote deposit of sediment. BMP C207, of the *Eastern Washington Stormwater Management Manual*, published by the Washington State Department of Ecology, shall



be followed during the construction of the check dams. As you know, you will also be required to follow all Washington Department of Ecology and Kittitas County Stormwater Standards during the construction of this development.

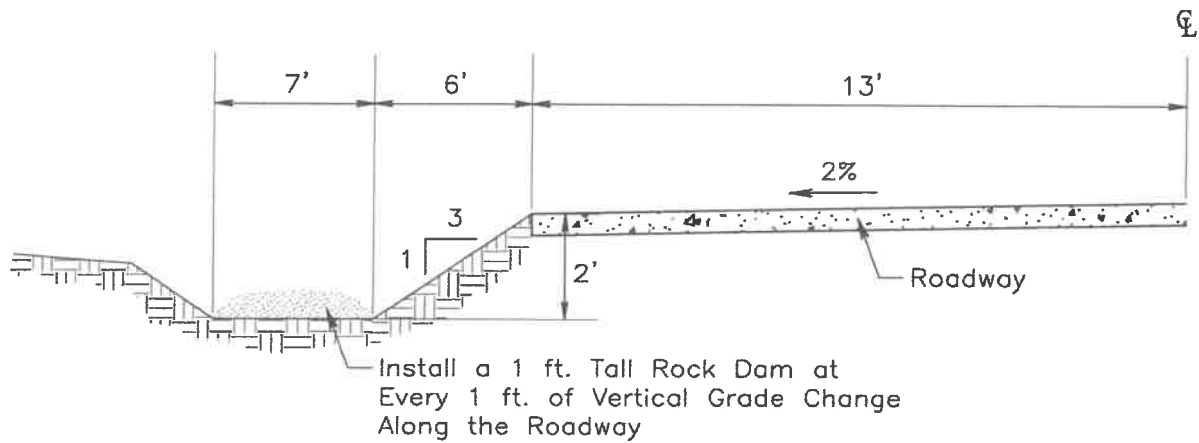
Thank you for allowing us to serve your engineering needs. If you have any further questions, please feel free to contact our office.

Sincerely,



Nathaniel D. Nofziger, P.E.  
WESTERN PACIFIC ENGINEERING & SURVEY  
1328 E. Hunter Place  
Moses Lake, Washington 98837  
(509) 765-1023





**NOTES:**

1. The Roadway shall be built up from the native grade. Stormwater collection areas shall not be dug out, or below native grade.
2. Drought resistant, low growing grasses shall be planted in the stormwater collection areas.



1328 East  
Hunter Place  
Moses Lake, WA  
T:(509)765-1023  
F:(509)765-1288

**PALOMINO MAJOR PLAT**  
Stormwater Exhibit  
Ellensburg, Washington

DRAWN BY: BNO  
CHECKED BY: NDN

DATE:  
07/2019

WPE PROJECT #:  
18541

Scale: 1" = N/A  
PLATE NO.: 01

# COUNTY ROAD NETWORK AMENDMENT FOR PALOMINO MAJOR PLAT



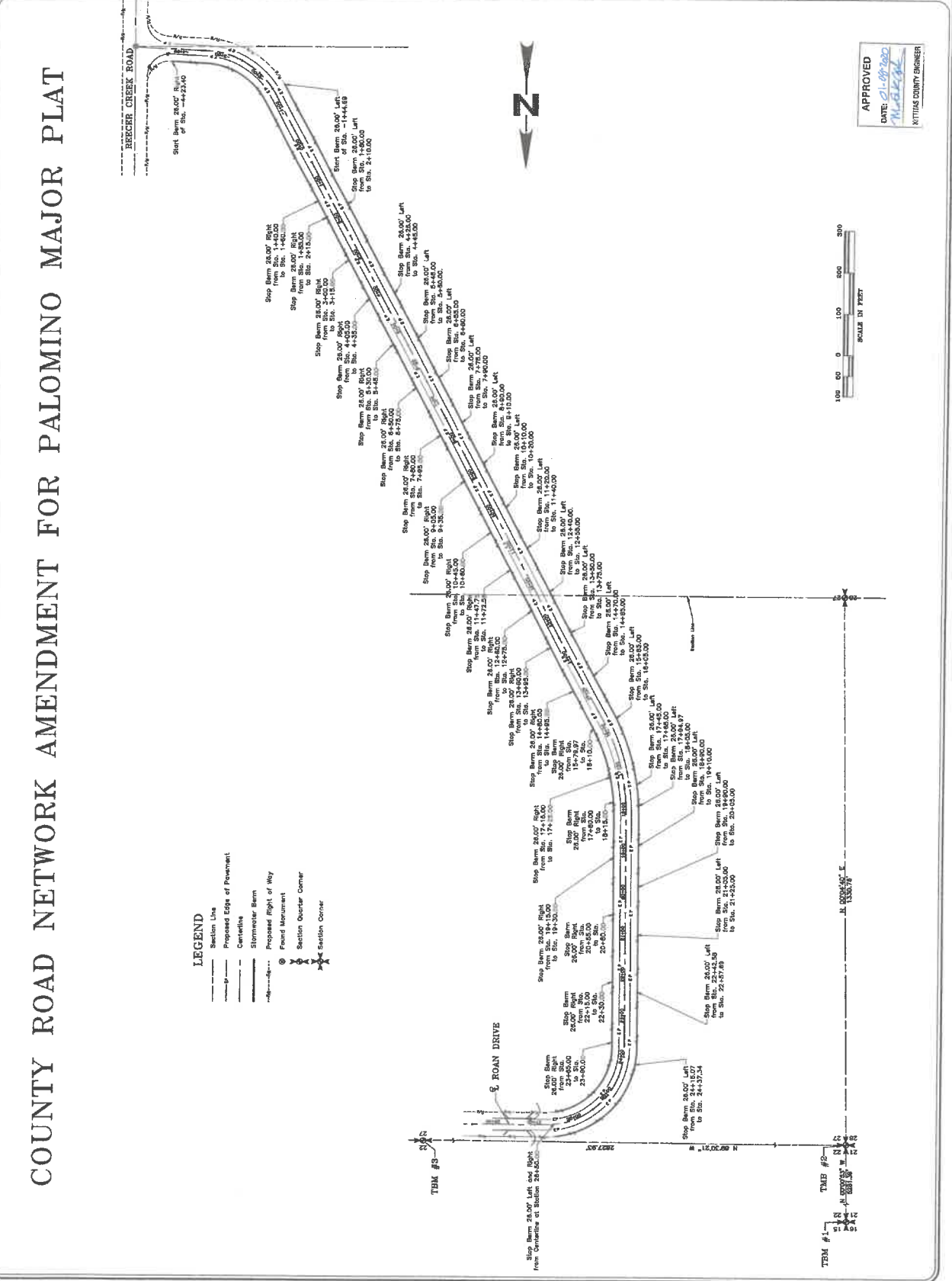
WESTERN PACIFIC  
ENGINEERING & SURVEY  
1322 E. Market Street, Suite 1000, Wallingford, WA 98148  
Tel: (206) 755-1023 Fax: (206) 755-1288  
Services in Washington and Alaska

No.	Revision	By	Date

ICU, INC.  
ROAN DRIVE STORMWATER ALTERATIONS  
PHASE 2 & 3  
Roan Drive Stormwater Alterations  
Road Layout  
Kittitas County

Designed by NBR  
Checked by JIMMY ZIM  
Drawn by JIMMY ZIM  
Project No. 14413  
Date: December 2010  
Scale: 1" = 100'  
Sheet: 1 of 4  
See ET, T, B, R, D, 1

SHEET NO.  
C1.1  
181827



APPROVED  
DATE: 2/10/2011  
KITTITAS COUNTY ENGINEER

Project Name: C:\Projects\2010\14413\14413.dwg Date: 2/10/2011 11:00 AM  
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TBM #100: N 6920'21.11 W 14' 1.0000000' to Sta. 24+37.54



# STORMWATER REPORT

## PALOMINO MAJOR PLAT, PHASE II & III

LCU Inc.

Prepared by

**WESTERN PACIFIC ENGINEERING and SURVEY**

1328 E. Hunter Place

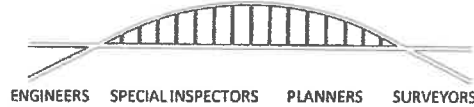
Moses Lake, Washington 98837

(509) 765-1023

WPES Project Number 18413

October 2019





WESTERN PACIFIC ENGINEERING & SURVEY  
PIONEER WAY PROFESSIONAL CENTER  
1328 E. HUNTER PLACE  
MOSES LAKE, WASHINGTON 98837  
OFFICE: (509) 765-1023  
FAX: (509) 765-1298

October 18, 2019

LCU, Inc.  
Attn: Pat Deneen  
P.O. Box 394  
Cle Elum, Washington 98922

**SUBJECT:** Revised Stormwater Report for Phase II and III of the Palomino Major Plat located in  
Ellensburg, WA  
**WPES Project No. 18413**

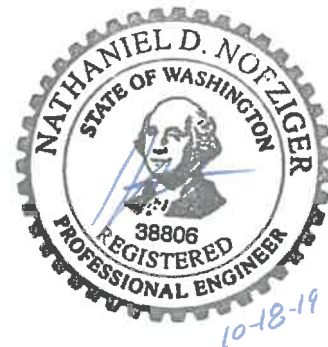
Dear Mr. Deneen:

Please find the attached revised Stormwater Report for Phase II and III of the Palomino Major Plat in Ellensburg, Washington. This revised report incorporates the feedback and current construction conditions as they exist on-site today. As you know, you will be required to follow all Washington Department of Ecology and Kittitas County Stormwater Standards during construction.

Thank you for allowing us to serve your engineering needs. If you have any questions concerning the attached report, please feel free to contact our office.

Sincerely,

Nathaniel D. Nofziger, P.E.  
WESTERN PACIFIC ENGINEERING & SURVEY  
1328 E. Hunter Place  
Moses Lake, Washington 98837  
(509) 765-1023



### **Proposed Development and Existing Site Conditions**

The original scope of this project included the development of approximately thirty-five hundred feet of private roadway network to serve thirty-six new single-family residences. Broken out into three phases, each phase would deal with a specific area of the development. This revised report specifically relates to the second and third phases of the overall project. This revision is required due to the reclassification of the roadway from a private road network to a public network and the presence of additional underground utilities.

Current project scope for phases two and three includes the extension of Roan Drive from its current location until it terminates at Reecer Creek Road. The development is located approximately three miles northwest of downtown Ellensburg, Washington. The site can be accessed to the northwest from Bowers Road or from the southeast by Reecer Creek Road. More specifically, the site is located in the Northwest quarter of Section 27, Township 18 North, Range 18 East, W.M., on Kittitas County's Tax Parcel No. 491033

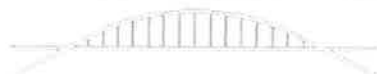
During the preliminary phases of this project, it was determined that the site experienced extremely high-water levels during the summer months. As such, the installation of traditional ditches and swales would be unfeasible. Without the ability to excavate for stormwater collection and infiltration, an elevated roadbed is the most reasonable solution to allow for grading and stormwater management.

In raising the grade of the road, stormwater will be able to run off the roadway and collect in constructed ditches. To accommodate the runoff from the roadway, areas outside the asphalt and compacted gravel shoulder will be left uncompacted to allow maximum infiltration capability. By minimizing compacted areas and allowing plant growth in these infiltration areas, the stormwater runoff will be able to properly infiltrate into the ground.

In the original design, the roadway was intended to be a private road. With this classification, the runoff from the roadway, driveways, and structures placed on each lot would need to have a stormwater collection system. Changing to a county road allows for only the stormwater running off from the roadway itself to be collected and stored. Each property will maintain their runoff on-site.

On October 17<sup>th</sup>, 2014, Budinger & Associates performed two shallow depth bores to determine soil classification and layer thickness. These bores were located to the west of the existing Bowers Road, approximately 100' and 400' respectively. These locations serve as the primary location for the Phase I development. Results from these tests are included in the appendix. This data indicates that primarily sands and gravels are present on site with a standing water table of five and a half feet or less at the time of boring.

On June 5<sup>th</sup>, 2018, Western Pacific Engineering and Survey was on site to dig test pits and collect soil samples representative of the native material found on site. The test pits were located in the vicinity of the bridge abutments. The soil conditions, drainage characteristics, and pertinent soil design information was gathered and analyzed for use within this report. The soil analysis, as well as a map showing locations of the test pits, can be found in the appendix.



The proposed development is classified as a low-use site as defined by the 2019 Stormwater Management Manual for Eastern Washington (SWMMEW). Roan Drive is a county road with an average daily traffic (ADT) count of less than 7,500 vehicles, categorizing it as a low-use site according to Table 5.22: Pollutant Loading Classifications for Solids, Metals, and Oil in Stormwater Runoff Directed to UIC Wells.

The natural topography is generally uniform in grade, sloping downward to the southwest. The surface of property is covered in a variety of native grasses. Within the boundaries of Phase III of this project, there is an abandoned irrigation ditch that runs east to west. This irrigation ditch is no longer in use and portions of it will be filled in as necessary. Other important features to note are Currier Creek, the Town Ditch, and their proximity to the site. The Town Ditch borders the eastern portion of the site and Currier Creek is located to the west.

### **Basin Analysis**

After placement of new roadway, the original drainage flow will be disrupted due to the elevated roadbed design. All stormwater that lands within the established Right of Way (ROW) will be collected and stored until it is able to infiltrate. The native soils are somewhat permeable, but will have limited infiltration prior to the soils becoming saturated due to the high-water table. For areas outside the ROW, runoff will be similar to pre-construction conditions.

For this development it is important that the stormwater runoff from the roadway does not directly flow into Currier Creek, due to the potential for contaminants. To protect Currier Creek, construction means and methods shall be consistent with the Stormwater Management Manual for Eastern Washington. For the purpose of this stormwater management document, only the stormwater that lands within the Right of Way will be considered.

### **General Calculation Procedure**

When computing the required infiltration and storage areas for the site, a number of design assumptions were made. These assumptions include: each lot would have its own driveway, approximately twenty feet wide, Roan Drive will be approximately twenty-six feet wide for the 3,250 feet long roadway, approximately twenty linear feet would be subtracted from effective ditch length for each utility cluster, and the infiltration rate is assumed to be zero feet per second to account for the high groundwater table and inability for native soils to infiltrate stormwater.

By quantifying the type of ground cover present on site, a more accurate representation of infiltration and storage is possible. The impervious area, consisting of the roadway and individual driveways, covers approximately 2.2 acres. The pervious cover, consisting of the ditches and shoulders along the roadway, adds an additional 1.3 acres. In accordance with the Kittitas County Code, the rainfall intensity and time of concentration from a 25-year storm were used. A rainfall volume of 1.6 inches, along with Type 1A hydrograph were used to analyze the volume of stormwater expected from the site.





According to the United States Department of Agriculture's (USDA) Soil Survey, the soils in the area have a Hydraulic Soil Group rating of C/D or better. Runoff Curve Number (CN) values can be pulled directly from Table 4.5.2, found in the Stormwater Management Manual for Eastern Washington, published by the Washington State Department of Ecology. For the impervious paved areas, the CN value is 98. For the previous areas, the CN value of 87 for open spaces with less than 50% grassy cover was used. This CN value was chosen as the infiltration areas are designed to be seeded with low-irrigation plants and may not assist in the infiltration of stormwater.

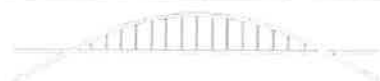
Based on the Budinger & Associates soil exploration data, project soils are classified as poorly graded clean gravels or gravel-sand mix (GP) according to Unified Soils Classification System with a hydraulic permeability of 0.01 feet per minute.

Based on our own research and soil sampling, the soils most closely resemble silty sands or poorly graded sand-silt mix (SM) with a hydraulic permeability of  $5 \times 10^{-3}$  feet per minute within the first foot of depth. For the remainder of the tests, for depths greater than a foot, the soils present have a higher hydraulic conductivity than the initial layer. As such, the lowest value will be used for calculations as it is the limited factor in stormwater infiltration. The data gathered by Western Pacific Engineering & Survey has been included in the appendix.

Lastly, by utilizing the United States Department of Agriculture's Web Soil Survey tool, a soil map encompassing the project site and the present soils with their respective engineering and physical properties was obtained. Using the median value for the topsoil infiltration rate returned a value of 0.0018 feet per second. Data sheets utilized to determine the soil type and infiltration rates are included in the appendix. To provide a factor of safety, an assumed infiltration rate of zero feet per second is used to determine the required 100-year storm storage capacity. As such, the required storage for a zero-infiltration scenario is the design standard.

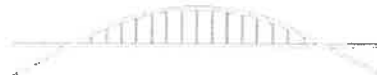
Current earthwork design calls for a one-and-a-half-foot tall berm on the outside of the ditch and a two-foot berm on the inside of the ditch with a trough between them. This depression will contain the stormwater from the roadway. With a design infiltration value of zero feet per second, the required storage is 13,737 ft<sup>3</sup>. This amount of water equates to approximately 7.5" and 6.5" of standing water in the left and right ditches, respectively. While the right ditch accepts more runoff, it also has a longer effective length due to the super-elevated roadway, thereby giving it a lower standing depth. With 100-year storm during frozen ground conditions, the stormwater collection system is capable of impounding all runoff without the need for any infiltration. During typical, non-frozen conditions, a storage depth of 2" or less should be expected based on median infiltration rates.

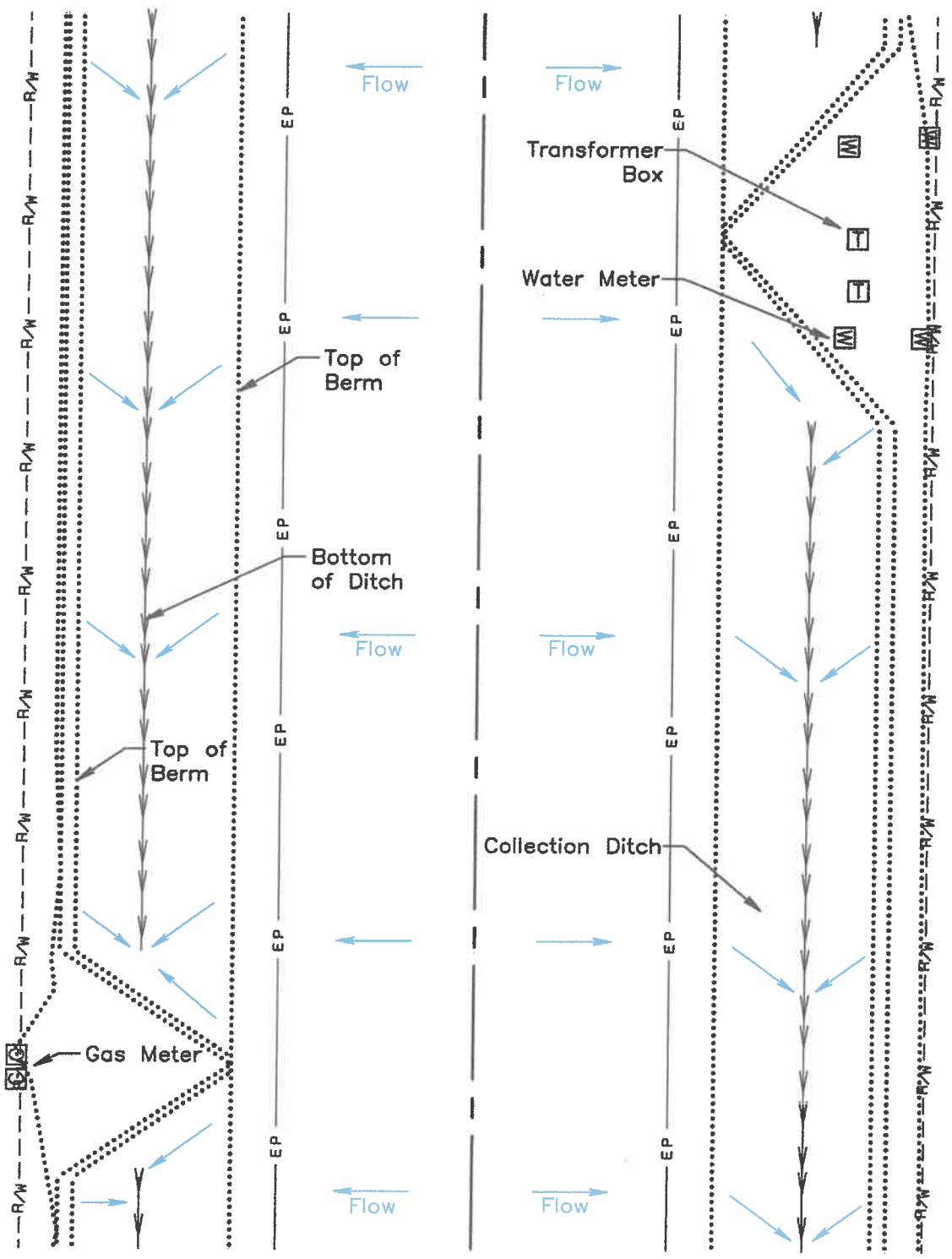
Taking all of the above information into consideration, it was determined that for an SCS Type 1A regional storm, the designed stormwater collection system is more than capable of handling the runoff from Roan Drive.



**Appendices and Attachments**

- Typical Layout Runoff Map
- Typical Roadway Cross-Section
- Budinger & Associates Soil Bore Data
- WPES Soil Classification
- USDA Soil Classification
- 25-Year Storm Map
- Stormwater Manual Hydrology Tables
- Infiltration Area Calculations
- Basin Runoff Calculations





**WESTERN PACIFIC  
ENGINEERING & SURVEY**  
A TERRA DEVELOPMENT SERVICES CORPORATION

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Hunter Place  
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**LCU, INC.**  
**Palomino Flats Runoff Map**  
**Typical Layout**

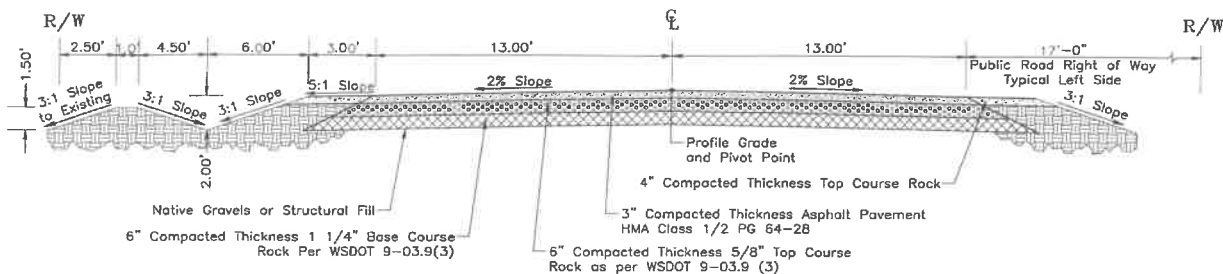
DRAWN BY: TSL  
CHECKED BY: NDN

DATE:  
October 9, 2019

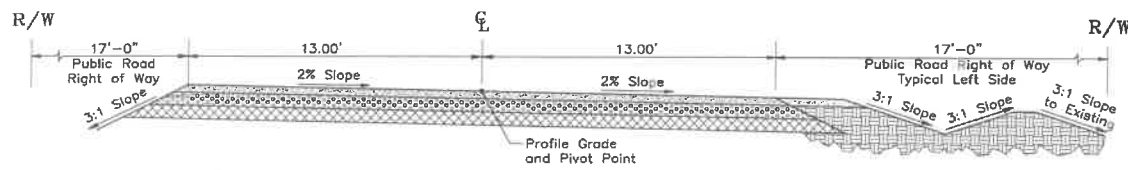
WPE PROJECT #:  
18413

Scale: 1" = 10'  
PLATE NO.: 01

### TYPICAL ROADWAY SECTION



### SUPER ROADWAY SECTION Sta. -4+23.40 to Sta. -1+44.69



**WESTERN PACIFIC  
ENGINEERING & SURVEYING**  
 A TRUCK BROKERAGE/RETAIL ASSOCIATION  
 1328 Hunter Place  
 Moses Lake, WA 98837  
 (509) 763-1053

No.	Revision	Date	By

**LCU, INC.**  
**PALOMINO FLATS DRAINAGE**  
 Typical Cross-Section  
 Kittitas County Washington

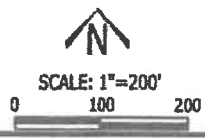
Designed by MDN  
 Drawn by Tml/TSL  
 Checked by MDN  
 Project No. 18413  
 Date: October, 2019  
 Scale: Hor. 1" = 40' V.A.  
 Vert. 1" = 10' N. R. 18 E.  
 Sec 27, T 18 N, R 18 E

**SHEET NO.**  
**1 of 1**

File: N:\18413\18413\Drawings\18413\18413.dwg Date: 10/16/2019



- DCPT LOCATION
- TEST PIT LOCATION



**B** Budinger & Associates

**SITE PLAN**  
PALOMINO FIELDS PLAT  
ELLENSBURG, WASHINGTON

**FIGURE 1**  
PROJECT NUMBER S14484  
DATE: 10/2014

### TEST PIT 1

**Date of Boring:** 10-17-14  
**Driller:** client  
**Type of Drill:** Bobcat E42 Mini-excavator  
**Location:** ~ 50 feet west of Reecer Creek Road at Bowers Road  
**Surface:** sparse grass and weeds

**Elevation:** 100 ft  
**Logged by:** T. Black  
**Size of hole:** 5 ft by 10 ft

DEPTH	SAMPLES RQD, BLOW COUNTS N (% RECOVERY) <i>(blows/6" (italics))</i>	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG	TEST RESULTS														
					10	20	30	40	50	60	70	80	90						
0		moist, dark brown to brown, loose	SAND with Silt and Organics (roots)																
		moist, brown to reddish brown, loose to medium dense	GRAVEL with Sand and Cobbles, occasional Boulders, coarse, rounded																
5		saturated, gray, loose to medium dense	(free groundwater at 5 feet) GRAVEL with Sand, occasional Cobbles and Boulders, coarse, rounded End of Boring @ 5.5 ft																
10																			

TEST PIT L\WWWMT S14484 TEST PIT LOGS.GPJ BUDINGER.GDT 1023/14



**Budinger & Associates**  
 3820 E. Broadway Ave.  
 Spokane, WA 99202

**TEST PIT LOGS** **FIGURE 3-1**  
 Project: Palomino Road Extension  
 Location: Ellensburg, WA  
 Number: S14484

**TEST PIT 2**

**Date of Boring:** 10-17-14  
**Driller:** client  
**Type of Drill:** Bobcat E42 Mini-excavator  
**Location:** ~ 400 feet west of Reecer Creek Road at Bowers Road  
**Surface:** sparse grass and weeds

**Elevation:** 95 ft  
**Logged by:** T. Black  
**Size of hole:** 5 ft by 10 ft

DEPTH	SAMPLES RQD, BLOW COUNTS N (% RECOVERY) <i>(blows/6" (italics))</i>	MOISTURE, COLOR, CONDITION	DESCRIPTION	SOIL LOG	TEST RESULTS									
					ATTERBERG LIMITS PL ————— LL WATER CONTENT ○ STANDARD PEN TEST, N-VALUE (OBSERVED) ■ 3" SPLIT SPOON PENETRATION, BLOWS/FT ■									
0					10	20	30	40	50	60	70	80	90	
		moist, dark brown to brown, loose	SAND with Silt and Organics (roots)											
		moist, brown to reddish brown, loose to medium dense	GRAVEL with Sand and Cobbles, occasional Boulders, coarse, rounded											
			▽ (free groundwater at 4 feet)											
5		saturated, gray, loose to medium dense	GRAVEL with Sand, occasional Cobbles and Boulders, coarse, rounded											
			End of Boring @ 5 ft											
10														

TEST PIT LWWMT\_S14484 TEST PIT LOGS.GPJ BUDINGER.GDT 10/23/14



**Budinger & Associates**  
 3820 E. Broadway Ave.  
 Spokane, WA 99202

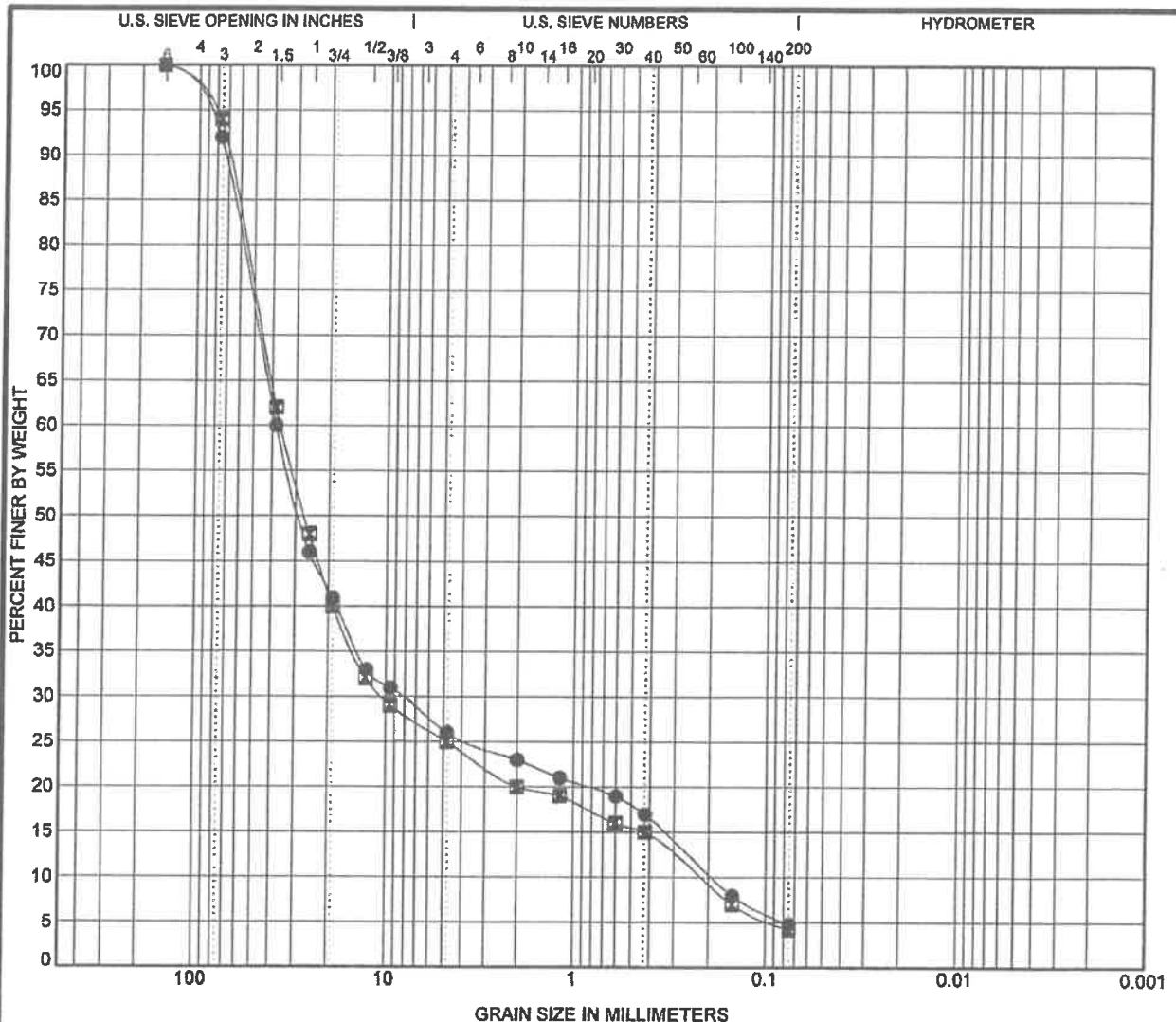
**TEST PIT LOGS      FIGURE 3-2**

Project: Palomino Road Extension  
 Location: Ellensburg, WA  
 Number: S14484

**SOIL MECHANICS  
LABORATORY SUMMARY**

LABORATORY NUMBER:		Units	Test Methods	Test 1	Test 2
TEST PIT NUMBER					
DEPTH	TOP	feet		1.0	1
	BOTTOM	feet		3.0	3
SAMPLE TYPE				Bulk	Bulk
MOISTURE		%	ASTM D2216	6.5	6.0
LIQUID LIMIT		%		27	28
PLASTIC LIMIT		%	ASTM D 4318	24	18
PLASTICITY INDEX		%		3	10
UNIFIED CLASSIFICATION			ASTM D 2487	GP	GP
	6"		ASTM D 422	100	100
	3"			92	94
S	1½"	%		60	62
I	1"			46	48
E	¾" GRAVEL	P		41	40
V	½"	A		33	32
E	⅜"	S		31	29
	#4	S		26	25
S	#10	I		23	20
I	#16	N		21	19
Z	#30 SAND	G		19	16
E	#40			17	15
	#100			8	7
	#200			4.8	4.2





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● 1	1.0				9.56	200.99
■ 2	1.0				13.77	161.84

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 1	1.0	152.4	38	8.288	0.189	65.3	21.2	4.8
■ 2	1.0	152.4	35.875	10.465	0.222	68.3	20.7	4.2

U.S. GRAIN SIZE S14484 TEST PIT LOGS.GPJ BUDINGER.GDT 10/23/14



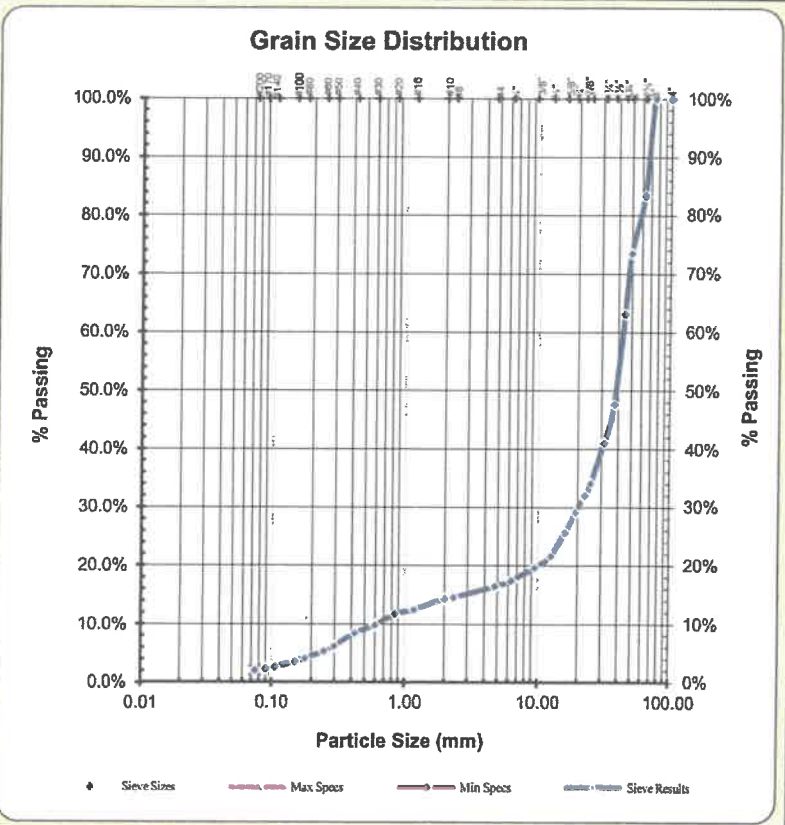
**GRAIN SIZE DISTRIBUTION RESULTS**  
 Project: Palomino Road Extension  
 Location: Ellensburg, WA  
 Number: S14484

**FIGURE 6**

### SIEVE ANALYSIS REPORT

<b>Report To:</b> LCU, Inc. Attn: Pat Deneen P.O. Box 394 Cle Elum, WA 98922	<b>Date Sampled:</b> 06/05/18 <b>Date Received:</b> 06/05/18 <b>Date Tested:</b> 06/07/18 <b>Sampled By:</b> WPE <b>Sample Method:</b> Test Pit	<b>Project #:</b> 18413 <b>Sample #:</b> 74 <b>Source:</b> On Site <b>Description:</b> T.P. #1 @ 6 ft
<b>Specifications:</b> No Specs <b>Sample Meets Specs ?</b> n/a		
<b>Procedure:</b> ASTM C136		
<b>ASTM D-2487 Unified Soils Classification System</b> GP, Poorly graded Gravel		
<b>D<sub>(10)</sub></b> = 0.623 mm	<b>% Gravel</b> = 83.5%	<b>Coeff. of Curvature, C<sub>c</sub></b> = 14.97
<b>D<sub>(30)</sub></b> = 20.135 mm	<b>% Sand</b> = 14.4%	<b>Coeff. of Uniformity, C<sub>u</sub></b> = 69.81
<b>D<sub>(60)</sub></b> = 43.489 mm	<b>% Silt &amp; Clay</b> = 2.1%	<b>Fineness Modulus</b> = 7.41

Sieve Size		Actual Cumulative		Interpolated Cumulative		Specs	
		Percent Passing	Percent Passing	Max	Min		
US	Metric						
6.00"	150.00		100%				
4.00"	100.00		100%				
3.00"	75.00		100%				
2.50"	63.00	83%	83%				
2.00"	50.00	74%	74%				
1.75"	45.00		63%				
1.50"	37.50	48%	48%				
1.25"	31.50	41%	41%				
1.00"	25.00	34%	34%				
7/8"	22.40		32%				
3/4"	19.00	29%	29%				
5/8"	16.00		26%				
1/2"	12.50	22%	22%				
3/8"	9.50	20%	20%				
1/4"	6.30	17%	17%				
#4	4.75	16%	16%				
#8	2.360		15%				
#10	2.000	14%	14%				
#16	1.180		12%				
#20	0.850	12%	12%				
#30	0.600		10%				
#40	0.425	8%	8%				
#50	0.300		6%				
#60	0.250		5%				
#80	0.180	4%	4%				
#100	0.150		4%				
#140	0.106		3%				
#170	0.090		2%				
#200	0.075	2.1%	2.1%				



Technician: Jack Demont  
 Engineer: Nathan Nofziger, P.E.

These test results relate only to the items tested, and were obtained in-lab unless otherwise specified.  
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## SIEVE ANALYSIS REPORT

**Report To:** LCU, Inc  
 Attn: Pat Deneen  
 P.O. Box 394  
 Cle Elum, WA 98922

**Date Sampled:** 06/05/18  
**Date Received:** 06/05/18  
**Date Tested:** 06/08/18  
**Sampled By:** WPE  
**Sample Method:** Test Pit

**Project #:** 18413  
**Sample #:** 75  
**Source:** On Site  
**Description:** T.P. #1 @ 4 ft

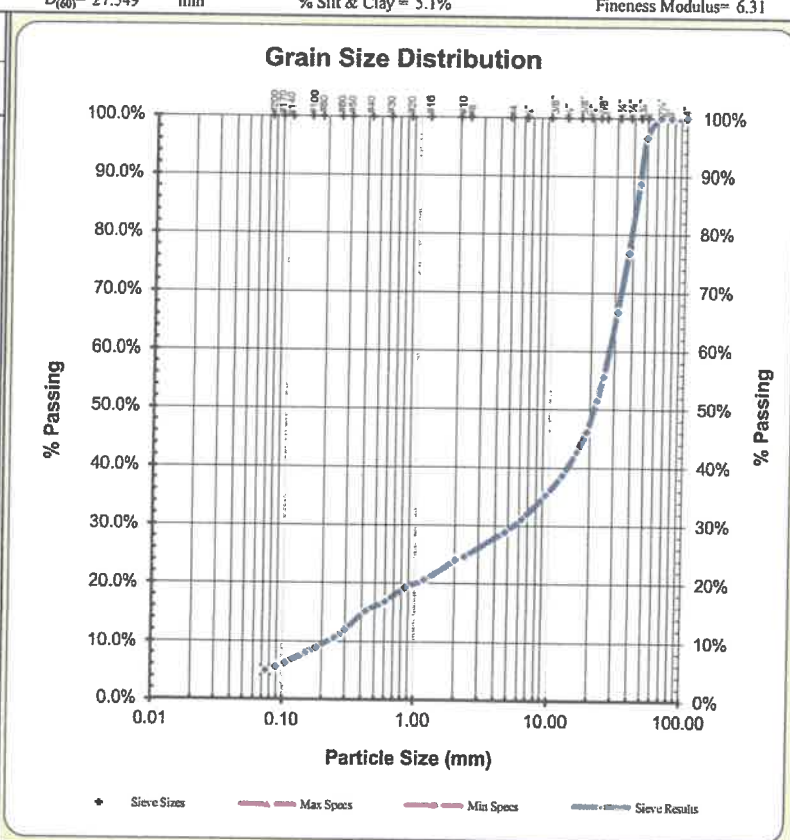
**Specifications:** No Specs  
**Sample Meets Specs ?** n/a

**ASTM D-2487 Unified Soils Classification System**  
**GP-GM, Poorly graded Gravel with Silt and Sand**

**Procedure:** ASTM C136

$D_{(10)}$  = 0.223 mm      % Gravel = 71.1%      Coeff. of Curvature,  $C_c$  = 4.93  
 $D_{(30)}$  = 5.501 mm      % Sand = 23.9%      Coeff. of Uniformity,  $C_u$  = 123.76  
 $D_{(60)}$  = 27.549 mm      % Silt & Clay = 5.1%      Fineness Modulus = 6.31

Sieve Size	Actual Cumulative		Interpolated Cumulative		Specs Max	Specs Min
	US	Metric	Percent Passing	Percent Passing		
6.00"	150.00		100%	100%		
4.00"	100.00		100%	100%		
3.00"	75.00		100%	100%		
2.50"	63.00	100%	100%	100%		
2.00"	50.00	97%	97%	97%		
1.75"	45.00		89%	89%		
1.50"	37.50	77%	77%	77%		
1.25"	31.50	67%	67%	67%		
1.00"	25.00	56%	56%	56%		
7/8"	22.40		52%	52%		
3/4"	19.00	46%	46%	46%		
5/8"	16.00		43%	43%		
1/2"	12.50	39%	39%	39%		
3/8"	9.50	35%	35%	35%		
1/4"	6.30	31%	31%	31%		
#4	4.75	29%	29%	29%		
#8	2.360		25%	25%		
#10	2.000	24%	24%	24%		
#16	1.180		21%	21%		
#20	0.850	19%	19%	19%		
#30	0.600		17%	17%		
#40	0.425	15%	15%	15%		
#50	0.300		12%	12%		
#60	0.250		11%	11%		
#80	0.180	9%	9%	9%		
#100	0.150	8%	8%	8%		
#140	0.106		6%	6%		
#170	0.090		6%	6%		
#200	0.075	5.1%	5.1%	5.1%		



**Technician:** Jack Demont  
**Engineer:** Nathan Nofziger, P.E.

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### SIEVE ANALYSIS REPORT

**Report To:** LCU, Inc.  
 Attn: Pat Deneen  
 P.O. Box 394  
 Cle Elum, Washington 98922

**Date Sampled:** 06/05/18  
**Date Received:** 06/05/18  
**Date Tested:** 06/08/18  
**Sampled By:** WPE  
**Sample Method:** Manual Native

**Project #:** 18413  
**Sample #:** 76  
**Source:** On-Site  
**Description:** T.P.# 1 @ 12"

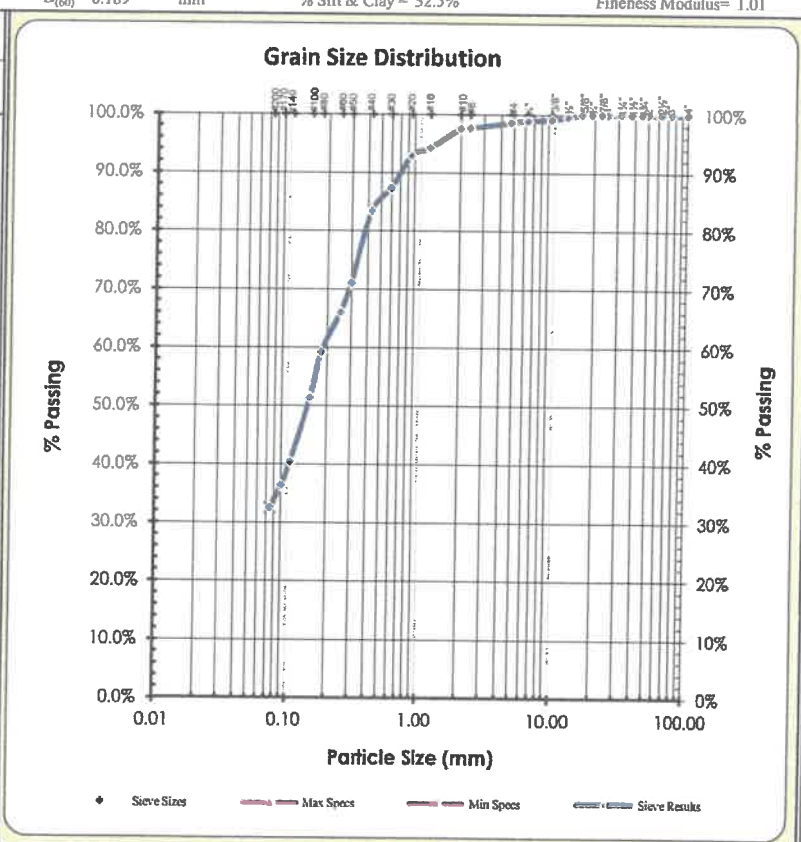
**Specifications:** No Specs  
**Sample Meets Specs ?** n/a

**ASTM D-2487 Unified Soils Classification System**  
**SM, Silty Sand**

**Procedure:** ASTM C117 Method B

$D_{(10)} = 0.023$  mm      % Gravel = 1.4%      Coeff. of Curvature,  $C_c = 1.10$   
 $D_{(30)} = 0.069$  mm      % Sand = 66.1%      Coeff. of Uniformity,  $C_u = 8.20$   
 $D_{(60)} = 0.189$  mm      % Silt & Clay = 32.5%      Fineness Modulus = 1.01

Sieve Size	Actual		Interpolated		Specs Max	Specs Min
	US	Metric	Percent Passing	Percent Passing		
6.00"	150.00			100%		
4.00"	100.00			100%		
3.00"	75.00			100%		
2.50"	63.00			100%		
2.00"	50.00			100%		
1.75"	45.00			100%		
1.50"	37.50			100%		
1.25"	31.50			100%		
1.00"	25.00			100%		
7/8"	22.40			100%		
3/4"	19.00			100%		
5/8"	16.00	100%		100%		
1/2"	12.50	100%		100%		
3/8"	9.50	99%		99%		
1/4"	6.30	99%		99%		
#4	4.75	99%		99%		
#8	2.360			98%		
#10	2.000	98%		98%		
#16	1.180			94%		
#20	0.850	93%		93%		
#30	0.600			87%		
#40	0.425	83%		83%		
#50	0.300			71%		
#60	0.250			66%		
#80	0.180	59%		59%		
#100	0.150			52%		
#140	0.106			40%		
#170	0.090			36%		
#200	0.075	32.5%		32.5%		



Technician: Jack Demont  
 Engineer: Nathan Nofziger, P.E.

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## SIEVE ANALYSIS REPORT

**Report To:** LCU, Inc.  
 Attn: Pat Deneen  
 P.O. Box 394  
 Cle Elum, WA 98922

**Date Sampled:** 06/05/18  
**Date Received:** 06/05/18  
**Date Tested:** 06/06/18  
**Sampled By:** WPE  
**Sample Method:** Test Pit

**Project #:** 18413  
**Sample #:** 77  
**Source:** On Site  
**Description:** T.P. #2 @ 6"

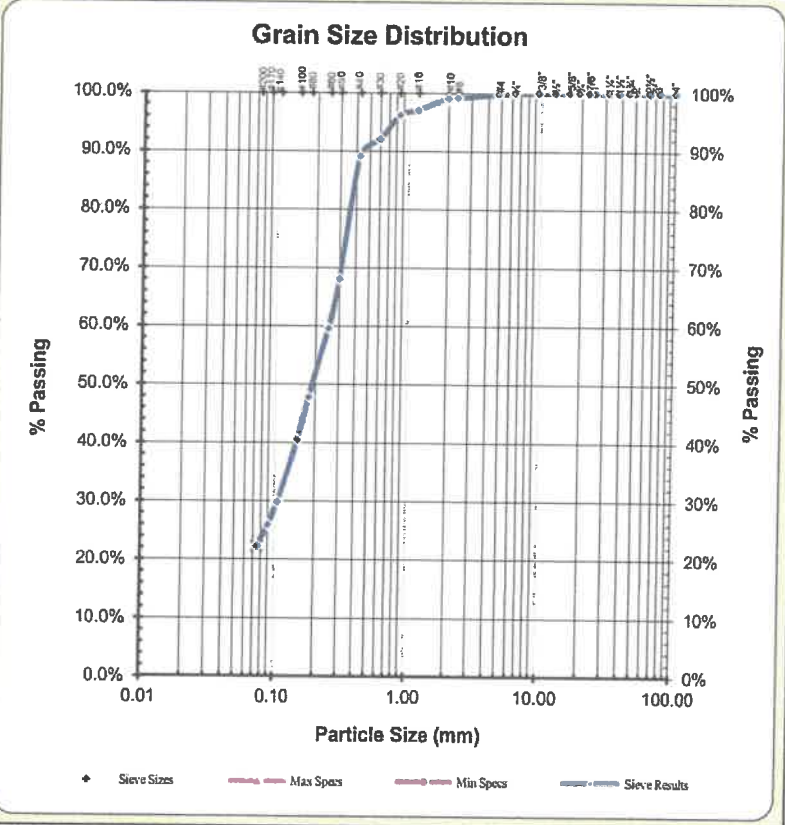
**Specifications:** No Specs  
**Sample Meets Specs ?** n/a

**ASTM D-2487 Unified Soils Classification System**  
 SM, Silty Sand

**Procedure:** ASTM C136

$D_{10} = 0.034$  mm      % Gravel = 0.2%      Coeff. of Curvature,  $C_c = 1.34$   
 $D_{30} = 0.107$  mm      % Sand = 77.5%      Coeff. of Uniformity,  $C_u = 7.49$   
 $D_{60} = 0.252$  mm      % Silt & Clay = 22.3%      Fineness Modulus = 1.03

Sieve Size		Actual Cumulative	Interpolated Cumulative	Specs	Specs
US	Metric	Percent Passing	Percent Passing	Max	Min
6.00"	150.00		100%		
4.00"	100.00		100%		
3.00"	75.00		100%		
2.50"	63.00		100%		
2.00"	50.00		100%		
1.75"	45.00		100%		
1.50"	37.50		100%		
1.25"	31.50		100%		
1.00"	25.00		100%		
7/8"	22.40		100%		
3/4"	19.00		100%		
5/8"	16.00		100%		
1/2"	12.50		100%		
3/8"	9.50		100%		
1/4"	6.30	100%	100%		
#4	4.75	100%	100%		
#8	2.360		99%		
#10	2.000	99%	99%		
#16	1.180		97%		
#20	0.850	96%	96%		
#30	0.600		92%		
#40	0.425	89%	89%		
#50	0.300		68%		
#60	0.250		60%		
#80	0.180	48%	48%		
#100	0.150		41%		
#140	0.106		30%		
#170	0.090		26%		
#200	0.075	22.3%	22.3%		



Technician: Jack Demont  
 Engineer: Nathan Nofziger, P.E.

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## SIEVE ANALYSIS REPORT

**Report To:** LCU, Inc.  
 Attn: Pat Deneen  
 P.O. Box 394  
 Cle Elum, WA 98922

**Date Sampled:** 06/05/18  
**Date Received:** 06/05/18  
**Date Tested:** 06/08/18  
**Sampled By:** WPE  
**Sample Method:** Test Pit

**Project #:** 18413  
**Sample #:** 78  
**Source:** On Site  
**Description:** T.P. #2 @ 3 ft

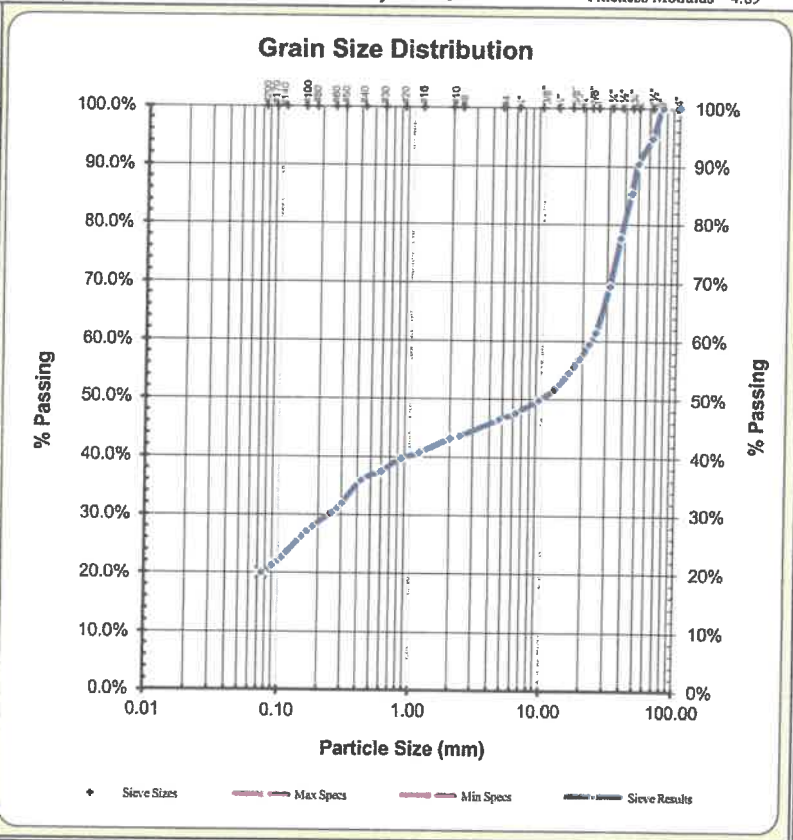
**Specifications:** No Specs  
**Sample Meets Specs ?** n/a

**ASTM D-2487 Unified Soils Classification System**  
 GM, Silty Gravel with Sand

**Procedure:** ASTM C117 Method B

$D_{(10)} = 0.037$  mm      % Gravel = 53.5%      Coeff. of Curvature,  $C_c = 0.07$   
 $D_{(30)} = 0.243$  mm      % Sand = 26.5%      Coeff. of Uniformity,  $C_u = 616.12$   
 $D_{(60)} = 23.057$  mm      % Silt & Clay = 20.0%      Fineness Modulus = 4.89

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
US	Metric				
6.00"	150.00		100%		
4.00"	100.00		100%		
3.00"	75.00	100%	100%		
2.50"	63.00	95%	95%		
2.00"	50.00	90%	90%		
1.75"	45.00		85%		
1.50"	37.50	78%	78%		
1.25"	31.50	69%	69%		
1.00"	25.00	61%	61%		
7/8"	22.40		60%		
3/4"	19.00	57%	57%		
5/8"	16.00		55%		
1/2"	12.50	52%	52%		
3/8"	9.50	50%	50%		
1/4"	6.30	48%	48%		
#4	4.75	47%	47%		
#8	2.360		44%		
#10	2.000	43%	43%		
#16	1.180		41%		
#20	0.850	40%	40%		
#30	0.600		37%		
#40	0.425	36%	36%		
#50	0.300		32%		
#60	0.250		30%		
#80	0.180	28%	28%		
#100	0.150	26%	26%		
#140	0.106		23%		
#170	0.090		21%		
#200	0.075	20.0%	20.0%		



**Technician:** Jack Demont  
**Engineer:** Nathan Nofziger, P.E.

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## SIEVE ANALYSIS REPORT

**Report To:** LCU, Inc.  
 Attn: Pat Deneen  
 P.O. Box 394  
 Cle Elum, WA 98922

**Date Sampled:** 06/05/18  
**Date Received:** 06/05/18  
**Date Tested:** 06/08/18  
**Sampled By:** WPE  
**Sample Method:** Tset Pit

**Project #:** 18413  
**Sample #:** 79  
**Source:** On Site  
**Description:** T.P. #2 @ 7 ft

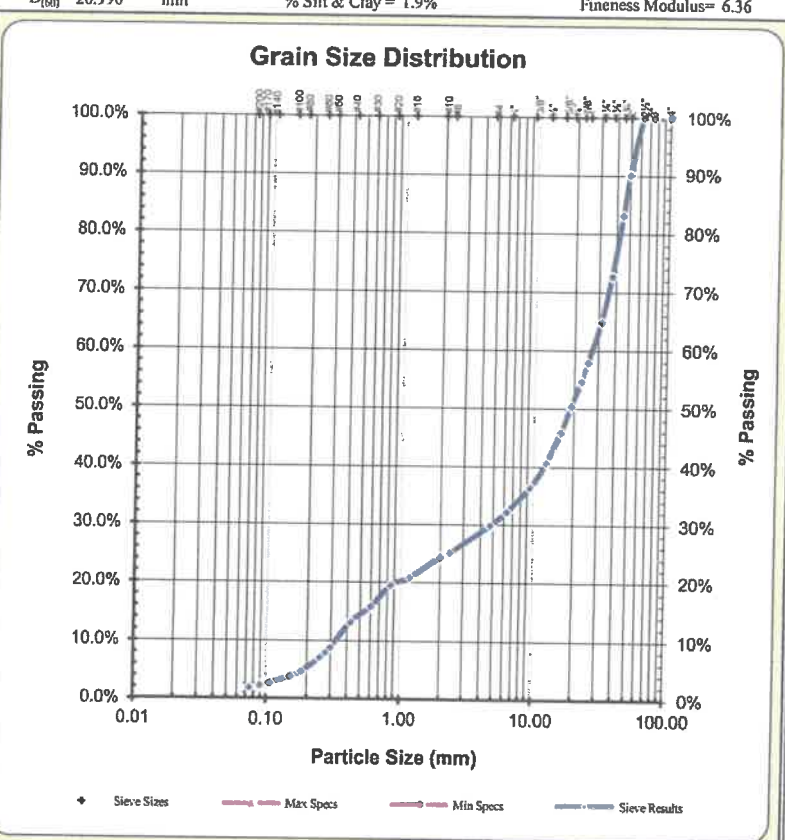
**Specifications:** No Specs  
**Sample Meets Specs ?** n/a

**ASTM D-2487 Unified Soils Classification System**  
 GW, Well-graded Gravel with Sand

**Procedure:** ASTM C136

$D_{(10)} = 0.333$  mm      % Gravel = 70.1%      Coeff. of Curvature,  $C_c = 2.59$   
 $D_{(30)} = 4.819$  mm      % Sand = 28.0%      Coeff. of Uniformity,  $C_u = 81.19$   
 $D_{(60)} = 26.996$  mm      % Silt & Clay = 1.9%      Fineness Modulus = 6.36

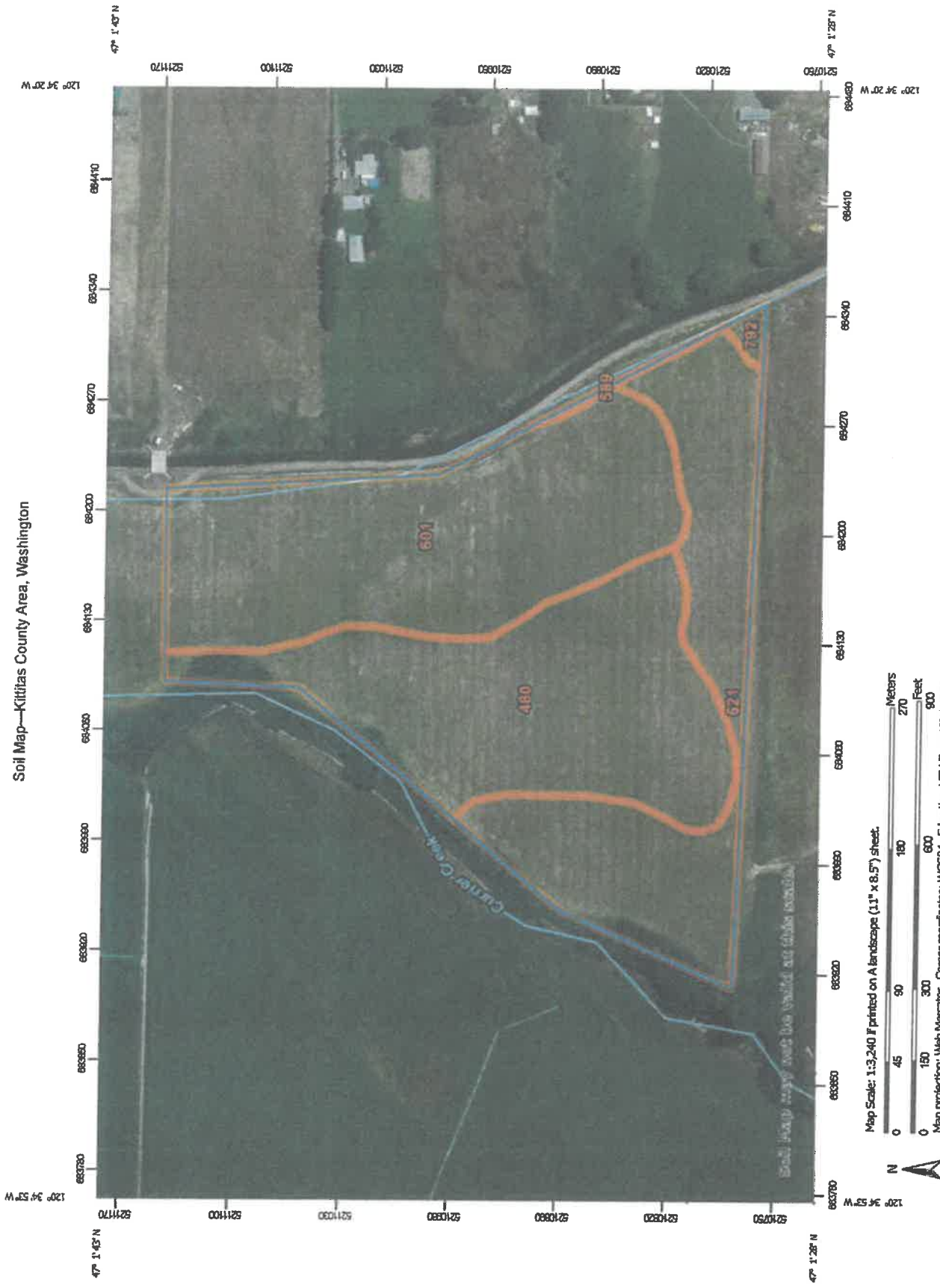
Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
US	Metric				
6.00"	150.00		100%		
4.00"	100.00		100%		
3.00"	75.00		100%		
2.50"	63.00		100%		
2.00"	50.00	90%	90%		
1.75"	45.00		83%		
1.50"	37.50	73%	73%		
1.25"	31.50	65%	65%		
1.00"	25.00	58%	58%		
7/8"	22.40		55%		
3/4"	19.00	50%	50%		
5/8"	16.00		46%		
1/2"	12.50	41%	41%		
3/8"	9.50	36%	36%		
1/4"	6.30	32%	32%		
#4	4.75	30%	30%		
#8	2.360		25%		
#10	2.000	24%	24%		
#16	1.180		21%		
#20	0.850	20%	20%		
#30	0.600		16%		
#40	0.425	13%	13%		
#50	0.300		9%		
#60	0.250		7%		
#80	0.180	5%	5%		
#100	0.150		4%		
#140	0.106		3%		
#170	0.090		2%		
#200	0.075	1.9%	1.9%		



Technician: Jack Demont  
 Engineer: Nathan Nofziger, P.E.

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Soil Map—Kittitas County Area, Washington



Map Scale: 1:3,240 (Printed on A landscape (11" x 8.5") sheet.)



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84











































Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey



## MAP LEGEND

- |  |   |
|--|---|
|  Area of Interest (AOI) |  Spoil Area            |
|  Soils                  |  Stony Spot            |
|  Soil Map Unit Polygons |  Very Stony Spot       |
|  Soil Map Unit Lines    |  Wet Spot              |
|  Soil Map Unit Points   |  Other                 |
|  Special Point Features |  Special Line Features |
|  Blowout                |  Water Features        |
|  Borrow Pit             |  Streams and Canals    |
|  Clay Spot              |  Transportation        |
|  Closed Depression      |  Rails                 |
|  Gravel Pit             |  Interstate Highways   |
|  Gravelly Spot          |  US Routes             |
|  Landfill               |  Major Roads           |
|  Lava Flow              |  Local Roads           |
|  Marsh or swamp       |  Background          |
|  Mine or Quarry       |  Aerial Photography  |
|  Miscellaneous Water  |   |
|  Perennial Water      |   |
|  Rock Outcrop         |   |
|  Saline Spot          |   |
|  Sandy Spot           |   |
|  Severely Eroded Spot |   |
|  Sinkhole             |   |
|  Slide or Slip        |   |
|  Sodic Spot           |   |

## MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Kittitas County Area, Washington  
Survey Area Data: Version 10, Sep 7, 2017

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

Date(s) aerial images were photographed: Jul 3, 2014—Sep 21, 2016

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.

### Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
480	Nanum ashy loam, 0 to 2 percent slopes	7.9	34.5%
589	Nack-Brickmill complex, 0 to 5 percent slopes	0.1	0.2%
601	Brickmill gravelly ashy loam, 0 to 2 percent slopes	8.7	37.8%
621	Mitta ashy silt loam, flooded, 0 to 2 percent slopes	6.1	26.8%
792	Brickmill gravelly ashy loam, 0 to 5 percent slopes	0.2	0.7%
<b>Totals for Area of Interest</b>		<b>22.9</b>	<b>100.0%</b>

## Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Particle size* is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

*Sand* as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Silt* as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity (Ksat)* refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and till. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kw* indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

**Reference:**

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

## Report—Physical Soil Properties

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties—Kittitas County Area, Washington														
Map symbol and soil name	Depth <i>In</i>	Sand <i>Pct</i>	Silt <i>Pct</i>	Clay <i>Pct</i>	Moist bulk density <i>g/cc</i>	Saturated hydraulic conductivity <i>micro m/sec</i>	Available water capacity <i>In/In</i>	Linear extensibility <i>Pct</i>	Organic matter <i>Pct</i>	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
480—Nanum ashy loam, 0 to 2 percent slopes														
Nanum	0-8	-39-	-37-	22-25-27	1.15-1.28 -1.40	4.00-9.00-14.00	0.17-0.19-0. 20	0.0- 1.5- 2.9	2.0- 3.5- 5.0	.24	.24	3	5	56
	8-15	-38-	-36-	25-26-33	1.15-1.28 -1.40	1.40-3.00-4.00	0.17-0.19-0. 20	3.0- 4.5- 5.9	2.0- 3.5- 5.0	.28	.28			
	15-28	-35-	-34-	27-31- 35	1.15-1.28 -1.40	1.40-3.00-4.00	0.15-0.18-0. 20	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.28	.28			
	28-35	-35-	-34-	27-31- 35	1.25-1.33 -1.40	1.40-3.00-4.00	0.08-0.10-0. 11	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.10	.28			
	35-60	-55-	-14-	27-31- 35	1.25-1.33 -1.40	1.40-3.00-4.00	0.07-0.09-0. 10	3.0- 4.5- 5.9	0.0- 1.0- 2.0	.02	.20			

Physical Soil Properties—Kittitas County Area, Washington														
Map symbol and soil name	Depth In	Sand Pct	Silt Pct	Clay Pct	Moist bulk density g/cc	Saturated hydraulic conductivity micro m/sec	Available water capacity In/in	Linear extensibility Pct	Organic matter Pct	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
589—Nack-Brickmill complex, 0 to 5 percent slopes														
Nack	0-6	-41-	-37-	18-22-25	1.15-1.28 -1.40	4.00-9.00-14.00	0.11-0.13-0.15	0.0-1.5-2.9	2.0-3.0-4.0	.15	.24	2	6	48
	6-15	-35-	-38-	25-28-30	1.15-1.28 -1.40	1.40-3.00-4.00	0.11-0.14-0.16	3.0-4.5-5.9	1.0-2.0-3.0	.32	.32			
	15-60	-53-	-12-	25-35-40	1.30-1.40 -1.50	1.40-3.00-4.00	0.04-0.06-0.08	3.0-4.5-5.9	1.0-1.5-2.0	.02	.17			
Brickmill	0-12	-43-	-40-	15-18-20	1.15-1.28 -1.40	4.00-9.00-14.00	0.07-0.09-0.11	0.0-1.5-2.9	1.0-2.0-3.0	.15	.28	3	5	56
	12-28	-67-	-15-	15-18-20	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.06-0.11	0.0-1.5-2.9	0.5-1.3-2.0	.05	.20			
	28-38	-66-	-15-	15-19-25	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.06-0.10	0.0-1.5-2.9	0.5-0.8-1.0	.02	.20			
	38-49	-67-	-20-	12-14-15	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.06-0.10	0.0-1.5-2.9	0.5-0.8-1.0	.05	.24			
	49-60	-84-	-11-	0-5-10	1.40-1.48 -1.55	42.00-92.00-141.00	0.03-0.04-0.04	0.0-1.5-2.9	0.0-0.3-0.5	.02	.15			

Physical Soil Properties—Kittitas County Area, Washington														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
601—Brickmill gravelly ashy loam, 0 to 2 percent slopes	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct					
Brickmill	0-12	-43-	-40-	15-18-20	1.15-1.28 -1.40	4.00-9.00-14.00	0.07-0.09-0.11	0.0-1.5-2.9	1.0-2.0-3.0	.15	.28	3	5	56
	12-28	-67-	-15-	15-18-20	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.08-0.11	0.0-1.5-2.9	0.5-1.3-2.0	.05	.20			
	28-38	-66-	-15-	15-19-25	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.08-0.10	0.0-1.5-2.9	0.5-0.8-1.0	.02	.20			
	38-49	-67-	-20-	12-14-15	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.08-0.10	0.0-1.5-2.9	0.5-0.8-1.0	.05	.24			
	49-60	-84-	-11-	0-5-10	1.40-1.48 -1.55	42.00-92.00-141.00	0.03-0.04-0.04	0.0-1.5-2.9	0.0-0.3-0.5	.02	.15			
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes														
Mitta, flooded	0-6	-7-	-70-	19-23-25	1.00-1.15 -1.30	4.00-9.00-14.00	0.19-0.20-0.21	0.0-1.5-2.9	3.0-4.0-5.0	.32	.32	5	5	56
	6-15	-7-	-70-	19-23-25	1.00-1.15 -1.30	4.00-9.00-14.00	0.19-0.20-0.21	0.0-1.5-2.9	2.0-3.5-5.0	.37	.37			
	15-34	-7-	-70-	19-23-25	1.00-1.15 -1.30	4.00-9.00-14.00	0.19-0.20-0.21	0.0-1.5-2.9	1.0-1.5-2.0	.49	.49			
	34-49	-9-	-64-	25-28-30	1.15-1.28 -1.40	1.40-3.00-4.00	0.17-0.19-0.21	3.0-4.5-5.9	0.5-1.3-2.0	.43	.43			
	49-60	-9-	-64-	25-28-30	1.25-1.33 -1.40	1.40-3.00-4.00	0.17-0.19-0.21	3.0-4.5-5.9	0.0-0.3-0.5	.49	.49			



Physical Soil Properties—Kittitas County Area, Washington													
Map symbol and soil name	Depth <i>In</i>	Sand <i>Pct</i>	Silt <i>Pct</i>	Clay <i>Pct</i>	Moist bulk density <i>g/cc</i>	Saturated hydraulic conductivity <i>micro m/sec</i>	Available water capacity <i>In/In</i>	Linear extensibility <i>Pct</i>	Organic matter <i>Pct</i>	Erosion factors		Wind erodibility group	Wind erodibility index
										Kw	Kf T		
792—Brickmill gravelly ash loam, 0 to 5 percent slopes	0-12	-43-	-40-	15-18-20	1.15-1.28 -1.40	4.00-9.00-14.00	0.07-0.09-0.11	0.0-1.5-2.9	1.0-2.0-3.0	.15	.28 3	5	56
	12-28	-67-	-15-	15-18-20	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.08-0.11	0.0-1.5-2.9	0.5-1.3-2.0	.05	.20		
	28-38	-66-	-15-	15-19-25	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.08-0.10	0.0-1.5-2.9	0.5-0.8-1.0	.02	.20		
	38-49	-67-	-20-	12-14-15	1.30-1.40 -1.50	4.00-9.00-14.00	0.05-0.08-0.10	0.0-1.5-2.9	0.5-0.8-1.0	.05	.24		
	49-60	-84-	-11-	0-5-10	1.40-1.48 -1.55	42.00-92.00-14.00	0.03-0.04-0.04	0.0-1.5-2.9	0.0-0.3-0.5	.02	.15		

### Data Source Information

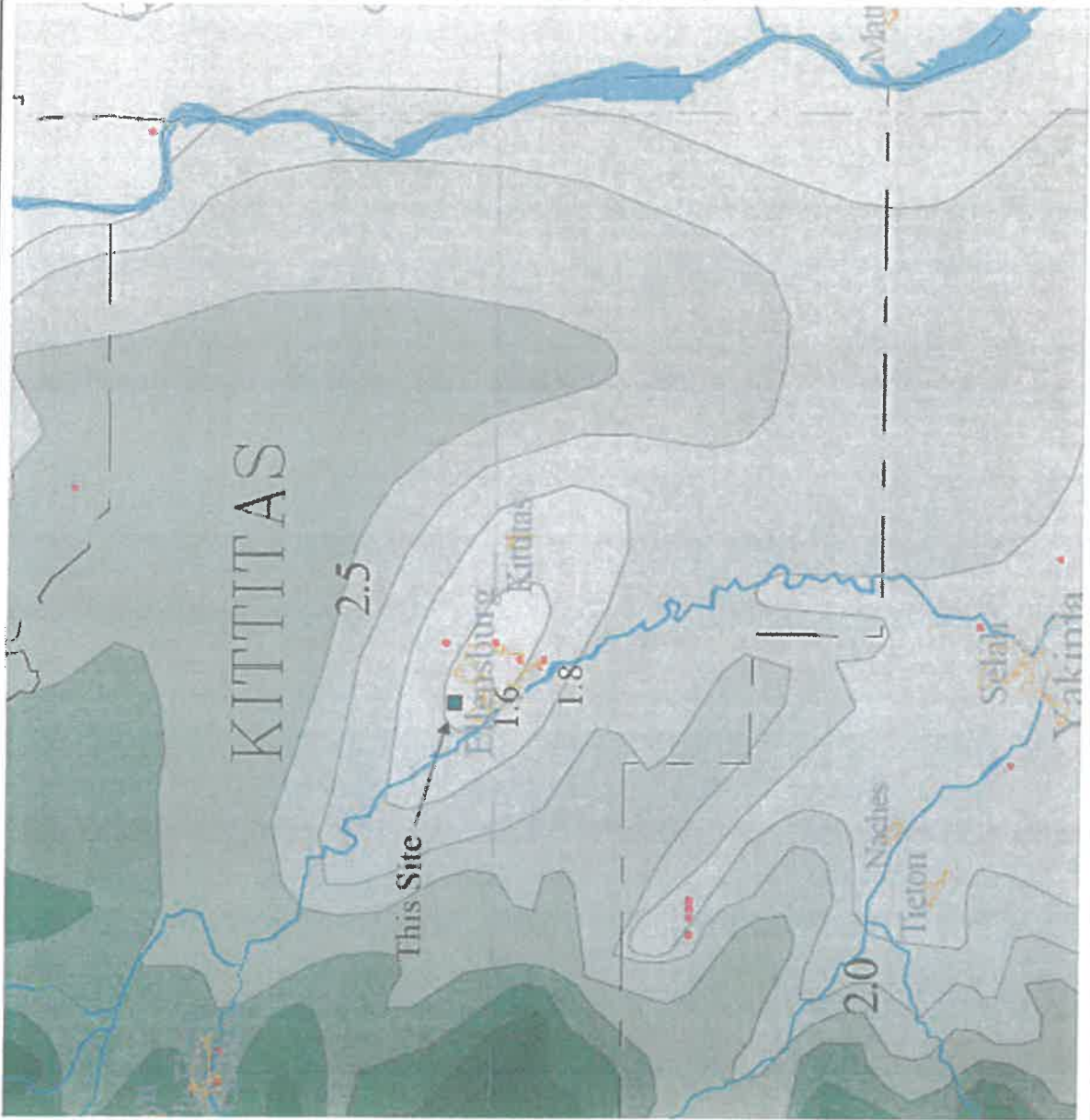
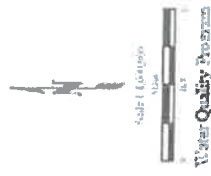
Soil Survey Area: Kittitas County Area, Washington  
 Survey Area Data: Version 10, Sep 7, 2017

# Eastern Washington Stormwater Manual



25-Year 24-Hour Isoplethials  
Source: NOAA Atlas 2, Volume IX, 1973  
Precipitation in inches

- County: 0003, 1, 2, 4, 600
- City: 0003, 1, 2, 4, 600
- Latitude/Longitude: (10 degree)
- Isopleth: 1973, 1, 2, 000, 000
- NOAA/NWS Service: (1931-1998)



High ground water or shallow bedrock can cause a significant increase in runoff. If either of these conditions exists, it needs to be addressed by the designer. For a more complete discussion of computing weighted CN values, see *Urban Hydrology for Small Watersheds* (USDA, 1986).

**Table 4.14: Runoff Curve Numbers (CNs) for Selected Agricultural, Suburban, and Urban Areas**

Cover type and hydrologic condition	CNs for hydrologic soil group			
	A	B	C	D
<b>Open space (lawns, parks, golf courses, cemeteries, landscaping, etc.)<sup>a</sup></b>				
Poor condition (grass cover <50% of the area)	68	79	86	89
Fair condition (grass cover on 50% to 75% of the area)	49	69	79	84
Good condition (grass cover on >75% of the area)	39	61	74	80
<b>Impervious areas</b>				
Open water bodies: lakes, wetlands, ponds etc.	100	100	100	100
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98	98	98	98
<b>Permeable pavers and permeable interlocking concrete (assumed as 85% impervious and 15% lawn)</b>				
Fair lawn condition (weighted average CNs)	95	96	97	97
Gravel (including right-of-way)	76	85	89	91
Dirt (including right-of-way)	72	82	87	89
<b>Pasture, grassland, or range-continuous forage for grazing</b>				
Poor condition (ground cover <50% or heavily grazed with no mulch)	68	79	86	89
Fair condition (ground cover 50% to 75% and not heavily grazed)	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
<b>Cultivated agricultural lands</b>				
Row Crops (good) e.g., corn, sugar beets, soy beans	64	75	82	85
Small Grain (good) e.g., wheat, barley, flax	60	72	80	84
<b>Meadow</b>				
Continuous grass, protected from grazing and generally mowed for hay	30	58	71	78
<b>Brush (brush-weed-grass mixture with brush the major element)</b>				

**Table 4.14: Runoff Curve Numbers (CNs) for Selected Agricultural, Suburban, and Urban Areas (continued)**

Cover type and hydrologic condition	CNs for hydrologic soil group			
	A	B	C	D
Poor (<50% ground cover)	48	67	77	83
Fair (50% to 75% ground cover)	35	56	70	77
Good (>75% ground cover)	30 <sup>b</sup>	48	65	73
<b>Woods-grass combination (orchard or tree farm)<sup>c</sup></b>				
Poor	57	73	82	86
Fair	43	65	76	82
Good	32	58	72	79
<b>Woods</b>				
Poor (Forest litter, small trees, and brush destroyed by heavy grazing or regular burning)	45	66	77	83
Fair (Woods are grazed but not burned, and some forest litter covers the soil)	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil)	30	55	70	77
<b>Herbaceous (mixture of grass, weeds, and low-growing brush, with brush the minor element)</b>				
Poor (<30% ground cover)	n/a <sup>d</sup>	80	87	93
Fair (30% to 70% ground cover)		71	81	89
Good (>70% ground cover)		62	74	85
<b>Sagebrush with grass understory</b>				
Poor (<30% ground cover)	n/a <sup>d</sup>	67	80	85
Fair (30% to 70% ground cover)		51	63	70
Good (>70% ground cover)		35	47	55
<sup>a</sup> Composite CNs may be computed for other combinations of open space cover type. <sup>b</sup> Actual CN is < 30; use CN = 30 for runoff computations. <sup>c</sup> The indicated CNs were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture. <sup>d</sup> CNs have not been developed for hydrologic soil group A.				

Stormwater Area Calcs - Left Ditch

Length of Roadway	3250	ft
Width of Roadway	13	ft
Lots Left	24	units
Width of Driveway	20	ft
Left Ditch Length	2110.0	ft
Shoulder Width	3	ft
Ditch Right Width	6	ft
Ditch Left Width	4.5	ft

Impervious Area	48730	sq. ft.	1.118	ac
Pervious Area	28485	sq. ft.	0.654	ac
Total Area	77215	sq. ft.	1.772	ac

Infiltration Area	6330	sq. ft.
Storage Volume	527.5	cu. ft.
Assumed Depth	2	inches

Stormwater Area Calcs - Right Ditch

Length of Roadway	3250	ft
Width of Roadway	13	ft
Lots Right	22	units
Width of Driveway	20	ft
Right Ditch Length	2410.0	ft
Shoulder Width	3	ft
Ditch Right Width	6	ft
Ditch Left Width	4.5	ft

Impervious Area	48190	sq. ft.	1.106	ac
Pervious Area	32535	sq. ft.	0.747	ac
Total Area	80725	sq. ft.	1.852	ac

Infiltration Area	7230	sq. ft.
Storage Volume	602.5	cu. ft.
Assumed Depth	2	inches

**SCS Type 1A Regional Storm - Central Basin**  
Stormwater Runoff Area - Left Ditch

Area (acres) = 1.772 P (inches) = 1.6 q (min) = 6 Tc (min) = 5 Infiltration Area (ft²) = 6330.0  
 W = 0.375 Max Storage (cu. ft.) = 556.6  
 Pervious Area (acres) = 0.654 CN = 37 S = 1.49 0.25 = 0.30 Infiltration Rate (cf/min/ft²) = 0.0018  
 Impervious Area (acres) = 1.118 CN = 34 S = 0.20 0.25 = 0.04 Total Disp = 68.364000

1 Time Increment	2.0 Time Hours	2 Time (min)	3 Rainfall Distribution (Fraction)	4 Incremental Rainfall (inches)	5 Accum. Rainfall (inches)	6 Pervious Acc. Run (inches)	7 Pervious Inc. Run (inches)	8 Impervious Acc. Run (inches)	9 Impervious Inc. Run (inches)	10 Total Runoff (inches)	11 Instant Flow (inches)	12 Design Flow Rate (cfs)	13 Incremental Flow (cf)	14 Drywell Disp. Volume (cf)	15 Accum. Storage (cf)
1	0.0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
2	0.1	6	0.002	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
3	0.2	12	0.002	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
4	0.3	18	0.002	0.003	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
5	0.4	24	0.002	0.003	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
6	0.5	30	0.002	0.003	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
7	0.6	36	0.002	0.003	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
8	0.7	42	0.002	0.003	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
9	0.8	48	0.002	0.003	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
10	0.9	54	0.002	0.003	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
11	1.0	60	0.002	0.003	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
12	1.1	66	0.003	0.005	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
13	1.2	72	0.003	0.005	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0046	0.0
14	1.3	78	0.003	0.005	0.046	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.2	0.2274	0.0
15	1.4	84	0.003	0.005	0.051	0.000	0.000	0.001	0.001	0.000	0.004	0.002	0.8	0.8174	0.0
16	1.5	90	0.003	0.005	0.056	0.000	0.000	0.001	0.001	0.000	0.006	0.004	1.6	1.5782	0.0
17	1.5	96	0.003	0.005	0.061	0.000	0.000	0.002	0.001	0.000	0.008	0.007	2.3	2.3419	0.0
18	1.7	102	0.003	0.005	0.066	0.000	0.000	0.003	0.001	0.001	0.010	0.009	3.1	3.0697	0.0
19	1.8	108	0.003	0.005	0.070	0.000	0.000	0.004	0.001	0.001	0.012	0.010	3.8	3.7552	0.0
20	1.9	114	0.003	0.005	0.075	0.000	0.000	0.005	0.001	0.001	0.014	0.012	4.4	4.3994	0.0
21	2.0	120	0.003	0.005	0.080	0.000	0.000	0.006	0.001	0.001	0.015	0.014	5.0	5.0049	0.0
22	2.1	126	0.003	0.005	0.085	0.000	0.000	0.008	0.001	0.001	0.017	0.015	5.6	5.5748	0.0
23	2.2	132	0.003	0.005	0.090	0.000	0.000	0.009	0.002	0.001	0.018	0.017	6.1	6.1116	0.0
24	2.3	138	0.004	0.006	0.096	0.000	0.000	0.012	0.002	0.001	0.026	0.021	7.5	7.5348	0.0
25	2.4	144	0.003	0.005	0.101	0.000	0.000	0.014	0.002	0.001	0.021	0.023	8.3	8.2970	0.0
26	2.5	150	0.003	0.005	0.106	0.000	0.000	0.016	0.002	0.001	0.022	0.022	8.0	7.9550	0.0
27	2.6	156	0.003	0.005	0.110	0.000	0.000	0.018	0.002	0.001	0.023	0.023	8.2	8.1785	0.0
28	2.7	162	0.003	0.005	0.115	0.000	0.000	0.020	0.002	0.001	0.025	0.024	8.5	8.5272	0.0
29	2.8	168	0.004	0.006	0.122	0.000	0.000	0.023	0.003	0.002	0.034	0.028	10.1	10.0704	0.0
30	2.9	174	0.003	0.005	0.126	0.000	0.000	0.025	0.002	0.001	0.027	0.030	10.8	10.7615	0.0
31	3.0	180	0.003	0.005	0.131	0.000	0.000	0.028	0.003	0.002	0.027	0.028	10.0	10.0463	0.0
32	3.1	186	0.003	0.005	0.136	0.000	0.000	0.030	0.003	0.002	0.029	0.028	10.1	10.1021	0.0
33	3.2	192	0.003	0.005	0.141	0.000	0.000	0.033	0.003	0.002	0.029	0.029	10.3	10.3395	0.0
34	3.3	198	0.003	0.005	0.146	0.000	0.000	0.036	0.003	0.002	0.030	0.029	10.6	10.6118	0.0
35	3.4	204	0.004	0.006	0.152	0.000	0.000	0.039	0.004	0.002	0.041	0.034	12.3	12.2923	0.0
36	3.5	210	0.003	0.005	0.157	0.000	0.000	0.042	0.003	0.002	0.032	0.036	12.9	12.6369	0.0
37	3.6	216	0.003	0.005	0.162	0.000	0.000	0.045	0.003	0.002	0.032	0.033	11.9	11.9030	0.0
38	3.7	222	0.004	0.006	0.168	0.000	0.000	0.049	0.004	0.002	0.044	0.037	13.3	13.3251	0.0
39	3.8	228	0.004	0.006	0.174	0.000	0.000	0.053	0.004	0.003	0.045	0.043	15.4	15.4151	0.0
40	3.9	234	0.003	0.005	0.179	0.000	0.000	0.056	0.003	0.002	0.035	0.041	14.6	14.6411	0.0
41	4.0	240	0.004	0.006	0.186	0.000	0.000	0.060	0.004	0.003	0.047	0.041	14.7	14.6789	0.0
42	4.1	246	0.004	0.006	0.192	0.000	0.000	0.064	0.004	0.003	0.048	0.046	16.5	16.4812	0.0
43	4.2	252	0.003	0.005	0.197	0.000	0.000	0.068	0.003	0.002	0.036	0.043	15.5	15.5138	0.0
44	4.3	258	0.004	0.006	0.203	0.000	0.000	0.072	0.004	0.003	0.049	0.043	15.5	15.4707	0.0
45	4.4	264	0.004	0.006	0.210	0.000	0.000	0.076	0.004	0.003	0.050	0.048	17.3	17.3045	0.0
46	4.5	270	0.004	0.006	0.216	0.000	0.000	0.081	0.005	0.003	0.051	0.050	18.0	17.9687	0.0
47	4.6	276	0.004	0.006	0.222	0.000	0.000	0.085	0.005	0.003	0.052	0.051	18.3	18.3302	0.0
48	4.7	282	0.004	0.006	0.229	0.000	0.000	0.090	0.005	0.003	0.052	0.052	18.6	18.6063	0.0
49	4.8	288	0.004	0.006	0.235	0.000	0.000	0.095	0.005	0.003	0.053	0.052	18.9	18.8521	0.0
50	4.9	294	0.005	0.008	0.243	0.000	0.000	0.101	0.006	0.004	0.067	0.058	20.9	20.9005	0.0
51	5.0	300	0.004	0.006	0.250	0.000	0.000	0.106	0.005	0.003	0.054	0.060	21.6	21.5920	0.0
52	5.1	306	0.005	0.008	0.258	0.000	0.000	0.112	0.006	0.004	0.069	0.061	22.0	21.9774	0.0
53	5.2	312	0.004	0.006	0.264	0.000	0.000	0.117	0.005	0.003	0.055	0.062	22.2	22.2352	0.0
54	5.3	318	0.005	0.008	0.272	0.000	0.000	0.123	0.006	0.004	0.070	0.062	22.5	22.4913	0.0
55	5.4	324	0.005	0.008	0.280	0.000	0.000	0.129	0.006	0.004	0.071	0.068	24.6	24.6180	0.0
56	5.5	330	0.005	0.008	0.288	0.000	0.000	0.135	0.006	0.004	0.071	0.070	25.3	25.3413	0.0
57	5.6	336	0.005	0.008	0.296	0.000	0.000	0.142	0.006	0.004	0.072	0.071	25.7	25.7036	0.0
58	5.7	342	0.005	0.008	0.304	0.000	0.000	0.148	0.006	0.004	0.073	0.072	26.0	25.9821	0.0
59	5.8	348	0.005	0.008	0.312	0.000	0.000	0.155	0.006	0.004	0.074	0.073	26.3	26.3014	0.0
60	5.9	354	0.005	0.008	0.320	0.000	0.000	0.161	0.007	0.004	0.075	0.074	26.7	26.6813	0.0
61	6.0	360	0.006	0.010	0.330	0.001	0.000	0.169	0.008	0.005	0.091	0.081	29.1	29.1427	0.0
62	6.1	366	0.006	0.010	0.339	0.001	0.000	0.177	0.008	0.005	0.093	0.089	32.2	32.1756	0.0
63	6.2	372	0.006	0.010	0.349	0.002	0.001	0.185	0.008	0.005	0.094	0.093	33.3	33.3283	0.0
64	6.3	378	0.006	0.010	0.358	0.002	0.001	0.193	0.008	0.005	0.096	0.094	34.0	33.9565	0.0
65	6.4	384	0.007	0.011	0.370	0.003	0.001	0.203	0.010	0.006	0.113	0.102	36.7	36.7314	0.0
66	6.5	390	0.006	0.010	0.379	0.004	0.001	0.211	0.008	0.006	0.099	0.105	37.8	37.7973	0.0
67	6.6	396	0.006	0.010	0.389	0.005	0.001	0.219	0.008	0.006	0.100	0.101	36.2	36.2318	0.0
68	6.7	402	0.006	0.010	0.398	0.006	0.001	0.228	0.008	0.006	0.101	0.100	36.2	36.1691	0.0
69	6.8	408	0.006	0.010	0.408	0.007	0.001	0.236	0.008	0.006	0.102	0.101	36.5	36.4715	0.0
70	6.9	414	0.006	0.010	0.418	0.009	0.001	0.244	0.008	0.006	0.103	0.102	36.9	36.8551	0.0
71	7.0	420	0.007	0.011	0.429	0.010	0.002	0.254	0.010	0.007	0.122	0.110	39.6	39.6120	0.0
72	7.1	426	0.007	0.011	0.440	0.012	0.002	0.264	0.010	0.007	0.123	0.119	43.0	43.0038	0.0
73	7.2	432	0.008	0.013	0.453	0.014	0.002	0.276	0.011	0.008	0.143	0.130	46.7	46.6509	0.0
74	7.3	438	0.008	0.013	0.466	0.017	0.002	0.287	0.011	0.008	0.144	0.140	50.4	50.4031	0.0
75	7.4	444	0.009	0.014	0.480	0.020	0.003	0.300	0.013	0.009	0.164	0.151	54.3	54.2808	0.0
76	7.5	450	0.010</												

85	8.4	504	0.010	0.016	0.755	0.107	0.007	0.556	0.015	0.012	0.214	0.226	81.2	68.3640	551.1
86	8.5	510	0.008	0.013	0.768	0.112	0.005	0.568	0.012	0.010	0.172	0.201	72.5	68.3640	555.3
87	8.6	516	0.009	0.014	0.782	0.118	0.006	0.582	0.014	0.011	0.195	0.188	67.7	67.7418	555.3
88	8.7	522	0.009	0.014	0.797	0.124	0.006	0.595	0.014	0.011	0.196	0.194	64.6	68.3640	556.6
89	8.8	528	0.007	0.011	0.808	0.129	0.005	0.606	0.011	0.009	0.153	0.179	60.5	64.5733	556.6
90	8.9	534	0.008	0.013	0.821	0.135	0.006	0.618	0.012	0.010	0.176	0.168	60.5	60.5474	556.6
91	9.0	540	0.007	0.011	0.832	0.140	0.005	0.629	0.011	0.009	0.154	0.166	59.7	59.7090	556.6
92	9.1	546	0.007	0.011	0.843	0.145	0.005	0.640	0.011	0.009	0.155	0.157	56.7	96.6926	556.6
93	9.2	552	0.006	0.010	0.853	0.150	0.004	0.649	0.009	0.007	0.133	0.147	53.1	53.0851	556.6
94	9.3	558	0.006	0.010	0.862	0.154	0.005	0.658	0.009	0.007	0.134	0.137	49.3	49.3077	556.6
95	9.4	564	0.006	0.010	0.872	0.159	0.005	0.667	0.009	0.008	0.134	0.135	48.5	48.4700	556.6
96	9.5	570	0.005	0.008	0.880	0.163	0.004	0.675	0.008	0.006	0.112	0.126	45.3	45.3369	556.6
97	9.6	576	0.006	0.010	0.890	0.167	0.005	0.684	0.009	0.008	0.135	0.124	44.6	44.6483	556.6
98	9.7	582	0.005	0.008	0.898	0.171	0.004	0.692	0.008	0.006	0.113	0.124	44.6	44.5538	556.6
99	9.8	588	0.006	0.010	0.907	0.176	0.005	0.701	0.009	0.008	0.135	0.124	44.6	44.6220	556.6
100	9.9	594	0.005	0.008	0.915	0.180	0.004	0.709	0.008	0.006	0.113	0.124	44.7	44.7145	556.6
101	10.0	600	0.005	0.008	0.923	0.184	0.004	0.717	0.008	0.006	0.113	0.116	41.8	41.7611	556.6
102	10.1	606	0.005	0.008	0.931	0.188	0.004	0.724	0.008	0.006	0.114	0.114	41.1	41.0894	556.6
103	10.2	612	0.005	0.008	0.939	0.192	0.004	0.732	0.008	0.006	0.114	0.114	41.0	40.9872	556.6
104	10.3	618	0.005	0.008	0.947	0.196	0.004	0.740	0.008	0.006	0.114	0.114	41.0	41.0265	556.6
105	10.4	624	0.004	0.006	0.954	0.199	0.003	0.746	0.006	0.005	0.091	0.106	38.0	38.0103	556.6
106	10.5	630	0.005	0.008	0.962	0.204	0.004	0.754	0.008	0.006	0.115	0.104	37.3	37.3131	556.6
107	10.6	636	0.005	0.008	0.970	0.208	0.004	0.761	0.008	0.006	0.115	0.112	40.3	40.2851	556.6
108	10.7	642	0.004	0.006	0.976	0.211	0.003	0.768	0.006	0.005	0.092	0.106	38.0	37.9825	556.6
109	10.8	648	0.005	0.008	0.984	0.215	0.004	0.775	0.008	0.006	0.115	0.104	37.5	37.4617	556.6
110	10.9	654	0.005	0.008	0.992	0.220	0.004	0.783	0.008	0.006	0.115	0.112	40.5	40.4930	556.6
111	11.0	660	0.004	0.006	0.998	0.223	0.003	0.789	0.006	0.005	0.092	0.106	38.2	38.1864	556.6
112	11.1	666	0.004	0.006	1.005	0.227	0.003	0.796	0.006	0.005	0.093	0.096	34.5	34.5340	556.6
113	11.2	672	0.005	0.008	1.013	0.231	0.004	0.803	0.008	0.006	0.116	0.102	36.8	36.7915	556.6
114	11.3	678	0.004	0.006	1.019	0.234	0.003	0.810	0.006	0.005	0.093	0.104	37.4	37.3973	556.6
115	11.4	684	0.004	0.006	1.026	0.238	0.003	0.816	0.006	0.005	0.093	0.096	34.5	34.4566	556.6
116	11.5	690	0.004	0.006	1.032	0.241	0.004	0.822	0.006	0.005	0.093	0.094	33.8	33.7574	556.6
117	11.6	696	0.004	0.006	1.038	0.245	0.004	0.828	0.006	0.005	0.093	0.093	33.6	33.6184	556.6
118	11.7	702	0.004	0.006	1.045	0.248	0.004	0.834	0.006	0.005	0.093	0.093	33.6	33.6190	556.6
119	11.8	708	0.004	0.006	1.051	0.252	0.004	0.841	0.006	0.005	0.094	0.093	33.7	33.6542	556.6
120	11.9	714	0.003	0.005	1.056	0.255	0.003	0.845	0.005	0.004	0.070	0.085	30.5	30.5334	556.6
121	12.0	720	0.004	0.006	1.062	0.258	0.004	0.851	0.006	0.005	0.094	0.083	29.8	29.7833	556.6
122	12.1	726	0.004	0.006	1.069	0.262	0.004	0.858	0.006	0.005	0.094	0.091	32.8	32.7899	556.6
123	12.2	732	0.003	0.005	1.074	0.265	0.003	0.862	0.005	0.004	0.071	0.084	30.4	30.3994	556.6
124	12.3	738	0.004	0.006	1.080	0.268	0.004	0.869	0.006	0.005	0.094	0.083	29.8	29.8311	556.6
125	12.4	744	0.004	0.006	1.086	0.272	0.004	0.875	0.006	0.005	0.094	0.091	32.9	32.8939	556.6
126	12.5	750	0.004	0.006	1.093	0.275	0.004	0.881	0.006	0.005	0.094	0.094	33.7	33.6925	556.6
127	12.6	756	0.004	0.006	1.099	0.279	0.004	0.887	0.006	0.005	0.095	0.095	33.9	33.9247	556.6
128	12.7	762	0.003	0.005	1.104	0.282	0.003	0.892	0.005	0.004	0.071	0.086	30.8	30.8198	556.6
129	12.8	768	0.004	0.006	1.110	0.286	0.004	0.898	0.006	0.005	0.095	0.084	30.1	30.0716	556.6
130	12.9	774	0.003	0.005	1.115	0.288	0.003	0.903	0.005	0.004	0.071	0.083	29.9	29.9054	556.6
131	13.0	780	0.004	0.006	1.122	0.292	0.004	0.909	0.006	0.005	0.095	0.083	29.9	29.8914	556.6
132	13.1	786	0.004	0.006	1.128	0.296	0.004	0.915	0.006	0.005	0.095	0.092	33.1	33.1173	556.6
133	13.2	792	0.003	0.005	1.133	0.299	0.003	0.920	0.005	0.004	0.071	0.085	30.7	30.7419	556.6
134	13.3	798	0.004	0.006	1.139	0.302	0.004	0.926	0.006	0.005	0.095	0.084	30.2	30.1749	556.6
135	13.4	804	0.004	0.006	1.146	0.306	0.004	0.933	0.006	0.005	0.095	0.092	33.3	33.2726	556.6
136	13.5	810	0.003	0.005	1.150	0.309	0.003	0.937	0.005	0.004	0.072	0.086	30.9	30.6540	556.6
137	13.6	816	0.003	0.005	1.155	0.312	0.003	0.942	0.005	0.004	0.072	0.075	27.0	27.0496	556.6
138	13.7	822	0.004	0.006	1.162	0.316	0.004	0.948	0.006	0.005	0.096	0.082	29.3	29.3438	556.6
139	13.8	828	0.003	0.005	1.168	0.319	0.003	0.953	0.005	0.004	0.072	0.083	29.9	29.9368	556.6
140	13.9	834	0.004	0.006	1.173	0.323	0.004	0.959	0.006	0.005	0.096	0.084	30.1	30.1106	556.6
141	14.0	840	0.003	0.005	1.178	0.325	0.003	0.964	0.005	0.004	0.072	0.084	30.2	30.1731	556.6
142	14.1	846	0.003	0.005	1.182	0.328	0.003	0.968	0.005	0.004	0.072	0.075	27.0	26.9725	556.6
143	14.2	852	0.004	0.006	1.189	0.332	0.004	0.975	0.006	0.005	0.096	0.082	29.4	29.4325	556.6
144	14.3	858	0.003	0.005	1.194	0.335	0.003	0.979	0.005	0.004	0.072	0.084	30.1	30.0661	556.6
145	14.4	864	0.003	0.005	1.198	0.338	0.003	0.984	0.005	0.004	0.072	0.075	27.0	26.9990	556.6
146	14.5	870	0.004	0.006	1.205	0.342	0.004	0.990	0.006	0.005	0.096	0.082	29.5	29.5007	556.6
147	14.6	876	0.003	0.005	1.210	0.345	0.003	0.995	0.005	0.004	0.072	0.084	30.1	30.1443	556.6
148	14.7	882	0.003	0.005	1.214	0.348	0.003	1.000	0.005	0.004	0.072	0.075	27.1	27.0705	556.6
149	14.8	888	0.004	0.006	1.221	0.352	0.004	1.006	0.006	0.005	0.097	0.082	29.6	29.5787	556.6
150	14.9	894	0.003	0.005	1.226	0.355	0.003	1.011	0.005	0.004	0.073	0.084	30.2	30.2236	556.6
151	15.0	900	0.003	0.005	1.230	0.358	0.003	1.015	0.005	0.004	0.073	0.075	27.1	27.1412	556.6
152	15.1	906	0.003	0.005	1.235	0.361	0.003	1.020	0.005	0.004	0.073	0.073	26.4	26.3857	556.6
153	15.2	912	0.004	0.006	1.242	0.365	0.004	1.026	0.006	0.005	0.097	0.082	29.5	29.4838	556.6
154	15.3	918	0.003	0.005	1.246	0.368	0.003	1.031	0.005	0.004	0.073	0.084	30.3	30.2757	556.6
155	15.4	924	0.003	0.005	1.251	0.371	0.003	1.036	0.005	0.004	0.073	0.076	27.2	27.2187	556.6
156	15.5	930	0.003	0.005	1.256	0.374	0.003	1.040	0.005	0.004	0.073	0.074	26.5	26.4691	556.6
157	15.6	936	0.003	0.005	1.261	0.377	0.003	1.045	0.005	0.004	0.073	0.073	26.3	26.2962	556.6
158	15.7	942	0.004	0.006	1.267	0.381	0.004	1.051	0.006	0.005	0.097	0.082	29.6	29.5524	556.6
159	15.8	948	0.003	0.005	1.272	0.384	0.003	1.056	0.005	0.004	0.073	0.084	30.4	30.3832	556.6
160	15.9	954	0.003	0.005	1.277	0.387	0.003	1.061	0.005	0.004	0.073	0.076	27.3	27.3225	556.6
161	16.0	960	0.003	0.005	1.282	0.390	0.003	1.066	0.005	0.004	0.073	0.074	26.6	26.	

183	18.2	1092	0.002	0.003	1.384	0.457	0.002	1.166	0.003	0.003	0.049	0.065	23.3	23.3402	556.6	
184	18.3	1098	0.003	0.005	1.389	0.460	0.003	1.171	0.005	0.004	0.074	0.063	22.5	22.5319	556.6	
185	18.4	1104	0.003	0.005	1.394	0.463	0.003	1.175	0.005	0.004	0.074	0.063	25.7	25.6794	556.6	
186	18.5	1110	0.003	0.005	1.398	0.466	0.003	1.180	0.005	0.004	0.074	0.074	26.5	26.4784	556.6	
187	18.6	1116	0.002	0.003	1.402	0.468	0.002	1.183	0.003	0.003	0.050	0.065	23.3	23.3434	556.6	
188	18.7	1122	0.003	0.005	1.406	0.471	0.003	1.188	0.005	0.004	0.074	0.063	22.6	22.5697	556.6	
189	18.8	1128	0.003	0.005	1.411	0.475	0.003	1.193	0.005	0.004	0.074	0.071	25.7	25.7330	556.6	
190	18.9	1134	0.002	0.003	1.414	0.477	0.002	1.196	0.003	0.003	0.050	0.064	23.2	23.1836	556.6	
191	19.0	1140	0.003	0.005	1.419	0.480	0.003	1.201	0.005	0.004	0.075	0.063	22.6	22.5562	556.6	
192	19.1	1146	0.003	0.005	1.424	0.483	0.003	1.205	0.005	0.004	0.075	0.072	25.8	25.7611	556.6	
193	19.2	1152	0.002	0.003	1.427	0.485	0.002	1.208	0.003	0.003	0.050	0.064	23.2	23.2168	556.6	
194	19.3	1158	0.003	0.005	1.432	0.489	0.003	1.213	0.005	0.004	0.075	0.063	22.6	22.5904	556.6	
195	19.4	1164	0.002	0.003	1.435	0.491	0.002	1.216	0.003	0.003	0.050	0.062	22.4	22.4403	556.6	
196	19.5	1170	0.003	0.005	1.440	0.494	0.003	1.221	0.005	0.004	0.075	0.072	25.8	25.7753	556.6	
197	19.6	1176	0.003	0.005	1.445	0.497	0.003	1.226	0.005	0.004	0.075	0.072	22.4	22.4123	556.6	
198	19.7	1182	0.002	0.003	1.448	0.500	0.002	1.229	0.003	0.003	0.050	0.063	22.6	22.6430	556.6	
199	19.8	1188	0.003	0.005	1.453	0.503	0.003	1.234	0.005	0.004	0.075	0.063	22.5	22.4946	556.6	
200	19.9	1194	0.002	0.003	1.456	0.505	0.002	1.237	0.003	0.003	0.050	0.062	22.5	22.4668	556.6	
201	20.0	1200	0.003	0.005	1.461	0.508	0.003	1.242	0.005	0.004	0.075	0.062	22.5	22.4661	556.6	
202	20.1	1206	0.002	0.003	1.464	0.510	0.002	1.245	0.003	0.003	0.050	0.062	22.5	22.4752	556.6	
203	20.2	1212	0.003	0.005	1.469	0.514	0.003	1.249	0.005	0.004	0.075	0.062	22.5	22.4836	556.6	
204	20.3	1218	0.002	0.003	1.472	0.516	0.002	1.253	0.003	0.003	0.050	0.053	19.1	19.1189	556.6	
205	20.4	1224	0.002	0.003	1.475	0.518	0.002	1.256	0.003	0.003	0.050	0.053	19.1	19.1189	556.6	
206	20.5	1230	0.003	0.005	1.480	0.521	0.003	1.260	0.005	0.004	0.075	0.060	21.7	21.6598	556.6	
207	20.6	1236	0.002	0.003	1.483	0.524	0.002	1.264	0.003	0.003	0.050	0.062	22.3	22.3011	556.6	
208	20.7	1242	0.003	0.005	1.488	0.527	0.003	1.268	0.005	0.004	0.075	0.062	22.5	22.4704	556.6	
209	20.8	1248	0.002	0.003	1.491	0.529	0.002	1.271	0.003	0.003	0.050	0.063	22.5	22.5188	556.6	
210	20.9	1254	0.002	0.003	1.494	0.531	0.002	1.275	0.003	0.003	0.050	0.053	19.2	19.1586	556.6	
211	21.0	1260	0.003	0.005	1.499	0.535	0.003	1.279	0.005	0.004	0.075	0.060	21.7	21.7053	556.6	
212	21.1	1266	0.002	0.003	1.502	0.537	0.002	1.283	0.003	0.003	0.050	0.062	22.3	22.3483	556.6	
213	21.2	1272	0.002	0.003	1.506	0.539	0.002	1.286	0.003	0.003	0.050	0.053	19.1	19.1306	556.6	
214	21.3	1278	0.003	0.005	1.510	0.542	0.003	1.290	0.005	0.004	0.075	0.060	21.7	21.7194	556.6	
215	21.4	1284	0.002	0.003	1.514	0.545	0.002	1.294	0.003	0.003	0.050	0.062	22.4	22.3724	556.6	
216	21.5	1290	0.002	0.003	1.517	0.547	0.002	1.297	0.003	0.003	0.050	0.053	19.2	19.1530	556.6	
217	21.6	1296	0.003	0.005	1.522	0.550	0.003	1.301	0.005	0.004	0.075	0.060	21.7	21.7453	556.6	
218	21.7	1302	0.002	0.003	1.525	0.553	0.002	1.305	0.003	0.003	0.050	0.062	22.4	22.3992	556.6	
219	21.8	1308	0.002	0.003	1.528	0.555	0.002	1.308	0.003	0.003	0.050	0.053	19.2	19.1758	556.6	
220	21.9	1314	0.002	0.003	1.531	0.557	0.002	1.311	0.003	0.003	0.050	0.051	18.4	18.3746	556.6	
221	22.0	1320	0.002	0.003	1.534	0.559	0.002	1.314	0.003	0.003	0.050	0.050	18.2	18.1788	556.6	
222	22.1	1326	0.003	0.005	1.539	0.563	0.003	1.319	0.005	0.004	0.076	0.060	21.5	21.5333	556.6	
223	22.2	1332	0.002	0.003	1.542	0.565	0.002	1.322	0.003	0.003	0.050	0.062	22.4	22.3775	556.6	
224	22.3	1338	0.002	0.003	1.546	0.567	0.002	1.325	0.003	0.003	0.050	0.053	19.2	19.1954	556.6	
225	22.4	1344	0.002	0.003	1.549	0.569	0.002	1.328	0.003	0.003	0.050	0.051	18.4	18.4043	556.6	
226	22.5	1350	0.002	0.003	1.552	0.572	0.002	1.331	0.003	0.003	0.050	0.051	18.2	18.2110	556.6	
227	22.6	1356	0.002	0.003	1.555	0.574	0.002	1.335	0.003	0.003	0.050	0.050	18.2	18.1672	556.6	
228	22.7	1362	0.002	0.003	1.558	0.576	0.002	1.338	0.003	0.003	0.050	0.050	18.2	18.1606	556.6	
229	22.8	1368	0.002	0.003	1.562	0.578	0.002	1.341	0.003	0.003	0.050	0.050	18.2	18.1634	556.6	
230	22.9	1374	0.002	0.003	1.565	0.581	0.002	1.344	0.003	0.003	0.050	0.050	18.2	18.1685	556.6	
231	23.0	1380	0.002	0.003	1.568	0.583	0.002	1.347	0.003	0.003	0.050	0.050	18.2	18.1741	556.6	
232	23.1	1386	0.002	0.003	1.571	0.585	0.002	1.350	0.003	0.003	0.051	0.050	18.2	18.1799	556.6	
233	23.2	1392	0.002	0.003	1.574	0.587	0.002	1.353	0.003	0.003	0.051	0.051	18.2	18.1857	556.6	
234	23.3	1398	0.002	0.003	1.578	0.590	0.002	1.357	0.003	0.003	0.051	0.051	18.2	18.1857	556.6	
235	23.4	1404	0.002	0.003	1.581	0.592	0.002	1.360	0.003	0.003	0.051	0.051	18.2	18.1915	556.6	
236	23.5	1410	0.002	0.003	1.584	0.594	0.002	1.363	0.003	0.003	0.051	0.051	18.2	18.1973	556.6	
237	23.6	1416	0.002	0.003	1.587	0.597	0.002	1.366	0.003	0.003	0.051	0.051	18.2	18.2030	556.6	
238	23.7	1422	0.002	0.003	1.590	0.599	0.002	1.369	0.003	0.003	0.051	0.051	18.2	18.2087	556.6	
239	23.8	1428	0.002	0.003	1.594	0.601	0.002	1.372	0.003	0.003	0.051	0.051	18.2	18.2144	556.6	
240	23.9	1434	0.002	0.003	1.597	0.603	0.002	1.376	0.003	0.003	0.051	0.051	18.2	18.2201	556.6	
241	24.0	1440	0.002	0.003	1.600	0.606	0.002	1.379	0.003	0.003	0.051	0.051	18.2	18.2258	556.6	
														Max Storage Req=	556.6	C.F.



**SCS Type 1A Regional Storm - Central Basin**  
Stormwater Runoff Area - Right Ditch

Area (acres) = 1.852 P (inches) = 1.6 d (min) = 6 Tc (min) = 5 Infiltration Area (ft²) = 7230.0  
 W = 0.375 Max Storage (cu. ft.) = 480.2  
 Pervious Area (acres) = 0.746 CN = 57 S = 1.49 0.2S = 0.30 Infiltration Rate (cf/min/ft²) = 0.0018  
 Impervious Area (acres) = 1.106 CN = 58 S = 0.20 0.2S = 0.04 Total Disp = 78.064000

1 Time Increment	2.0 Time Hours	2 Time (min)	3 Rainfall Distribution (Fraction)	4 Incremental Rainfall (inches)	5 Accum. Rainfall (inches)	6 Pervious Acc. Run (inches)	7 Pervious Inc. Run (inches)	8 Impervious Acc. Run (inches)	9 Impervious Inc. Run (inches)	10 Total Runoff (inches)	11 Instant Flow (inches)	12 Design Flow Rate (cfs)	13 Incremental Flow (cf)	14 Drywell Disp. Volume (cf)	15 Accum. Storage (cf)
1	0.0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
2	0.1	6	0.002	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
3	0.2	12	0.002	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
4	0.3	18	0.002	0.003	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
5	0.4	24	0.002	0.003	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
6	0.5	30	0.002	0.003	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
7	0.6	36	0.002	0.003	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
8	0.7	42	0.002	0.003	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
9	0.8	48	0.002	0.003	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
10	0.9	54	0.002	0.003	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
11	1.0	60	0.002	0.003	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
12	1.1	66	0.003	0.005	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0000	0.0
13	1.2	72	0.003	0.005	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0045	0.0
14	1.3	78	0.003	0.005	0.046	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.2	0.2250	0.0
15	1.4	84	0.003	0.005	0.051	0.000	0.000	0.001	0.000	0.000	0.004	0.002	0.8	0.8086	0.0
16	1.5	90	0.003	0.005	0.056	0.000	0.000	0.001	0.001	0.000	0.006	0.004	1.6	1.5613	0.0
17	1.6	96	0.003	0.005	0.061	0.000	0.000	0.002	0.001	0.000	0.008	0.006	2.3	2.3167	0.0
18	1.7	102	0.003	0.005	0.066	0.000	0.000	0.003	0.001	0.001	0.010	0.008	3.0	3.0368	0.0
19	1.8	108	0.003	0.005	0.070	0.000	0.000	0.004	0.001	0.001	0.012	0.010	3.7	3.7149	0.0
20	1.9	114	0.003	0.005	0.075	0.000	0.000	0.005	0.001	0.001	0.014	0.012	4.4	4.3522	0.0
21	2.0	120	0.003	0.005	0.080	0.000	0.000	0.006	0.001	0.001	0.015	0.014	5.0	4.9512	0.0
22	2.1	126	0.003	0.005	0.085	0.000	0.000	0.008	0.001	0.001	0.017	0.015	5.5	5.5149	0.0
23	2.2	132	0.003	0.005	0.090	0.000	0.000	0.009	0.002	0.001	0.018	0.017	6.0	6.0460	0.0
24	2.3	138	0.004	0.006	0.096	0.000	0.000	0.012	0.002	0.001	0.026	0.021	7.5	7.4539	0.0
25	2.4	144	0.003	0.005	0.101	0.000	0.000	0.014	0.002	0.001	0.021	0.023	8.2	8.2079	0.0
26	2.5	150	0.003	0.005	0.106	0.000	0.000	0.016	0.002	0.001	0.022	0.022	7.9	7.8696	0.0
27	2.6	156	0.003	0.005	0.110	0.000	0.000	0.018	0.002	0.001	0.023	0.022	8.1	8.0007	0.0
28	2.7	162	0.003	0.005	0.115	0.000	0.000	0.020	0.002	0.001	0.024	0.023	8.4	8.4357	0.0
29	2.8	168	0.004	0.006	0.122	0.000	0.000	0.023	0.003	0.002	0.034	0.028	10.0	9.9624	0.0
30	2.9	174	0.003	0.005	0.126	0.000	0.000	0.025	0.002	0.001	0.027	0.030	10.6	10.6460	0.0
31	3.0	180	0.003	0.005	0.131	0.000	0.000	0.028	0.002	0.001	0.027	0.028	9.9	9.9384	0.0
32	3.1	186	0.003	0.005	0.136	0.000	0.000	0.030	0.003	0.002	0.028	0.028	10.0	9.9937	0.0
33	3.2	192	0.003	0.005	0.141	0.000	0.000	0.033	0.003	0.002	0.029	0.028	10.2	10.2285	0.0
34	3.3	198	0.003	0.005	0.146	0.000	0.000	0.036	0.003	0.002	0.030	0.029	10.5	10.4979	0.0
35	3.4	204	0.004	0.006	0.152	0.000	0.000	0.039	0.004	0.002	0.041	0.034	12.2	12.1604	0.0
36	3.5	210	0.003	0.005	0.157	0.000	0.000	0.042	0.003	0.002	0.031	0.036	12.8	12.7980	0.0
37	3.6	216	0.003	0.005	0.162	0.000	0.000	0.045	0.003	0.002	0.032	0.033	11.8	11.7752	0.0
38	3.7	222	0.004	0.006	0.168	0.000	0.000	0.049	0.004	0.002	0.042	0.044	13.2	13.1821	0.0
39	3.8	228	0.004	0.006	0.174	0.000	0.000	0.053	0.004	0.002	0.045	0.042	15.2	15.2497	0.0
40	3.9	234	0.003	0.005	0.179	0.000	0.000	0.056	0.003	0.002	0.034	0.040	14.5	14.4840	0.0
41	4.0	240	0.004	0.006	0.186	0.000	0.000	0.060	0.004	0.002	0.046	0.040	14.5	14.5213	0.0
42	4.1	246	0.004	0.006	0.192	0.000	0.000	0.064	0.004	0.003	0.047	0.045	16.3	16.3043	0.0
43	4.2	252	0.003	0.005	0.197	0.000	0.000	0.068	0.003	0.002	0.036	0.043	15.3	15.3473	0.0
44	4.3	258	0.004	0.006	0.203	0.000	0.000	0.072	0.004	0.003	0.049	0.043	15.3	15.3046	0.0
45	4.4	264	0.004	0.006	0.210	0.000	0.000	0.076	0.004	0.003	0.050	0.048	17.1	17.1188	0.0
46	4.5	270	0.004	0.006	0.216	0.000	0.000	0.081	0.005	0.003	0.050	0.049	17.8	17.7759	0.0
47	4.6	276	0.004	0.006	0.222	0.000	0.000	0.085	0.005	0.003	0.051	0.050	18.1	18.1334	0.0
48	4.7	282	0.004	0.006	0.229	0.000	0.000	0.090	0.005	0.003	0.052	0.051	18.4	18.4066	0.0
49	4.8	288	0.004	0.006	0.235	0.000	0.000	0.095	0.005	0.003	0.052	0.052	18.6	18.6497	0.0
50	4.9	294	0.005	0.008	0.243	0.000	0.000	0.101	0.006	0.004	0.066	0.057	20.7	20.6762	0.0
51	5.0	300	0.004	0.006	0.250	0.000	0.000	0.106	0.005	0.003	0.054	0.059	21.4	21.3602	0.0
52	5.1	306	0.005	0.008	0.258	0.000	0.000	0.112	0.006	0.004	0.068	0.060	21.7	21.7415	0.0
53	5.2	312	0.004	0.006	0.264	0.000	0.000	0.117	0.005	0.003	0.055	0.061	22.0	21.9965	0.0
54	5.3	318	0.005	0.008	0.272	0.000	0.000	0.123	0.006	0.004	0.069	0.062	22.2	22.2499	0.0
55	5.4	324	0.005	0.008	0.280	0.000	0.000	0.129	0.006	0.004	0.070	0.068	24.4	24.3538	0.0
56	5.5	330	0.005	0.008	0.288	0.000	0.000	0.135	0.006	0.004	0.071	0.070	25.1	25.0693	0.0
57	5.6	336	0.005	0.008	0.296	0.000	0.000	0.142	0.006	0.004	0.071	0.071	25.4	25.4278	0.0
58	5.7	342	0.005	0.008	0.304	0.000	0.000	0.148	0.006	0.004	0.072	0.071	25.7	25.7056	0.0
59	5.8	348	0.005	0.008	0.312	0.000	0.000	0.155	0.006	0.004	0.073	0.072	26.0	26.0351	0.0
60	5.9	354	0.005	0.008	0.320	0.000	0.000	0.161	0.007	0.004	0.074	0.073	26.4	26.4363	0.0
61	6.0	360	0.006	0.010	0.330	0.001	0.000	0.169	0.008	0.005	0.091	0.080	28.9	28.9084	0.0
62	6.1	366	0.006	0.010	0.339	0.001	0.000	0.177	0.008	0.005	0.092	0.089	32.0	31.9531	0.0
63	6.2	372	0.006	0.010	0.349	0.002	0.001	0.185	0.008	0.005	0.094	0.092	33.1	33.1354	0.0
64	6.3	378	0.006	0.010	0.358	0.002	0.001	0.193	0.008	0.005	0.095	0.094	33.8	33.8374	0.0
65	6.4	384	0.007	0.011	0.370	0.003	0.001	0.203	0.010	0.006	0.113	0.102	36.6	36.6019	0.0
66	6.5	390	0.006	0.010	0.379	0.004	0.001	0.211	0.008	0.005	0.098	0.105	37.7	37.7029	0.0
67	6.6	396	0.006	0.010	0.389	0.005	0.001	0.219	0.008	0.005	0.100	0.100	38.2	38.1780	0.0
68	6.7	402	0.006	0.010	0.398	0.006	0.001	0.228	0.008	0.005	0.101	0.100	38.2	38.1501	0.0
69	6.8	408	0.006	0.010	0.408	0.007	0.001	0.236	0.008	0.005	0.102	0.101	38.5	38.4854	0.0
70	6.9	414	0.006	0.010	0.418	0.009	0.001	0.244	0.008	0.006	0.103	0.103	36.9	36.9011	0.0
71	7.0	420	0.007	0.011	0.429	0.010	0.002	0.254	0.010	0.007	0.122	0.110	39.7	39.6972	0.0
72	7.1	426	0.007	0.011	0.440	0.012	0.002	0.264	0.010	0.007	0.124	0.120	43.1	43.1335	0.0
73	7.2	432	0.008	0.013	0.453	0.014	0.002	0.276	0.011	0.008	0.143	0.130	46.8	46.8348	0.0
74	7.3	438	0.008	0.013	0.466	0.017	0.002	0.287	0.011	0.008	0.145	0.141	50.6	50.6476	0.0
75	7.4	444	0.009	0.014	0.480	0.020	0.003	0.300	0.013	0.009	0.165	0.152	54.6	54.5964	0.0
76	7.5	450	0.010												

85	8.4	504	0.010	0.016	0.755	0.107	0.007	0.556	0.015	0.012	0.219	0.230	82.8	78.0840	480.2
86	8.5	510	0.008	0.013	0.768	0.112	0.005	0.568	0.012	0.009	0.176	0.205	74.0	73.9630	480.2
87	8.6	516	0.009	0.014	0.782	0.118	0.006	0.582	0.014	0.011	0.199	0.192	69.1	69.1106	480.2
88	8.7	522	0.009	0.014	0.797	0.124	0.006	0.595	0.014	0.011	0.200	0.198	71.2	71.1691	480.2
89	8.8	528	0.007	0.011	0.808	0.129	0.005	0.606	0.011	0.008	0.156	0.183	65.9	65.9339	480.2
90	8.9	534	0.008	0.013	0.821	0.135	0.006	0.618	0.012	0.010	0.180	0.172	61.8	61.8476	480.2
91	9.0	540	0.007	0.011	0.832	0.140	0.005	0.629	0.011	0.008	0.158	0.169	61.0	61.0123	480.2
92	9.1	546	0.007	0.011	0.843	0.145	0.005	0.640	0.011	0.008	0.158	0.161	57.9	57.9493	480.2
93	9.2	552	0.006	0.010	0.853	0.150	0.004	0.649	0.009	0.007	0.136	0.151	54.3	54.2778	480.2
94	9.3	558	0.006	0.010	0.862	0.154	0.005	0.658	0.009	0.007	0.137	0.140	50.4	50.4296	480.2
95	9.4	564	0.006	0.010	0.872	0.159	0.005	0.667	0.009	0.007	0.137	0.138	49.6	49.5859	480.2
96	9.5	570	0.005	0.008	0.880	0.163	0.004	0.675	0.008	0.006	0.115	0.129	46.4	46.3914	480.2
97	9.6	576	0.006	0.010	0.890	0.167	0.005	0.684	0.009	0.007	0.138	0.127	45.7	45.6978	480.2
98	9.7	582	0.005	0.008	0.898	0.171	0.004	0.692	0.008	0.006	0.115	0.127	45.6	45.6107	480.2
99	9.8	588	0.006	0.010	0.907	0.176	0.005	0.701	0.009	0.007	0.139	0.127	45.7	45.6909	480.2
100	9.9	594	0.005	0.008	0.915	0.180	0.004	0.709	0.008	0.006	0.116	0.127	45.8	45.7947	480.2
101	10.0	600	0.005	0.008	0.923	0.184	0.004	0.717	0.008	0.006	0.116	0.119	42.8	42.7786	480.2
102	10.1	606	0.005	0.008	0.931	0.188	0.004	0.724	0.008	0.006	0.116	0.117	42.1	42.0986	480.2
103	10.2	612	0.005	0.008	0.939	0.192	0.004	0.732	0.008	0.006	0.117	0.117	42.0	42.0017	480.2
104	10.3	618	0.005	0.008	0.947	0.196	0.004	0.740	0.008	0.006	0.117	0.117	42.0	42.0496	480.2
105	10.4	624	0.004	0.006	0.954	0.199	0.003	0.746	0.006	0.005	0.094	0.108	39.0	38.9644	480.2
106	10.5	630	0.005	0.008	0.962	0.204	0.004	0.754	0.008	0.006	0.117	0.106	38.3	38.2564	480.2
107	10.6	636	0.005	0.008	0.970	0.208	0.004	0.761	0.008	0.006	0.118	0.115	41.3	41.3103	480.2
108	10.7	642	0.004	0.006	0.976	0.211	0.003	0.768	0.006	0.005	0.094	0.108	39.0	38.9549	480.2
109	10.8	648	0.005	0.008	0.984	0.215	0.004	0.775	0.008	0.006	0.118	0.107	38.4	38.4271	480.2
110	10.9	654	0.005	0.008	0.992	0.220	0.004	0.783	0.008	0.006	0.118	0.115	41.5	41.5431	480.2
111	11.0	660	0.004	0.006	0.998	0.223	0.003	0.789	0.006	0.005	0.095	0.109	39.2	39.1822	480.2
112	11.1	666	0.004	0.006	1.005	0.227	0.003	0.796	0.006	0.005	0.095	0.098	35.4	35.4397	480.2
113	11.2	672	0.005	0.008	1.013	0.231	0.004	0.803	0.008	0.006	0.119	0.105	37.8	37.7620	480.2
114	11.3	678	0.004	0.006	1.019	0.234	0.003	0.810	0.006	0.005	0.095	0.107	38.4	38.3889	480.2
115	11.4	684	0.004	0.006	1.026	0.238	0.003	0.816	0.006	0.005	0.096	0.098	35.4	35.3748	480.2
116	11.5	690	0.004	0.006	1.032	0.241	0.004	0.822	0.006	0.005	0.096	0.096	34.7	34.6615	480.2
117	11.6	696	0.004	0.006	1.038	0.245	0.004	0.828	0.006	0.005	0.096	0.096	34.5	34.5230	480.2
118	11.7	702	0.004	0.006	1.045	0.248	0.004	0.834	0.006	0.005	0.096	0.096	34.5	34.5278	480.2
119	11.8	708	0.004	0.006	1.051	0.252	0.004	0.841	0.006	0.005	0.096	0.096	34.6	34.5681	480.2
120	11.9	714	0.003	0.005	1.056	0.255	0.003	0.845	0.005	0.004	0.072	0.087	31.4	31.3658	480.2
121	12.0	720	0.004	0.006	1.062	0.258	0.004	0.851	0.006	0.005	0.095	0.085	30.6	30.5989	480.2
122	12.1	726	0.004	0.006	1.069	0.262	0.004	0.858	0.006	0.005	0.097	0.094	33.7	33.6913	480.2
123	12.2	732	0.003	0.005	1.074	0.265	0.003	0.862	0.005	0.004	0.072	0.087	31.2	31.2381	480.2
124	12.3	738	0.004	0.006	1.080	0.268	0.004	0.869	0.006	0.005	0.097	0.085	30.7	30.6575	480.2
125	12.4	744	0.004	0.006	1.086	0.272	0.004	0.875	0.006	0.005	0.097	0.094	33.8	33.8068	480.2
126	12.5	750	0.004	0.006	1.093	0.275	0.004	0.881	0.006	0.005	0.097	0.096	34.6	34.8333	480.2
127	12.6	756	0.004	0.006	1.099	0.279	0.004	0.887	0.006	0.005	0.097	0.097	34.9	34.8758	480.2
128	12.7	762	0.003	0.005	1.104	0.282	0.003	0.892	0.005	0.004	0.073	0.088	31.7	31.6868	480.2
129	12.8	768	0.004	0.006	1.110	0.286	0.004	0.898	0.006	0.005	0.097	0.086	30.9	30.5208	480.2
130	12.9	774	0.003	0.005	1.115	0.288	0.003	0.903	0.005	0.004	0.073	0.085	30.8	30.7413	480.2
131	13.0	780	0.004	0.006	1.122	0.292	0.004	0.909	0.006	0.005	0.098	0.085	30.7	30.7526	480.2
132	13.1	786	0.004	0.006	1.128	0.296	0.004	0.915	0.006	0.005	0.098	0.085	34.1	34.6623	480.2
133	13.2	792	0.003	0.005	1.133	0.299	0.003	0.920	0.005	0.004	0.073	0.088	31.6	31.6219	480.2
134	13.3	798	0.004	0.006	1.139	0.302	0.004	0.926	0.006	0.005	0.098	0.086	31.0	31.0418	480.2
135	13.4	804	0.004	0.006	1.146	0.306	0.004	0.933	0.006	0.005	0.098	0.085	34.2	34.2316	480.2
136	13.5	810	0.003	0.005	1.150	0.309	0.003	0.937	0.005	0.004	0.074	0.088	31.7	31.7460	480.2
137	13.6	816	0.003	0.005	1.155	0.312	0.003	0.942	0.005	0.004	0.074	0.077	27.8	27.8340	480.2
138	13.7	822	0.004	0.006	1.162	0.316	0.004	0.948	0.006	0.005	0.098	0.084	30.2	30.1976	480.2
139	13.8	828	0.003	0.005	1.166	0.319	0.003	0.953	0.005	0.004	0.074	0.086	30.8	30.8101	480.2
140	13.9	834	0.004	0.006	1.173	0.323	0.004	0.959	0.006	0.005	0.099	0.086	31.0	30.9919	480.2
141	14.0	840	0.003	0.005	1.178	0.325	0.003	0.964	0.005	0.004	0.074	0.086	31.1	31.0586	480.2
142	14.1	846	0.003	0.005	1.182	0.328	0.003	0.968	0.005	0.004	0.074	0.077	27.8	27.7663	480.2
143	14.2	852	0.004	0.006	1.189	0.332	0.004	0.975	0.006	0.005	0.099	0.084	30.3	30.3013	480.2
144	14.3	858	0.003	0.005	1.194	0.335	0.003	0.979	0.005	0.004	0.074	0.086	31.0	30.9558	480.2
145	14.4	864	0.003	0.005	1.198	0.338	0.003	0.984	0.005	0.004	0.074	0.077	27.8	27.8001	480.2
146	14.5	870	0.004	0.006	1.205	0.342	0.004	0.990	0.006	0.005	0.099	0.084	30.4	30.3786	480.2
147	14.6	876	0.003	0.005	1.210	0.345	0.003	0.995	0.005	0.004	0.074	0.086	31.0	31.0435	480.2
148	14.7	882	0.003	0.005	1.214	0.348	0.003	1.000	0.005	0.004	0.075	0.077	27.9	27.8801	480.2
149	14.8	888	0.004	0.006	1.221	0.352	0.004	1.006	0.006	0.005	0.099	0.085	30.5	30.4659	480.2
150	14.9	894	0.003	0.005	1.226	0.355	0.003	1.011	0.005	0.004	0.075	0.086	31.1	31.1322	480.2
151	15.0	900	0.003	0.005	1.230	0.358	0.003	1.015	0.005	0.004	0.075	0.078	28.0	27.9592	480.2
152	15.1	906	0.003	0.005	1.235	0.361	0.003	1.020	0.005	0.004	0.075	0.076	27.2	27.1828	480.2
153	15.2	912	0.004	0.006	1.242	0.365	0.004	1.026	0.006	0.005	0.100	0.084	30.4	30.3769	480.2
154	15.3	918	0.003	0.005	1.246	0.368	0.003	1.031	0.005	0.004	0.075	0.087	31.2	31.1948	480.2
155	15.4	924	0.003	0.005	1.251	0.371	0.003	1.036	0.005	0.004	0.075	0.078	28.0	28.0470	480.2
156	15.5	930	0.003	0.005	1.256	0.374	0.003	1.040	0.005	0.004	0.075	0.076	27.3	27.2764	480.2
157	15.6	936	0.003	0.005	1.261	0.377	0.003	1.045	0.005	0.004	0.075	0.075	27.1	27.1000	480.2
158	15.7	942	0.004	0.006	1.267	0.381	0.004	1.051	0.006	0.005	0.100	0.085	30.5	30.4580	480.2
159	15.8	948	0.003	0.005	1.272	0.384	0.003	1.056	0.005	0.004	0.075	0.087	31.3	31.3163	480.2
160	15.9	954	0.003	0.005	1.277	0.387	0.003	1.061	0.005	0.004	0.075	0.078	28.2	28.1634	480.2
161	16.0	960	0.003	0.005	1.282	0.390	0.003	1.066	0.005	0.004	0.075	0.076	27.4	27.	

183	18.2	1092	0.002	0.003	1.384	0.457	0.002	1.166	0.003	0.003	0.051	0.067	24.1	24.0898	480.2
184	18.3	1098	0.003	0.005	1.389	0.460	0.003	1.171	0.005	0.004	0.077	0.065	23.3	23.2568	480.2
185	18.4	1104	0.003	0.005	1.394	0.463	0.003	1.175	0.005	0.004	0.077	0.074	26.5	26.5068	480.2
186	18.5	1110	0.003	0.005	1.398	0.466	0.003	1.180	0.005	0.004	0.077	0.076	27.3	27.3329	480.2
187	18.6	1116	0.002	0.003	1.402	0.468	0.002	1.183	0.003	0.003	0.051	0.067	24.1	24.0978	480.2
188	18.7	1122	0.003	0.005	1.406	0.471	0.003	1.188	0.005	0.004	0.077	0.065	23.3	23.3002	480.2
189	18.8	1128	0.003	0.005	1.411	0.475	0.003	1.193	0.005	0.004	0.077	0.074	26.6	26.5672	480.2
190	18.9	1134	0.002	0.003	1.414	0.477	0.002	1.196	0.003	0.003	0.051	0.066	23.9	23.9361	480.2
191	19.0	1140	0.003	0.005	1.419	0.480	0.003	1.201	0.005	0.004	0.077	0.065	23.3	23.2894	480.2
192	19.1	1146	0.003	0.005	1.424	0.483	0.003	1.205	0.005	0.004	0.077	0.074	26.6	26.5958	480.2
193	19.2	1152	0.002	0.003	1.427	0.485	0.002	1.208	0.003	0.003	0.051	0.067	24.0	24.0254	480.2
194	19.3	1158	0.003	0.005	1.432	0.489	0.003	1.213	0.005	0.004	0.077	0.065	23.3	23.9736	480.2
195	19.4	1164	0.002	0.003	1.435	0.491	0.002	1.216	0.003	0.003	0.051	0.064	23.2	23.3279	480.2
196	19.5	1170	0.003	0.005	1.440	0.494	0.003	1.221	0.005	0.004	0.077	0.064	23.1	23.1459	480.2
197	19.6	1176	0.003	0.005	1.445	0.497	0.003	1.226	0.005	0.004	0.077	0.074	26.6	26.6202	480.2
198	19.7	1182	0.002	0.003	1.448	0.500	0.002	1.229	0.003	0.003	0.051	0.067	24.0	24.0254	480.2
199	19.8	1188	0.003	0.005	1.453	0.503	0.003	1.234	0.005	0.004	0.077	0.065	23.4	23.3873	480.2
200	19.9	1194	0.002	0.003	1.456	0.505	0.002	1.237	0.003	0.003	0.052	0.065	23.2	23.2348	480.2
201	20.0	1200	0.003	0.005	1.461	0.508	0.003	1.242	0.005	0.004	0.077	0.064	23.2	23.2071	480.2
202	20.1	1206	0.002	0.003	1.464	0.510	0.002	1.245	0.003	0.003	0.052	0.064	23.2	23.2072	480.2
203	20.2	1212	0.003	0.005	1.469	0.514	0.003	1.249	0.005	0.004	0.077	0.064	23.2	23.2176	480.2
204	20.3	1218	0.002	0.003	1.472	0.516	0.002	1.253	0.003	0.003	0.052	0.065	23.2	23.2271	480.2
205	20.4	1224	0.002	0.003	1.475	0.518	0.002	1.256	0.003	0.003	0.052	0.056	19.8	19.7518	480.2
206	20.5	1230	0.003	0.005	1.480	0.521	0.003	1.260	0.005	0.004	0.078	0.062	22.4	22.3778	480.2
207	20.6	1236	0.002	0.003	1.483	0.524	0.002	1.264	0.003	0.003	0.052	0.064	23.0	23.0411	480.2
208	20.7	1242	0.003	0.005	1.488	0.527	0.003	1.268	0.005	0.004	0.078	0.064	23.2	23.2171	480.2
209	20.8	1248	0.002	0.003	1.491	0.529	0.002	1.271	0.003	0.003	0.052	0.065	23.3	23.2678	480.2
210	20.9	1254	0.002	0.003	1.494	0.531	0.002	1.275	0.003	0.003	0.052	0.055	19.8	19.7945	480.2
211	21.0	1260	0.003	0.005	1.499	0.535	0.003	1.279	0.005	0.004	0.078	0.062	22.4	22.4289	480.2
212	21.1	1266	0.002	0.003	1.502	0.537	0.002	1.283	0.003	0.003	0.052	0.064	23.1	23.0941	480.2
213	21.2	1272	0.002	0.003	1.506	0.539	0.002	1.286	0.003	0.003	0.052	0.055	19.8	19.7697	480.2
214	21.3	1278	0.003	0.005	1.510	0.542	0.003	1.290	0.005	0.004	0.078	0.062	22.4	22.4459	480.2
215	21.4	1284	0.002	0.003	1.514	0.545	0.002	1.294	0.003	0.003	0.052	0.064	23.1	23.1215	480.2
216	21.5	1290	0.002	0.003	1.517	0.547	0.002	1.297	0.003	0.003	0.052	0.055	19.8	19.7949	480.2
217	21.6	1296	0.003	0.005	1.522	0.550	0.003	1.301	0.005	0.004	0.078	0.062	22.5	22.4750	480.2
218	21.7	1302	0.002	0.003	1.525	0.553	0.002	1.305	0.003	0.003	0.052	0.064	23.2	23.1515	480.2
219	21.8	1308	0.002	0.003	1.528	0.555	0.002	1.308	0.003	0.003	0.052	0.055	19.8	19.8206	480.2
220	21.9	1314	0.002	0.003	1.531	0.557	0.002	1.311	0.003	0.003	0.052	0.053	19.0	18.9930	480.2
221	22.0	1320	0.002	0.003	1.534	0.559	0.002	1.314	0.003	0.003	0.052	0.052	18.8	18.7912	480.2
222	22.1	1326	0.003	0.005	1.539	0.563	0.003	1.319	0.005	0.004	0.078	0.062	22.3	22.2594	480.2
223	22.2	1332	0.002	0.003	1.542	0.565	0.002	1.322	0.003	0.003	0.052	0.064	23.1	23.1328	480.2
224	22.3	1338	0.002	0.003	1.546	0.567	0.002	1.325	0.003	0.003	0.052	0.055	19.8	19.8439	480.2
225	22.4	1344	0.002	0.003	1.549	0.569	0.002	1.328	0.003	0.003	0.052	0.053	19.0	19.0267	480.2
226	22.5	1350	0.002	0.003	1.552	0.572	0.002	1.331	0.003	0.003	0.052	0.052	18.8	18.8274	480.2
227	22.6	1356	0.002	0.003	1.555	0.574	0.002	1.335	0.003	0.003	0.052	0.052	18.8	18.7764	480.2
228	22.7	1362	0.002	0.003	1.558	0.576	0.002	1.338	0.003	0.003	0.052	0.052	18.8	18.7798	480.2
229	22.8	1368	0.002	0.003	1.562	0.578	0.002	1.341	0.003	0.003	0.052	0.052	18.8	18.7856	480.2
230	22.9	1374	0.002	0.003	1.565	0.581	0.002	1.344	0.003	0.003	0.052	0.052	18.8	18.7919	480.2
231	23.0	1380	0.002	0.003	1.568	0.583	0.002	1.347	0.003	0.003	0.052	0.052	18.8	18.7984	480.2
232	23.1	1386	0.002	0.003	1.571	0.585	0.002	1.350	0.003	0.003	0.052	0.052	18.8	18.8050	480.2
233	23.2	1392	0.002	0.003	1.574	0.587	0.002	1.353	0.003	0.003	0.052	0.052	18.8	18.8114	480.2
234	23.3	1398	0.002	0.003	1.578	0.590	0.002	1.357	0.003	0.003	0.052	0.052	18.8	18.8179	480.2
235	23.4	1404	0.002	0.003	1.581	0.592	0.002	1.360	0.003	0.003	0.052	0.052	18.8	18.8244	480.2
236	23.5	1410	0.002	0.003	1.584	0.594	0.002	1.363	0.003	0.003	0.052	0.052	18.8	18.8308	480.2
237	23.6	1416	0.002	0.003	1.587	0.597	0.002	1.366	0.003	0.003	0.052	0.052	18.8	18.8372	480.2
238	23.7	1422	0.002	0.003	1.590	0.599	0.002	1.369	0.003	0.003	0.052	0.052	18.8	18.8436	480.2
239	23.8	1428	0.002	0.003	1.594	0.601	0.002	1.372	0.003	0.003	0.052	0.052	18.8	18.8499	480.2
240	23.9	1434	0.002	0.003	1.597	0.603	0.002	1.376	0.003	0.003	0.052	0.052	18.8	18.8563	480.2
241	24.0	1440	0.002	0.003	1.600	0.606	0.002	1.379	0.003	0.003	0.052	0.052	18.8	18.8563	480.2

Max Storage Req= 480.2 C.F.

# PRIVATE ROAD NETWORK DRAWINGS FOR PALOMINO MAJOR PLAT, PHASE 3

## Prepared By

### WESTERN PACIFIC ENGINEERING & SURVEY



**WESTERN PACIFIC  
ENGINEERING & SURVEY**

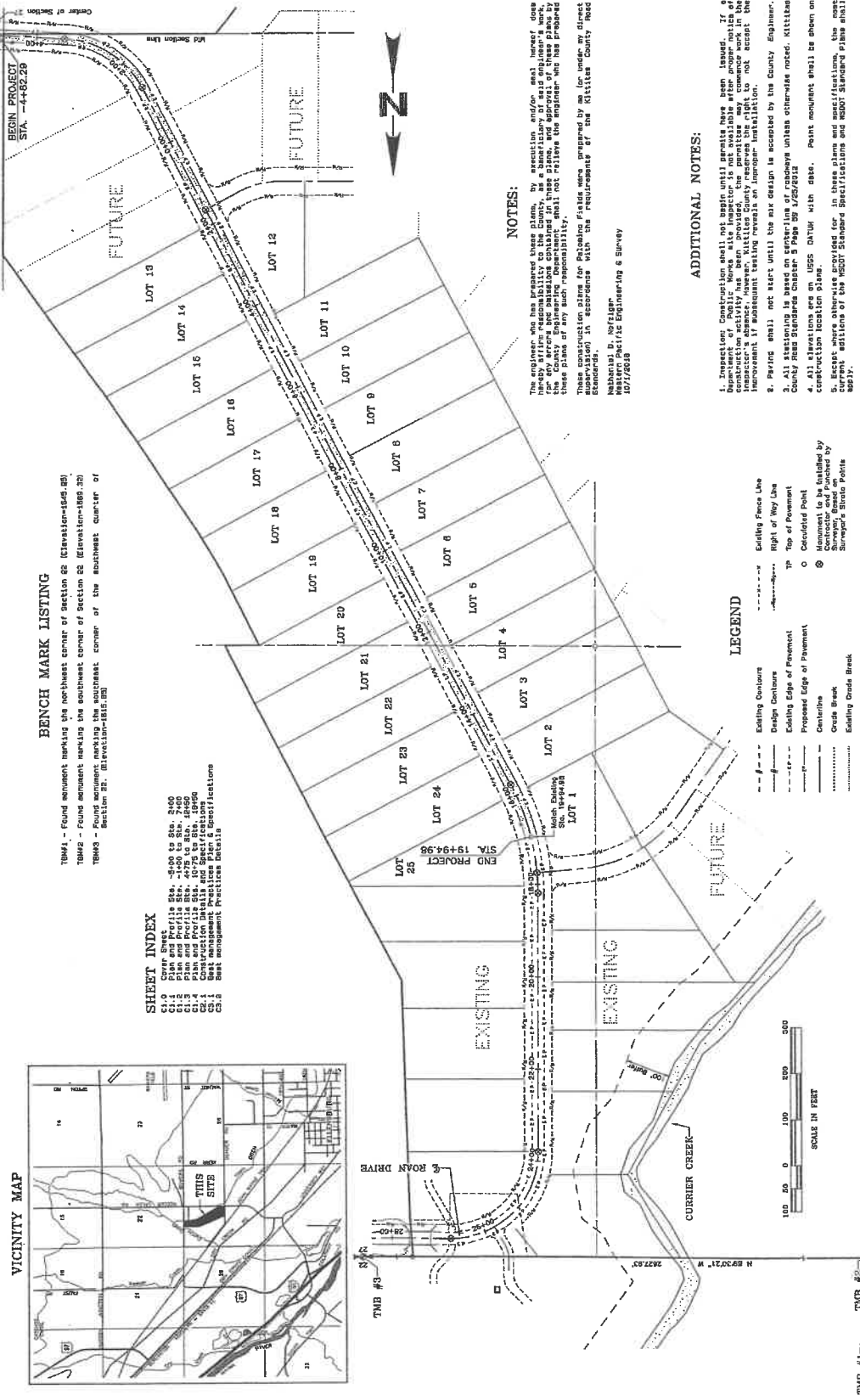
A TRUCK DEVELOPMENT SERVICES CORPORATION  
1328 E. Hunter Place, Moses Lake, Washington  
509/767-1228 / 769/978-1228  
Licenses in Washington and Utah

No.	Revision	Date	By

**LCU, INC.**  
**PALOMINO MAJOR PLAT, PHASE 3**  
Cover Sheet

Designed by: JDN  
Checked by: JDN  
Project No.: 18119  
Date: October 2018  
Scale: 1" = 100'  
Sheet No.: C1.0  
See P.L. 18119 S. 10 & 5

SHEET NO.  
**C1.0**  
1811927



**BENCH MARK LISTING**

TBM#1 - Found monument marking the northwest corner of section 22 (Elevation=1868.88)

TBM#2 - Found monument marking the southwest corner of section 22 (Elevation=1869.30)

TBM#3 - Found monument marking the southeast corner of the southeast quarter of section 22. (Elevation=1815.88)

**SHEET INDEX**

C1.1 Plan and Profile Sta. 3+00 to Sta. 5+00

C1.2 Plan and Profile Sta. 5+00 to Sta. 7+00

C1.3 Plan and Profile Sta. 7+00 to Sta. 9+00

C1.4 Construction Details and Specifications

C1.5 Best Management Practices Plan & Specifications

C1.6 Best Management Practices Details



**LEGEND**

Existing Centerline      - - - - -

Design Centerline      - - - - -

Existing Edge of Pavement      - - - - -

Proposed Edge of Pavement      - - - - -

Centerline      - - - - -

Grade Break      - - - - -

Existing Grade Break      - - - - -

Existing Fence Line      - - - - -

Right of Way Line      - - - - -

Top of Pavement      TP

Controlled Point      O

Control Point      O

Surveyor, field notes      S

Contractor field notes      C

Sampled Street Points      S

**NOTES:**

The engineer who has prepared these plans, by acceptance thereof, shall hereby accept full responsibility to the County, as a beneficiary of said engineer's work for all actions and omissions contained in these plans, and approval of these plans by the County shall not constitute an acknowledgment of any liability on the part of the engineer or any such responsibility.

These construction plans for Palomino Drive were prepared by an (or under my direct supervision) in accordance with the requirements of the Kittitas County Road Standards.

Nathaniel D. Norlander  
Western Pacific Engineering & Survey  
10/17/2018

**ADDITIONAL NOTES:**

1. Inspection/Construction shall not begin until permits have been issued. If a Department of Public Works site inspector is not available after proper notice of construction activity has been issued, the permittee shall commence work on the project. All utility lines shall be marked and located. All utility lines shall be marked and located. All utility lines shall be marked and located.

2. All stationing is based on centerline of roadway unless otherwise noted. Kittitas County Road Standards Chapter 3 Page 29 1/25/2012

3. All elevations are on UGCS datum with case. Point monument shall be shown on construction location plans.

4. All elevations are on UGCS datum with case. Point monument shall be shown on construction location plans.

5. All elevations are on UGCS datum with case. Point monument shall be shown on construction location plans.

6. All elevations are on UGCS datum with case. Point monument shall be shown on construction location plans.

These plans have been reviewed by Kittitas County Department of Public Works and have been accepted for complying with the requirements of Kittitas County Road Standards.

*M. A. K. Cook*  
County Engineer

Date: **10.15.18**



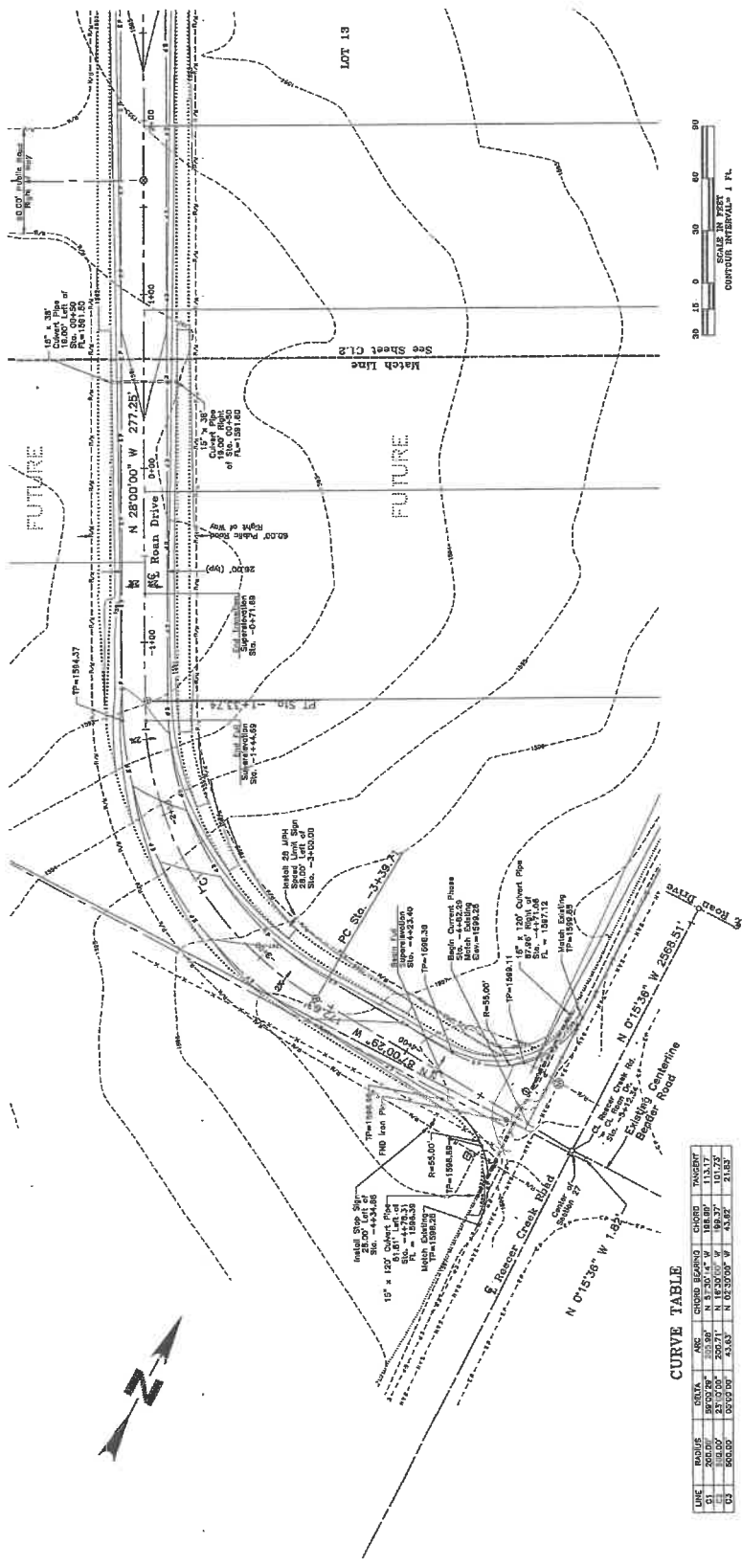
**WESTERN PACIFIC  
ENGINEERING & SURVEY**  
A TRUST AGREEMENT SERVICES CORPORATION  
1325 E. Hunter Place, Roseburg, Oregon 97470  
REGISTRATION NO. 1222 (REG) 02-1228  
Expires in September and June

No.	Revisions	Date	By

**LCU, INC.**  
**PALOMINO MAJOR PLAT, PHASE 3**  
**Plan and Profile Sta. -5+00 to Sta. 2+00**

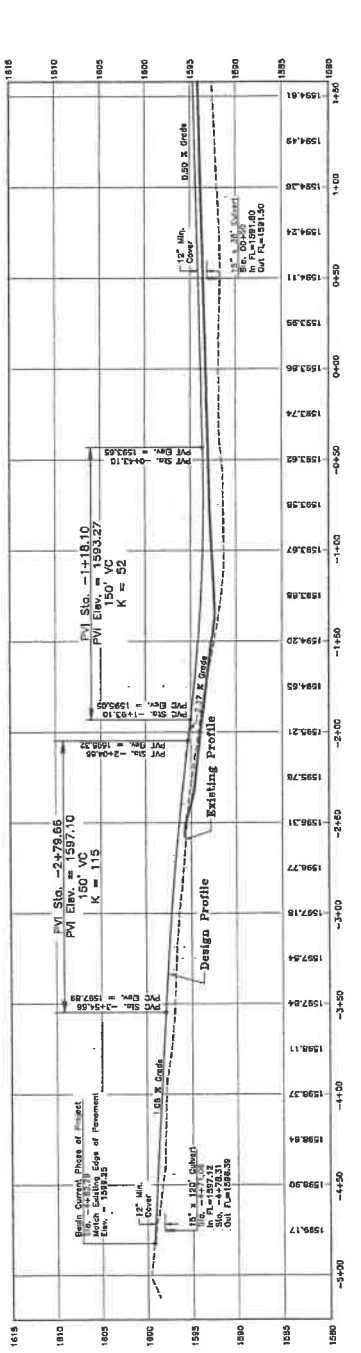
Designed by: NPH  
Checked by: JON  
Project No.: 8810  
Date: October 2010  
Scale: 1" = 40'  
Sheet: 1 of 2  
Rev: 01, 10, 11, 12, 13

**SHEET NO.  
C1.1**  
181887



**CURVE TABLE**

LINE	BEARING	ANGLE	CHORD BEARING	CHORD	TANGENT
C1	N 15'30'00" W	153.87	N 15'30'00" W	198.27	113.17
C2	N 03'30'00" W	43.63	N 03'30'00" W	43.67	21.83



10/15/10



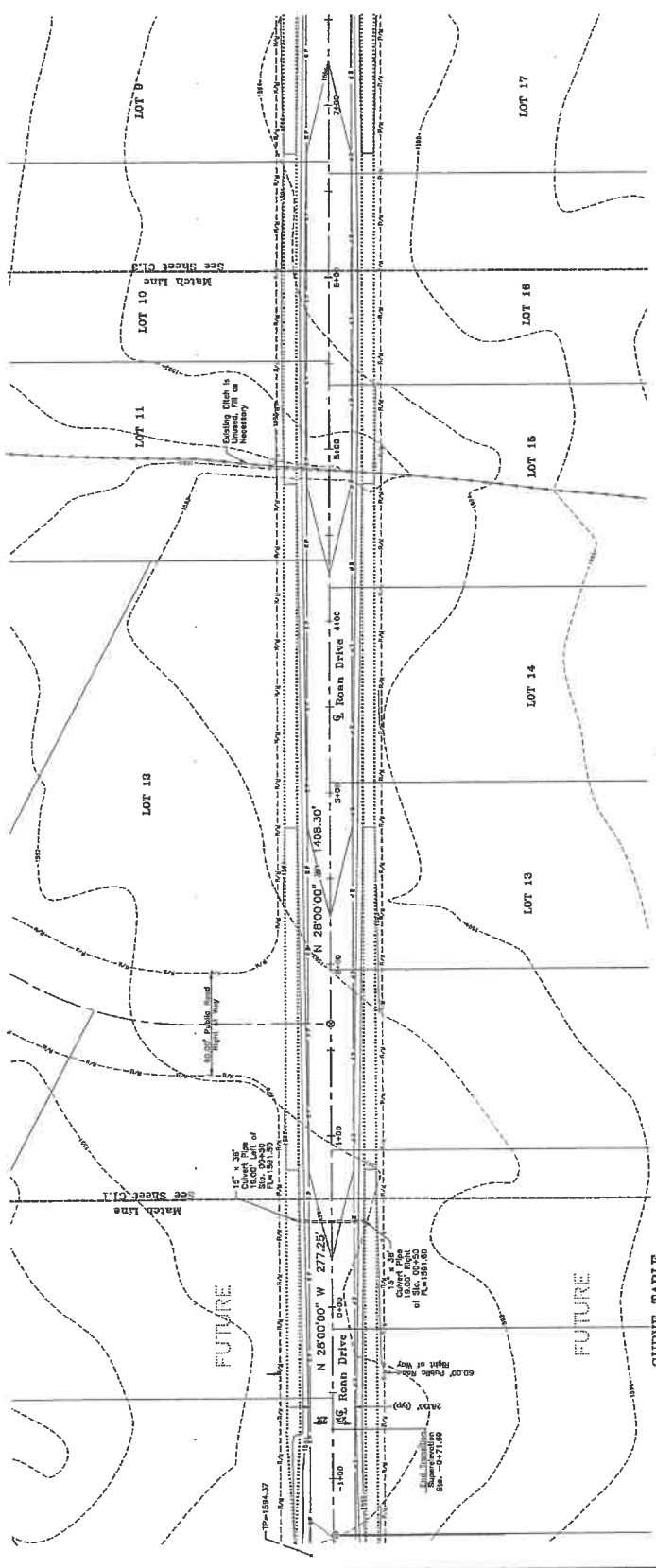
WESTERN PACIFIC  
ENGINEERING & SURVEY  
A TERRA CONSULTANT SERVICES CORPORATION  
1318 E. MILWAUKEE AVENUE, SUITE 100, RENO, NEVADA 89402  
TEL: (775) 785-1234 FAX: (775) 785-1235  
www.western-pacific.com

No.	Revision	Date

Palomino Major Plat, Phase 3  
Roan Drive Improvements  
Plan and Profile Sta. -1+00 to Sta. 7+00  
Kittitas County  
Washington

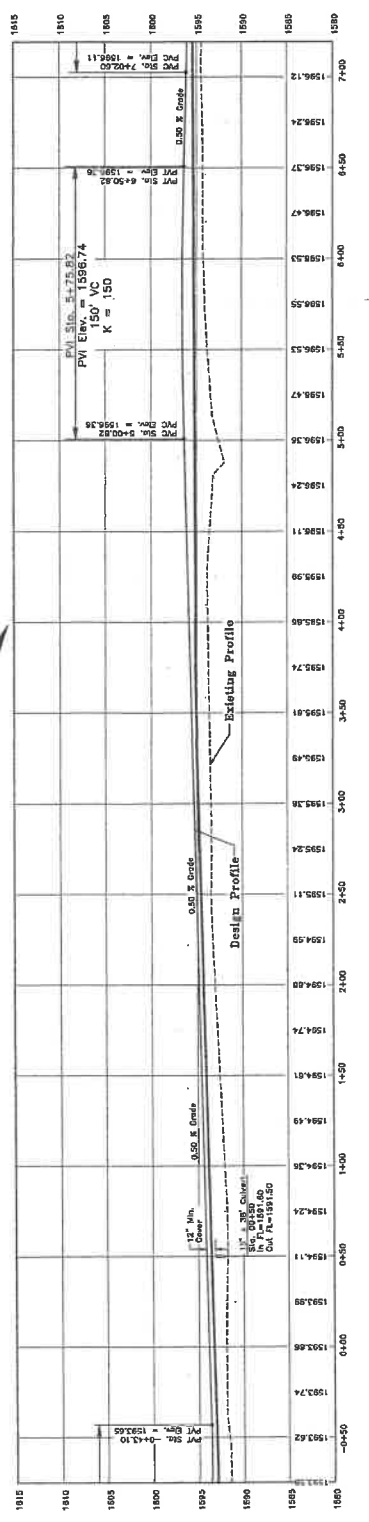
Designed by: [Name]  
Checked by: [Name]  
Project No.: 18113  
Issue Date: October 2019  
Scale: 1" = 40'  
Sheet: 1 of 3

SHEET NO. C1.2  
1810B7



CURVE TABLE

LINE	STATION	DELTA	ARC	CHORD	BEARING	CHORD	TANGENT
C1	1+00.00	30.0000°	200.87'	N 27.5000° W	108.00'	113.17'	100.00'
C2	2+00.00	150.0000°	43.83'	N 22.5000° E	43.83'	21.83'	20.00'



10/25/19





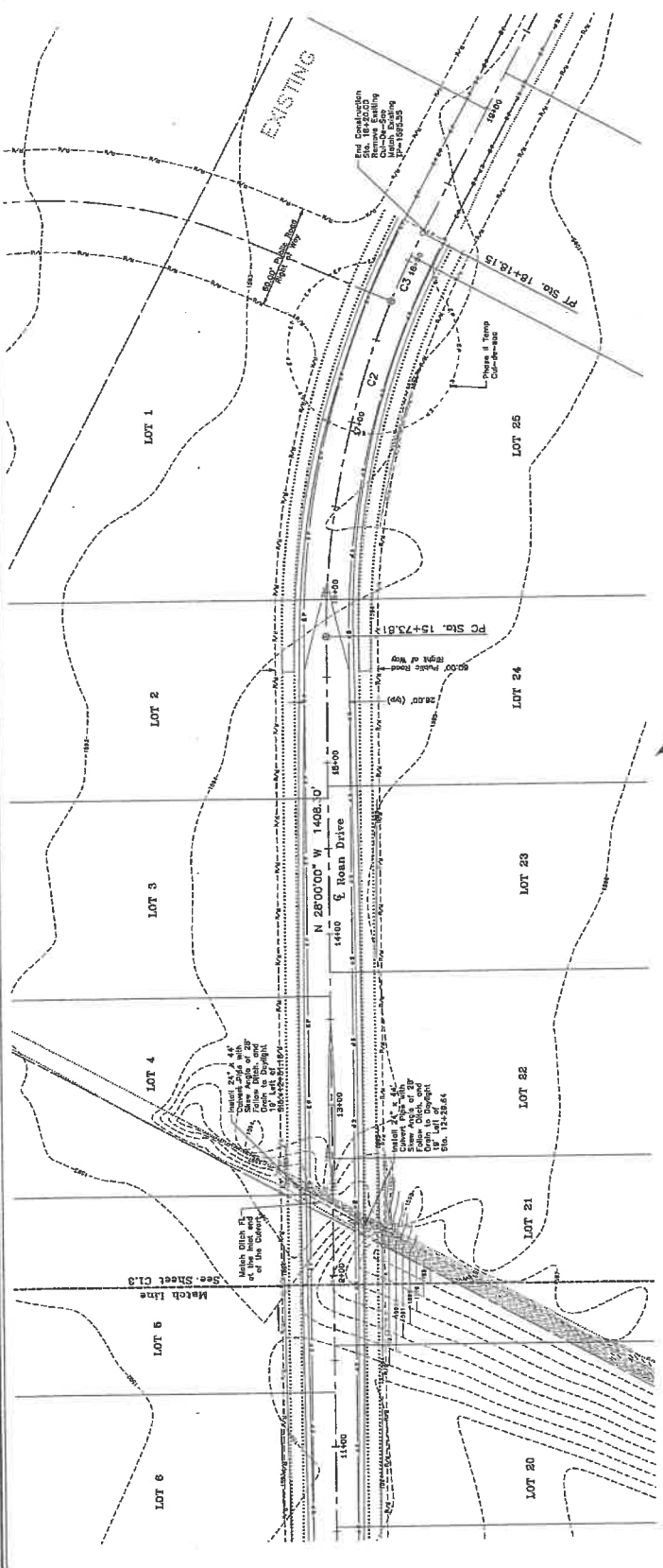
**WESTERN PACIFIC**  
**ENGINEERING & SURVEY**  
 A TRUCK DEVELOPMENT SERVICES CORPORATION  
 1228 E. Market Street, Fresno, California 93701  
 (559) 233-1228

No.	Revision	Date	By

**LCU, INC.**  
**PALOMINO MAJOR PLAT, PHASE 3**  
**ROAD AND PROFILE IMPROVEMENTS**  
**Plan and Profile Sta. 10+75 to Sta. 16+50**

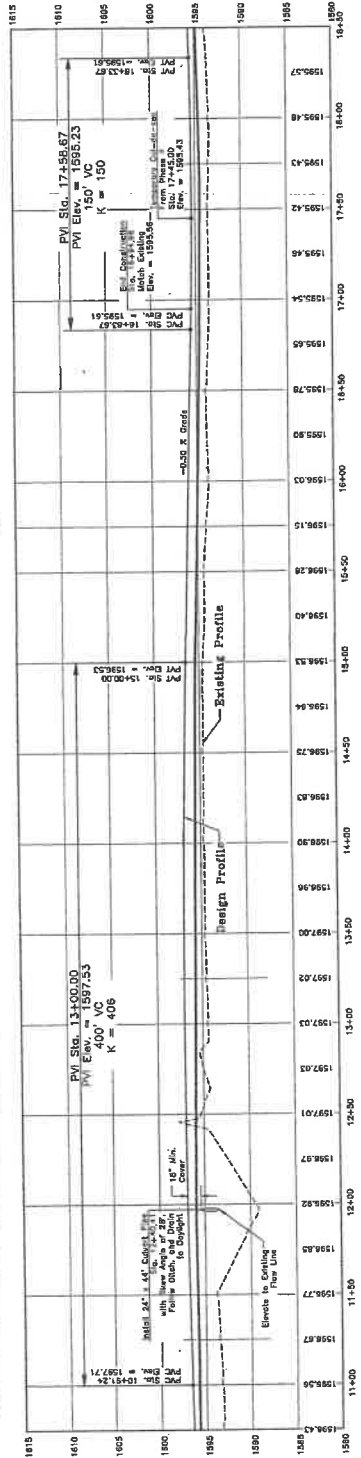
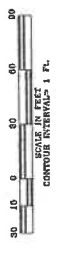
Designed by: NUN  
 Checked by: TMM  
 Drawn by: JMM  
 Project No. 18413  
 Date: October 2018  
 Scale: 1" = 30'  
 Note: See 27, 18, 19, 20 & 21

**SHEET NO. C1.4**  
 181827



**CURVE TABLE**

LINE	BEARING	DIST.	ANG.	CHORD BEARING	CHORD	TANGENT
1	S 89°00'00" W	255.8	113.17	N 17°57'44" W	186.98	113.17
2	S 89°00'00" W	255.8	113.17	N 17°57'44" W	186.98	113.17
3	S 89°00'00" W	255.8	113.17	N 17°57'44" W	186.98	113.17



**10/25/18**

18 -- Project Sheet Reference: Plan - 27, 18, 19, 20, 21; Profile - 181827







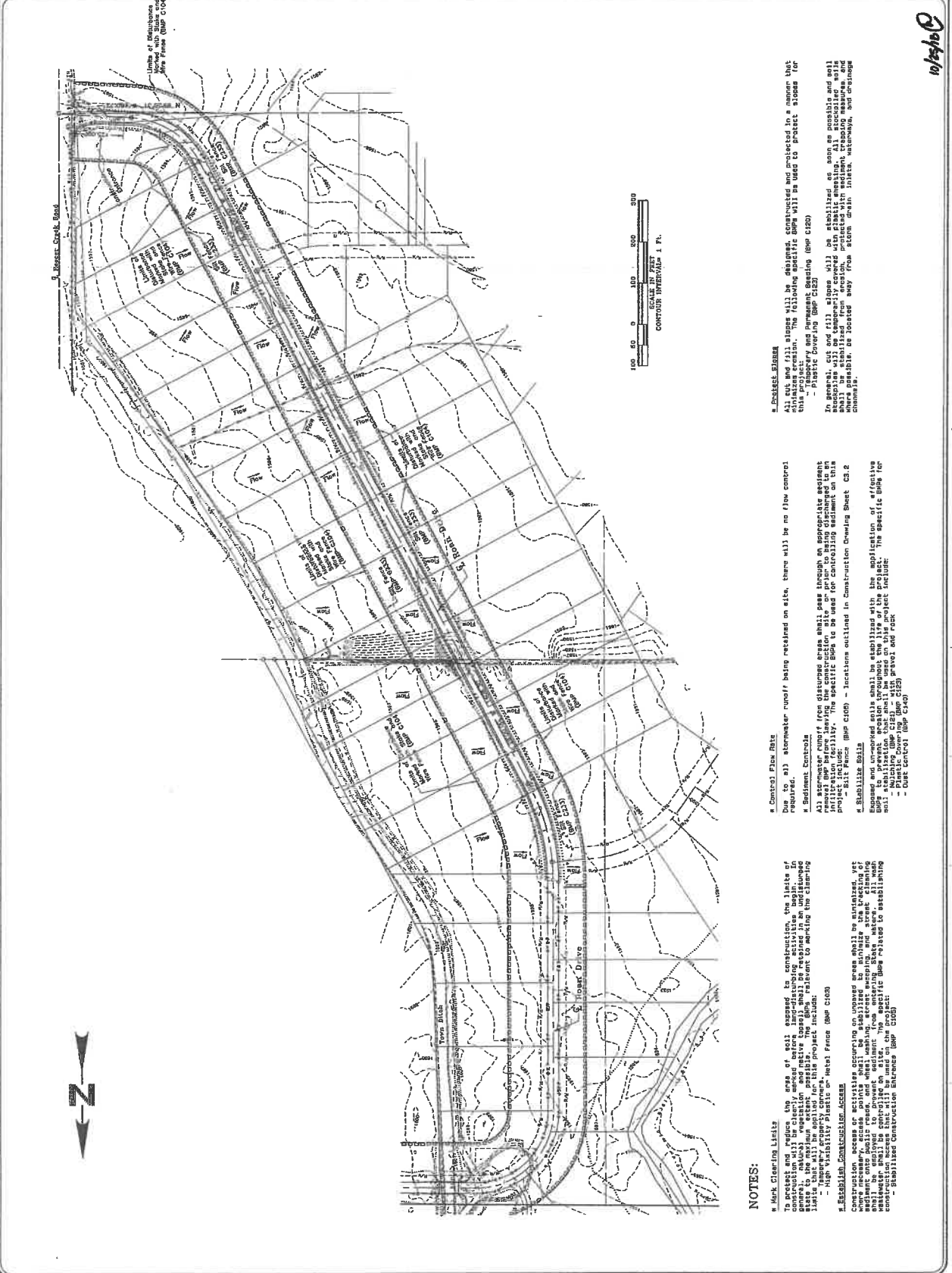
**WESTERN PACIFIC  
ENGINEERING & SURVEY**  
A TERRA DEVELOPMENT SERVICES CORPORATION  
1228 E. HENDERSON PARK, MOORELAND, WASHINGTON  
TELEPHONE 703-1023 FAX 703-1284  
Specialties in Washington and Nevada

No.	Revision	Date	By

**LCU, INC.  
PALOMINO MAJOR PLAT, PHASE 3  
Best Management Practices  
Plan and Specifications**  
Ritchie County

Designed by NIK  
Drawn by Tom/AG  
Checked by Tom/AG  
Project No. 181827  
Date: October 2018  
Scale: 1" = 100'  
Sheet: 1" of 3  
See DT, T, H, R, 10, 2

**SHEET NO.  
C3.1**  
181827



**NOTES:**

1. **Mark Clearing Limits**  
To protect and reduce the area of soil exposed to construction, the limits of construction shall be clearly marked with survey monuments and stakes. The stakes shall be placed at the minimum extent possible. The stakes shall be placed adjacent to marking the clearing limits.

2. **High Visibility Plastic or Metal Fence (See C10)**

3. **EROSION CONTROL ASSURE**  
Construction areas shall be stabilized immediately after clearing. The stabilization shall include seeding, mulching, and erosion control blankets. The stabilization shall be completed before the start of construction. The specific BMPs to be used shall be indicated on this sheet.

4. **Stabilize Soil**  
Exposed and un-worked soils shall be stabilized with the application of effective mulch, straw, or other suitable material. The stabilization shall be completed before the start of construction. The specific BMPs to be used shall be indicated on this sheet.

5. **Control Flow Rate**  
Due to all stormwater runoff being retained on site, there will be no flow control required.

6. **Sediment Controls**  
All stormwater runoff from disturbed areas shall pass through an appropriate sediment filtration facility. The specific BMPs to be used for controlling sediment on this project are: Silt Fence (See C10) - locations outlined in Construction Drawing Sheet C3.2

7. **Stabilize Soil**  
Exposed and un-worked soils shall be stabilized with the application of effective mulch, straw, or other suitable material. The stabilization shall be completed before the start of construction. The specific BMPs to be used shall be indicated on this sheet.

8. **Stabilize Construction Entrance (See C10)**  
- Mulch (See C10) - locations outlined in Construction Drawing Sheet C3.2  
- Silt Fence (See C10)  
- Dust Control (See C10)

9. **Stabilize Soil**  
Exposed and un-worked soils shall be stabilized with the application of effective mulch, straw, or other suitable material. The stabilization shall be completed before the start of construction. The specific BMPs to be used shall be indicated on this sheet.

10. **Stabilize Construction Entrance (See C10)**  
- Mulch (See C10) - locations outlined in Construction Drawing Sheet C3.2  
- Silt Fence (See C10)  
- Dust Control (See C10)

11. **Stabilize Soil**  
Exposed and un-worked soils shall be stabilized with the application of effective mulch, straw, or other suitable material. The stabilization shall be completed before the start of construction. The specific BMPs to be used shall be indicated on this sheet.

12. **Stabilize Construction Entrance (See C10)**  
- Mulch (See C10) - locations outlined in Construction Drawing Sheet C3.2  
- Silt Fence (See C10)  
- Dust Control (See C10)

10/18/18









