COMMUNITY AND VILLAGE PLAN

Saratoga Springs UT Welfare Complex

ENGINEERS
SURVEYORS
PLANNERS

July, 2020

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PREFACE

The following Community and Village Plan document addresses the proposed improvements as they pertain to the proposed Deseret Industries and Bishop's Storehouse located in Saratoga Springs, Utah. The property and the proposed improvements for the development are discussed in detail and follow the requirements set forth within the Community and Village Plan requirements of the City Code of Saratoga Springs. The purpose of the document is to inform the City (Staff, Planning Commission, and City Council) and Public of the proposed general design elements, open space plans, guiding design principles and land uses for the Saratoga Springs Welfare UT Welfare Complex. In addition, utility capacities based on conceptual plans, will outline the methods used to anticipate the demands and service requirements necessary to provide adequate utility service and infrastructure for the proposed improvements.

EXECUTIVE SUMMARY

The proposed Saratoga Springs UT Welfare Complex is an approximate 11.82-acre parcel located on the northwest corner of State Route 68 (Redwood Road) and Medical Drive in Saratoga Springs. The project is ideally situated to provide connectivity and minimize impact with local and major transportation corridors.

The proposed Community and Village Plan incorporates the following units and approximate acreages:

- *11.82 Total Acres*

LEGAL DESCRIPTION

The proposed Village Plan contains approximately 11.82-acres of property. Please see Appendix A for a copy of the ALTA survey for the property. The parcel metes and bounds legal description is as follows:

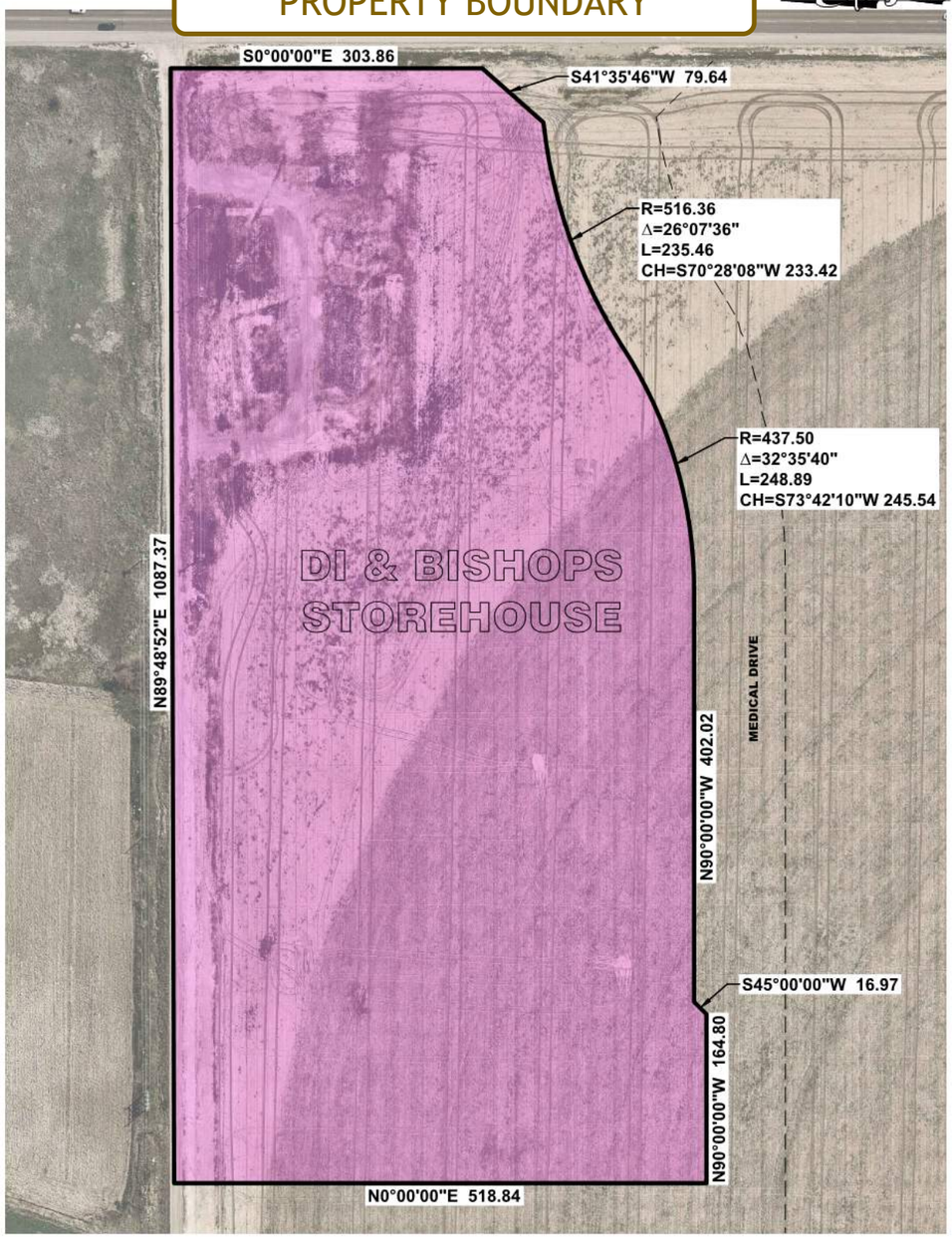
> A portion of the Southwest Quarter of Section 14, Township 5 South, Range 1 West, Salt Lake Base and Meridian, located in Saratoga Springs, Utah, more particularly described as follows:
>
> Beginning at a point on the north right-of-way line of Medical Drive, Being located N0°20’51”E along the Section Line 2137.03 feet and east 1512.99 feet from the southwest corner of Section 14, Township5 South, Range 1 West, Salt Lake Base & Meridian; thence north 518.84 feet to the Quarter Section Line; THENCE N89°48’52”E along the Quarter Section Line 1087.37 feet; thence south 303.86 feet; thence S41°35’46”W 79.65 feet; thence southwesterly along the arc of a 516.36 foot radius non-tangent curve to the left (radius bears: S6°28’’05”E) 235.46 feet through a central angle of 26°07’37” (chord: S70°28’09”W 233.43 feet); thence along the arc of a 437.50 foot radius curve to the right 248.89 feet through a central angle of 32°35’40” (chord: S73°42’10”W 245.54 feet); thence west 402.02 feet; thence S45°00’00”W 16.97 feet to the north right-of-way line of Medical Drive; thence west along said right-of-way line 164.80 feet to the point of beginning
>
> Contains: ±11.82 Acres

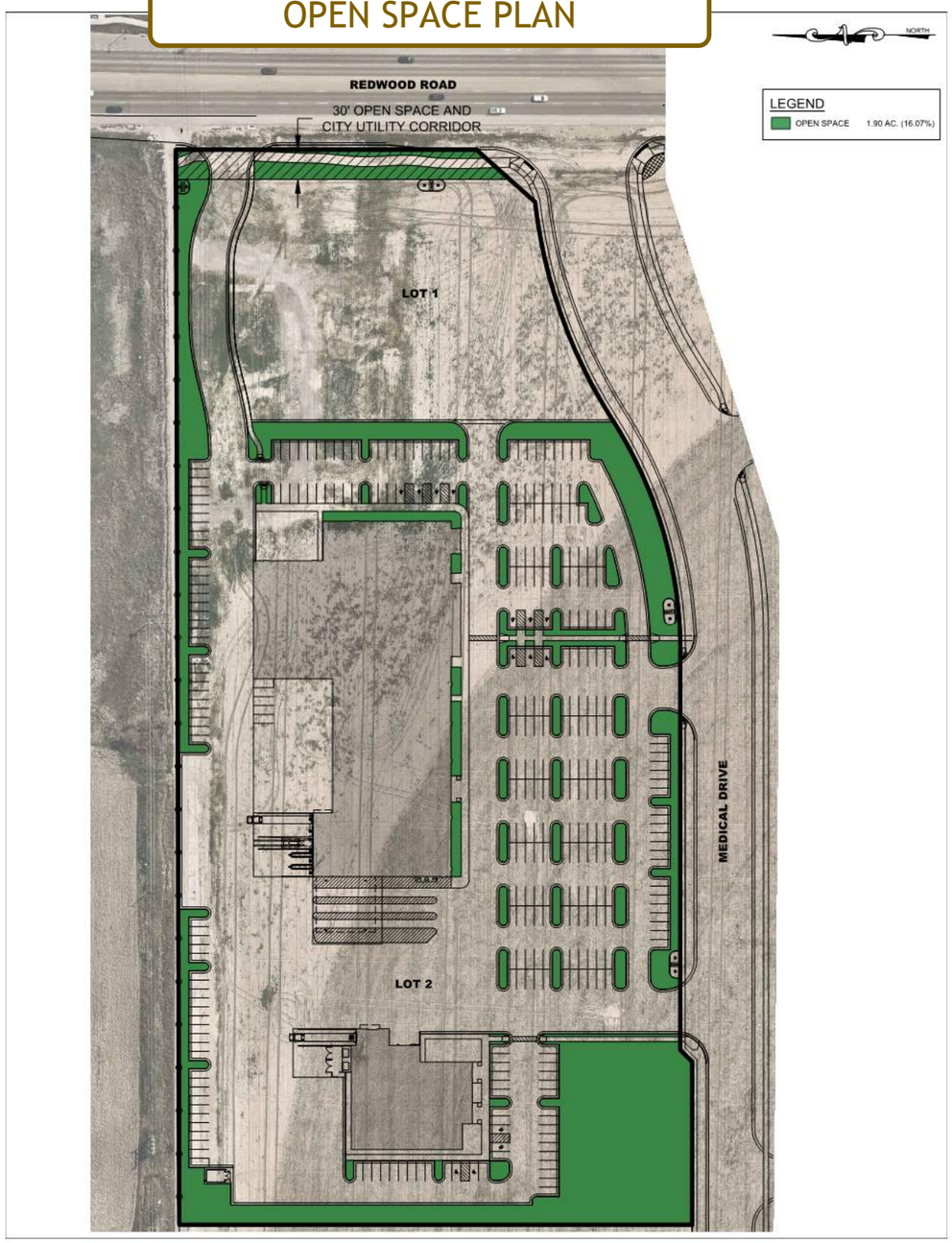
The intersection at Medical Drive and Redwood Road (SR-68) is currently being designed with the proposed development to the south. Depending on the design review and final platting from the Utah Department of Transportation and City staff, the following conditions are proposed related to this Community/Village Plan:

- If the project’s acreage increases or decreases from the amount listed above, City Staff can approve the updated acreage by amending the Community/Village Plan as a minor amendment.

The 11.82 acres of land is part of an overall parcel that will require a City approved subdivision exception through a metes and bounds description to be divided from the parent parcel. This will be completed prior or concurrently with the site plan approval.

PROPERTY BOUNDARY





OPEN SPACE PLAN

Open space for the proposed Saratoga Springs UT Welfare Complex will continue the City's goal for pedestrian wayfinding and safety by incorporating the following key elements that are based on the current City Code requirements:

Public Sidewalks. Sidewalks are to be installed along the entire property frontage. Sidewalk connections points will be at Medical Drive and Redwood Road (south. Roadway frontage improvements will adhere to City Roadway Standards. Sidewalk widths and placements will follow the 2019 Saratoga Springs City Standards and Specifications at a minimum.

- **Open Space / Landscaping.** The proposed Saratoga Springs UT Welfare Complex will follow the Regional Retail place type as specified in the DAP. The DAP specifies a landscaping requirement for Regional Retail of approximately 11 to 14-percent which is exceeded for the site at approximately 16-percent. In addition to the sidewalk and pedestrian access throughout the project and along the City ROWs, the project will utilize the Parkway (Boulevard) Open Space Type by placing a pedestrian plaza with benches at the corner of the shared access to the Bishop's Storehouse and Deseret Industries. The backdrop to the pedestrian plaza will feature landscaping that will create a warm and inviting location for those passing by. See the Conceptual Landscaping Plans found in Appendix B for more detail.
- **Public Open Space.** A 30-foot landscape and utility easement/buffer will be provided along Redwood Road that will be owned and maintained by the Church of Jesus Christ of Latter-day Saints. The buffer will include a meandering trail located within a pedestrian access easement and follow the 2019 Saratoga Springs City Standards and Specifications at a minimum.
- **Monumentation and Signage.** Signage will be specific and similar to other uses within the City. Monumentation and signage will meet the regional commercial sign requirements set forth in Title 19.18 of the City Code. See the signage example provided in the following section.

USE MAP AND BUILDOUT ALLOCATION

The following Use Map depicts the proposed land uses for the Saratoga Springs UT Welfare Project. There will be two lots within the boundary of the Saratoga Springs UT Welfare Project Community/Village Plan. The Village will incorporate the following place type as specified in the District Area Plan:

- **Regional Retail.** This area is located just west of State Route 68 and adjacent to Medical Drive in Saratoga Springs. The anticipated land use of Regional Retail coincides with the land uses within the City Center District Area Plan for Saratoga Springs. The DAP place type of Regional Retail will follow the Regional Commercial (RC) zone standards of Title 19 unless expressly identified herein.

Lot 1 will remain vacant until such time a commercial use is determined for the site. Lot 1 will need to follow the appropriate City approval process (Title 19.04 – Regional Commercial [RC]) once a commercial use has been determined. The remaining portion of this document will address the anticipated improvements of Lot 2 which will be completed in a single phase.

Two different methods were requested in determining the land use intensities for Lot 2 within this Village. Both methods illustrate the process used in determining the Equivalent Residential Units (ERUs) for this specific project. They are as follows:

Method 1 – District Area Plan Guidelines. The District Area Plan (DAP) states that one ERU is equivalent to 2,165 square feet (sf) of "non-residential area." The 2,165 sf is generated by dividing 10,000,000 sf commercial area by 4,620 non-residential ERUs as per the DAP. The total proposed building square footage within the boundaries is approximately 69,788 sf. The following yields:

(69,788 sf) / (2,165 sf/ERU) = **32.2 ERUs**

Method 2 – Water Supply Fixture Unit (wsfu). A plumbing fixture analysis was completed and based on the anticipated uses for this project. Calculations provided within the utility section of this Community and Village Plan generate approximately **6.5 ERUs** for the two proposed buildings within the project.

The ERU density calculation method (Method 1) identified in the District Area Plan will be used and results in **32.2 ERUs** for the proposed Lot 2 of this Village. Method 2 will be used later within this document for determining the anticipated utility capacities for the project and eventual impacts to the City system.

Village Plan

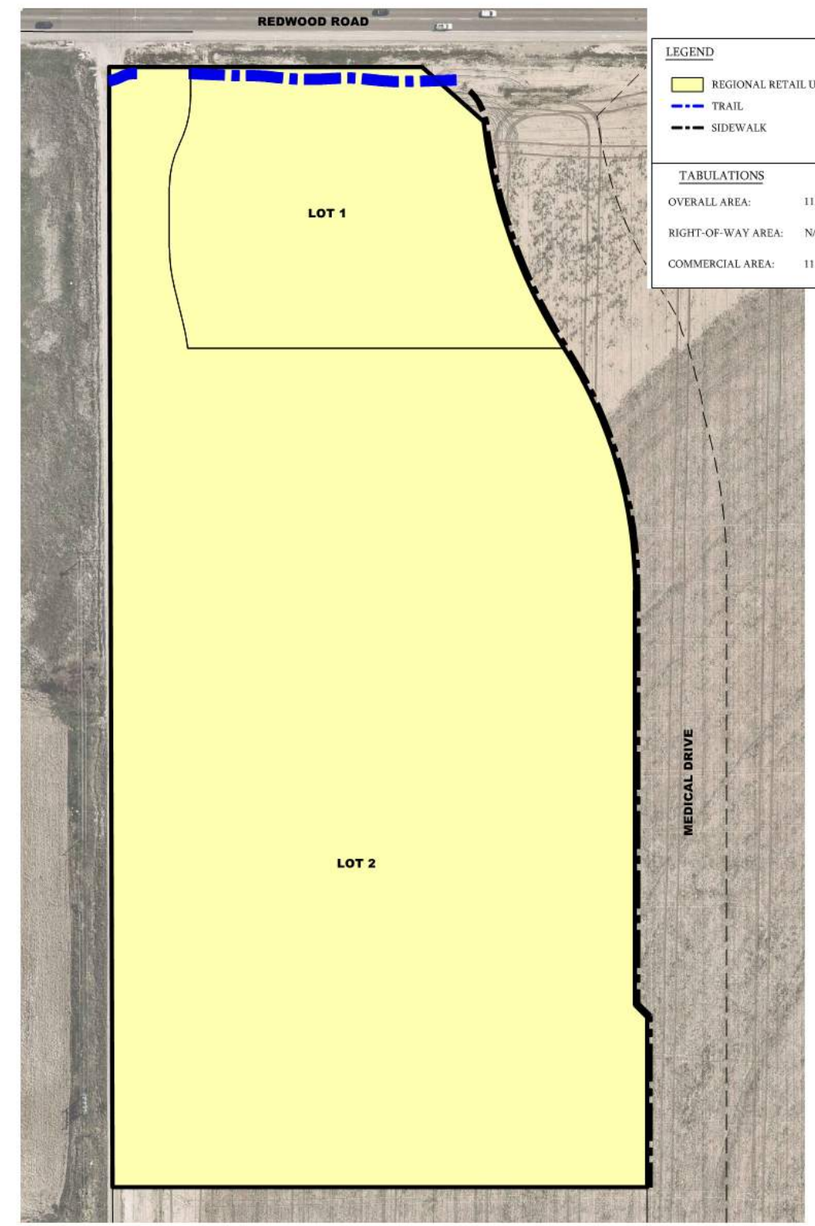
Lot 2 of this Village will only contain a single use. The Welfare Complex will contain a commodity resource center and a retail thrift store, both of which are a non-profit organization and a division of the Welfare Services of The Church of Jesus Christ of Latter-day Saints.

Overall Village Area (Regional Retail):	11.8 Ac (100%)	32 ERUs based on floor area (100%)
Lot 1 Area:	2.0 Ac (17%)	ERUs to be determined.
Lot 2 Area:	9.8 Ac (83%)	32 ERUs based on floor area (100%)
Projected Population:	0 Persons	
Projected Employment:	255 Equivalent Full Time Jobs	
Deseret Industries:	220 Equivalent Full Time Jobs (includes Employment Center)	
Bishop's Storehouse:	35 Equivalent Full Time Jobs	

DEVELOPMENT STANDARDS AND LOTTING MAP

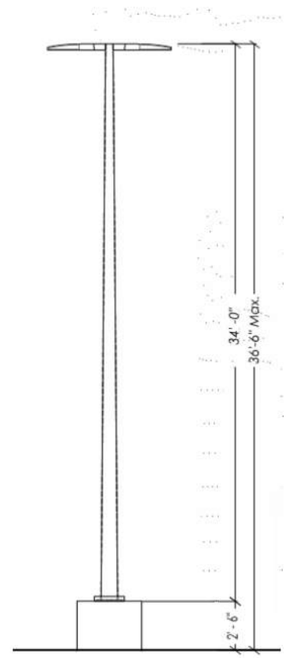
The Saratoga Springs UT Welfare Complex is the only use within this proposed area. Development standards will adhere to the City Code (RC Zone) and the latest approved version of the Standards and Specifications if not specified in the CP/VP.

LAND USE MAP



Fencing. There is only one type of fencing anticipated for the site. The fencing type is as follows:

- **6-Foot SimTek Fence.** This fence type will typically follow the rear exterior property lines on the north side of the Village. An authentic stone texture or material pattern is anticipated to contain and restrict access and viewership to the non-public areas and help the anticipated uses for the site to function uninhibited. Pattern and material may vary and to be approved by City Staff during the site plan approval process.
- **Trash Enclosure.** The proposed trash enclosure will follow Title 19 of the City Code.



Lighting. Section 19.11 Lighting shall govern with the exception that parking lot light poles may include fixtures of the type and design shown in below. Parking light poles of 36-feet 6-inches in height are permitted provided such lighting poles are bronze in color and designed to blend into existing backgrounds. Additional building accent and security lighting may be provided on the building not to exceed 16-feet in height. Lighting along public roads will be maintained by the City (Redwood Road) and shall be per City standard details and specifications. All exterior lighting shall comply with the City of Saratoga Springs Dark Sky ordinance/requirements.

MAINTENANCE PLAN

All the proposed open space or landscaping improvements as discussed above will be owned and maintained by The Church of Jesus Christ of Latter-day Saints. The planter strips within a public right-of-way along each property boundary will be owned by the City or UDOT but maintained by The Church of Jesus Christ of Latter-day Saints.

PHASING PLAN

All improvements for the proposed Village Plan will be completed in a single construction phase.

HOMEOWNERS ASSOCIATION

No homeowners association is anticipated for the project with all open space and amenities in and around the proposed Village Plan to be owned and maintained by The Church of Jesus Christ of Latter-day Saints.

GUIDING PRINCIPLES

The guiding principles for the proposed Saratoga Springs UT Welfare Complex will stay consistent with similar uses provided by the Church of Jesus Christ of Latter-day Saints within Saratoga Springs. It is the Church's goal to integrate with the local surroundings and keep in harmony with the standards set forth by the City of Saratoga Springs. The following provides the guiding principles anticipated for the project:

- **Establishment of Standards.** Architectural design of the building will be similar to what is shown in the rendering shown in Appendix F with final design to be reviewed at site plan approval. No Covenants, Conditions and Restrictions (CC&Rs) are anticipated for the project.
- **United Theme.** It is the desire of the Church of Jesus Christ of Latter-day Saints to keep consistent with similar uses within Saratoga Springs. Any and all street signage and monumentation will keep consistent with similar uses within the City. See the example previously provided. Colors and dimensions may vary with final design.
- **Minimize Impacts.** A variety of techniques have been incorporated within proposed Saratoga Springs UT Welfare Complex to decrease the impacts on the surrounding area and adjacent neighbors to the project. This is accomplished through project orientation and transportation corridors.
    - **Project Orientation.** The front of the Deseret Industries and Bishop's Storehouse are oriented to the south facing Medical Drive. A shared access point will be placed between the two buildings onto Medical Drive.
    - **Transportation Corridors.** Primary access to the Saratoga Springs UT Welfare Complex will be from Medical Drive with a single primary access and two secondary access points. Medical Drive and Redwood Road (State Route 68) is planned to be a controlled access point or traffic light. An additional secondary access point is planned on the northeast end of the project on to Redwood Road (State Route 68).
- **Community Plan Character.** Properly designed and placed landscaping can create a sense of character similar to other uses within the City. The conceptual landscape plan in Appendix B provides an example of the anticipated landscaping for the proposed Saratoga Springs UT Welfare Complex. Landscaping within the planter strips of the City right-of-way will adhere to City Standards and Specifications. Interior landscaping exhibits are conceptual by nature but show the general placement of trees, shrubs and other vegetation.

UTILITY CAPACITIES

The location of the proposed Village Plan has utilities located within two of the existing rights-of-way: Redwood Road (State Route 68 and Medical Drive. The existing utilities within these two-existing rights-of-way will serve as the backbone infrastructure for the culinary water, secondary water, storm drain and sanitary sewer. Internal line connections from one right-of-ways to the other will provide the necessary looping and sizing required to service the proposed uses within Village Plan. The following addresses each of the different utilities and any specific requirements for each:

CULINARY WATER

There is an existing 12-inch culinary water main located within Medical Drive that loops from Redwood Road to other adjacent projects in the area. The proposed Village Plan will fall entirely within the Zone 1 water zone. An additional loop will be created by extending an 8-inch culinary water main interior to the project to serve the necessary fire line and fire hydrants required on-site. The interior loop is not anticipated to connect with the existing culinary infrastructure within Redwood Road due to traffic and utility locations in this area.

Fire Flow Requirements

A fire flow test has not been conducted in the area but could be completed following the completion of the roadway and utility improvements completed by Costco. The expected fire flow available to the Saratoga Springs UT Welfare Complex is expected to be adequate with the connection and looping to the existing Zone 1 water zone in the area.

There are two proposed buildings within Village Plan which vary in size and use. Building #1 is a single-story, approximately 57,485 square foot, Type II-B structure with a fire flow requirement of 5,000-gpm as per the International Fire Code (IFC). The IFC allows for reductions to the fire flow requirement up to 75-percent when full sprinkler protection is provided. The Fire Chief for the City of Saratoga Springs requires a minimum 1,250-gpm as per City Code. Based on these criteria, a minimum flow of 1,250-gpm yields a 75-percent reduction with the proposed full sprinkler protection. It is anticipated that the 75-percent reduction will be accepted by the State Fire Marshal and local fire authority.

Building #2 is a single story, approximately 12,303 square foot, Type II-B structure with a fire flow requirement of 2,250-gpm as per the International Fire Code (IFC). The IFC allows for reductions to the fire flow requirement up to 75-percent when full sprinkler protection is provided. The Fire Chief for the City of Saratoga Springs requires a minimum 1,250-gpm as per City Code. Based on these criteria, a minimum flow of 1,250-gpm yields a 44-percent reduction with the proposed full sprinkler protection. It is anticipated that the 44-percent reduction will be accepted by the State Fire Marshal and local fire authority.

Water Demands

Based on estimations for the proposed uses, the following provides a breakdown of the anticipated plumbing fixtures within the proposed Village Plan. The plumbing fixture requirements were based on the International Building Code (IBC) 2015, Section 2902.1. The following provides a summary of the anticipated uses:

Type	Fixtures Provided	wsfu per Fixture	Total wsfu
Lavatories	15	2.0	30.0
Water Closet	16	10.0	160.0
Urinal	5	5.0	25.0
Drinking Fountains	12	0.25	3.0
Laundry Unit	3	4.0	12.0
Service Sinks	10	3.0	30.0
Total Fixtures	**61**		**260**

A total of **260.0 wsfu** is equivalent to **6.5 Equivalent Residential Connections (ERCs)** (260.0/40) as per the Saratoga Springs Drinking Water Impact Fee Plan, Section 2.4, Existing Equivalent Residential Connections.

The anticipated demand for the proposed Village Plan is approximately 61 fixtures. The architectural plans provide more specific detail to the types of fixtures that can be reviewed and compared to the standards set in the International Plumbing Code (IPC).

SECONDARY WATER

There is an existing 8-inch secondary water main located within Medical Drive that loops from Redwood Road to other adjacent projects in the area. The proposed Village Plan will fall entirely within the Zone 1 water zone. There will be no anticipated water loop planned interior to Village Plan. The landscaping needs for Lot 2 of the project will be served by existing secondary water laterals installed with the Costco roadway and utility improvements.

Overall Water Demand

The following design criteria was used in determining the secondary water demand for the project:

- Water Rights (WR) Required: 3.13 ac-ft/Irrigated Acre (IA) per year
- Storage Required: 9,216 gal/IA
- Peak Day Demand: 7.5 gpm/IA

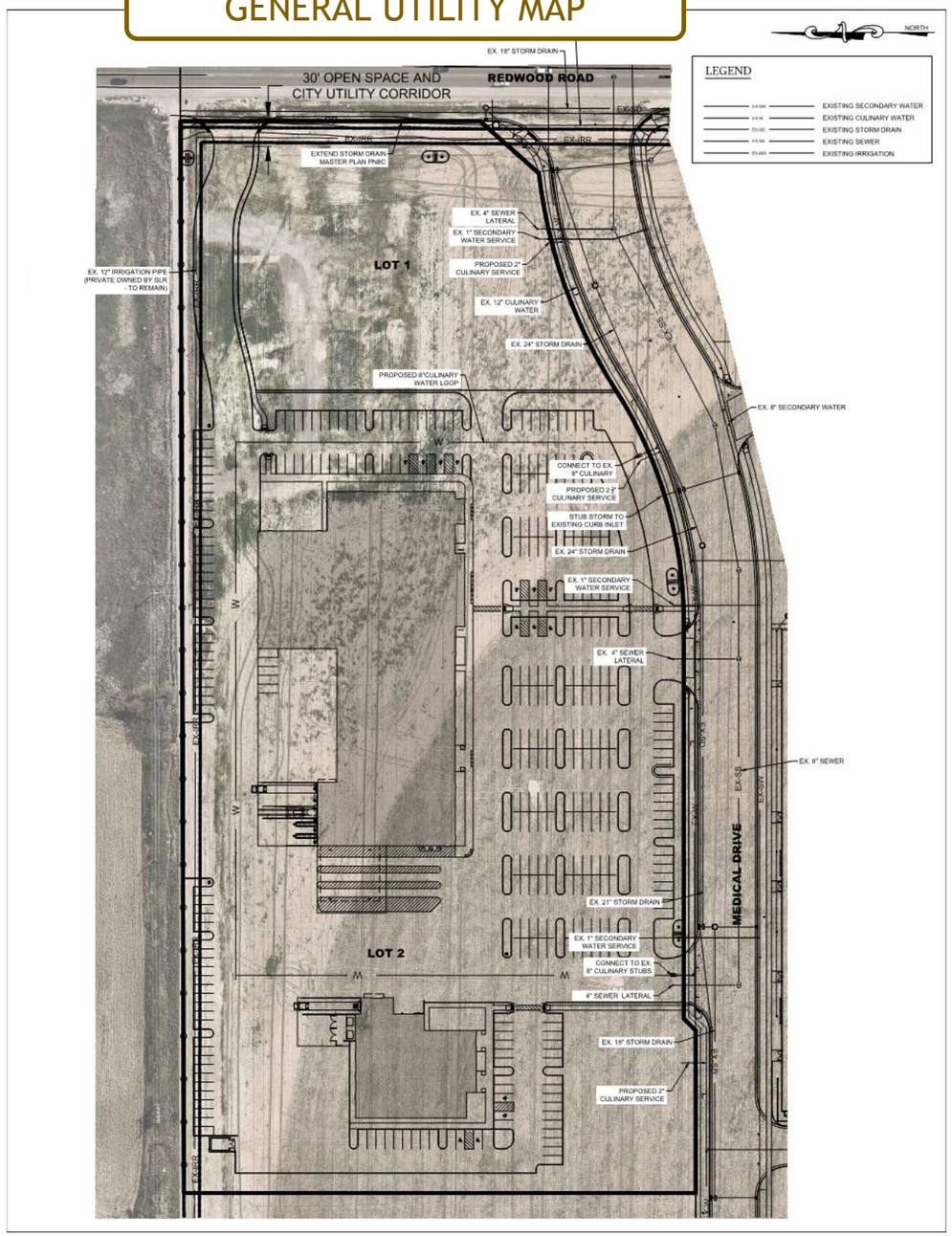
The overall secondary water demand for source and storage is as follows:

Type of Use	Irrigated Area (acres)	Water Right Req'd (ac-ft/IA)	Total Water Right Req'd (ac-ft)	Storage Req'd (gal/IA)	Total Storage (gal)
Regional Retail	1.90	3.13	5.95	9,216	17,510

SANITARY SEWER

There is an existing 8-inch sanitary sewer main located within Medical Drive that will collect the sanitary sewer waste for Building #1 and Building #2 of the Saratoga Springs UT Welfare Complex. Necessary sanitary sewer infrastructure and service laterals will be installed as per City Standards.

GENERAL UTILITY MAP



STORM DRAIN

A preliminary storm drain study in the Appendix C – Storm Drain Analysis was completed for the proposed Saratoga Springs UT Welfare Project and follows the design requirements provided within the Market Street Storm Drain Capacity Analysis dated May 3, 2019. The proposed uses within the site have been evaluated on a preliminary basis to determine the best methodology to discharge from the site with little impact to the downstream system. The following provides a summary of the findings with the full report:

- All storm water runoff from the site will be collected using curb inlets or similar devices at various points within the project. The runoff will then be conveyed using pipes to the southeast corner of the project to a discharge point or pipe installed with Costco roadway and utility improvements.
- A total of 1.30 cfs will be discharged during a 100-year storm event which coincides with the allowed discharge specified in the Market Street Storm Drain Capacity Analysis. All downstream pipes have been sized to accept this stormwater discharge along with runoff from the surrounding area.
- The storm drain design is based on the latest Market Street Storm Drain Capacity Analysis for the overall development area.

OFFSITE UTILITIES

There are no offsite utilities required with the improvement of the proposed Saratoga Springs UT Welfare Complex. Each of the utilities discussed above are adjacent to the property as depicted in the General Utility Map.

POWER

All primary power infrastructure improvements within the right-of-way will be installed and buried with the subdivision improvements. All secondary power infrastructure to the site and buildings will be placed underground in conduit or boxes.

TRANSPORTATION

The following addresses various elements related to the transportation design and service to the proposed Saratoga Springs UT Welfare Complex and is in harmony with the City's Transportation Master Plan. This includes design parameters for proposed roadways and cross sections as it is applicable to the site.

VEHICULAR AND PEDESTRIAN PLAN

Transportation and pedestrian access in and around Saratoga Springs UT Welfare Complex is a key element for the Church of Jesus Christ of Latter-day Saints and the proposed uses on the site. Transportation access points to the site are planned at three different locations to two different existing right-of-ways adjacent to the site: two on the south and one on the east. These various access points have been strategically placed to spread the flow of traffic rather than concentrating at one or two points of access. The access from Redwood Road (SR-68) will require a Utah Department of Transportation (UDOT) permit and final alignment will be determined during the UDOT approval process. The existing Medical Drive is planned as a 77-foot collector class transportation corridor. Redwood Road will follow the City's standard 180-foot right-of-way with access limited and controlled by the UDOT.

Pedestrian access to the site will be provided with connections to the adjacent City right-of-ways. Each use will connect to the existing five-foot sidewalk installed with Medical Drive and convey foot traffic to the proposed 10-foot trail running parallel to Redwood Road within the City 30-foot pedestrian and utility easement.

ROADWAY SECTIONS

There are no proposed changes to the existing roadway sections adjacent to the project.

FIRE DEPARTMENT ACCESS

There are no proposed modifications to the City Standards and Specifications as it relates to the fire department accesses. The internal traffic circulation of the site will be addressed at the time of site plan approval with City Staff.

ROAD NAME AND ADDRESSING

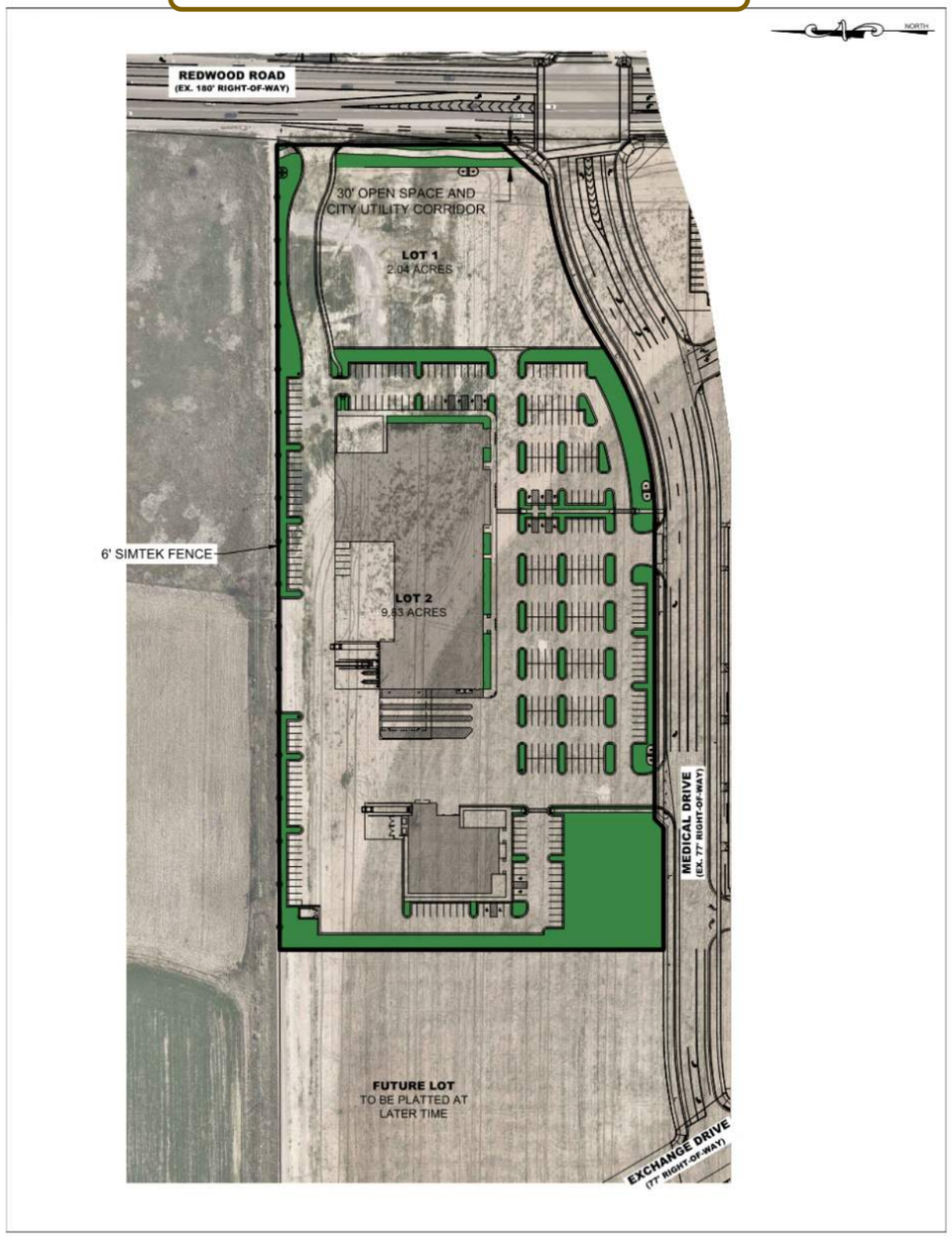
As shown on the exhibit to the right, the main roadways have been named. The existing roadways around Saratoga Springs UT Welfare Complex will remain the same as dedicated with Costco's roadway improvements: Medical Drive (south) and Redwood Road (west). No other additional roadways are planned internally to the property.

OFF-STREET PARKING

The anticipated parking layout and final quantity will meet the requirements of Title 19 in the City Code. A breakdown of the required parking has been provided below based on the conceptual floor plans provided later in this Village Plan. Although floor plans may vary, approximately 197 parking stalls are required with 334 parking stalls provided. The appropriate number of accessible stalls will be provided as required by the International Building Code (IBC) and the Americans with Disabilities Act (ADA). The final layout, quantity and placement of these stalls will be reviewed at the site plan submittal to the City.

Type	Area (sf)	Parking Requirement	Required Parking
Deseret Industries			
Office	13,200	4 stalls per 1000 sf	53
Retail	24,700	4 stalls per 1000 sf	99
Warehouse	19,900	1 stall per 1000 sf	20
Bishop's Storehouse			
Office	3,800	4 stalls per 1000 sf	16
Warehouse	8,700	1 stall per 1000 sf	9
Total			**197**

TRANSPORTATION PLAN

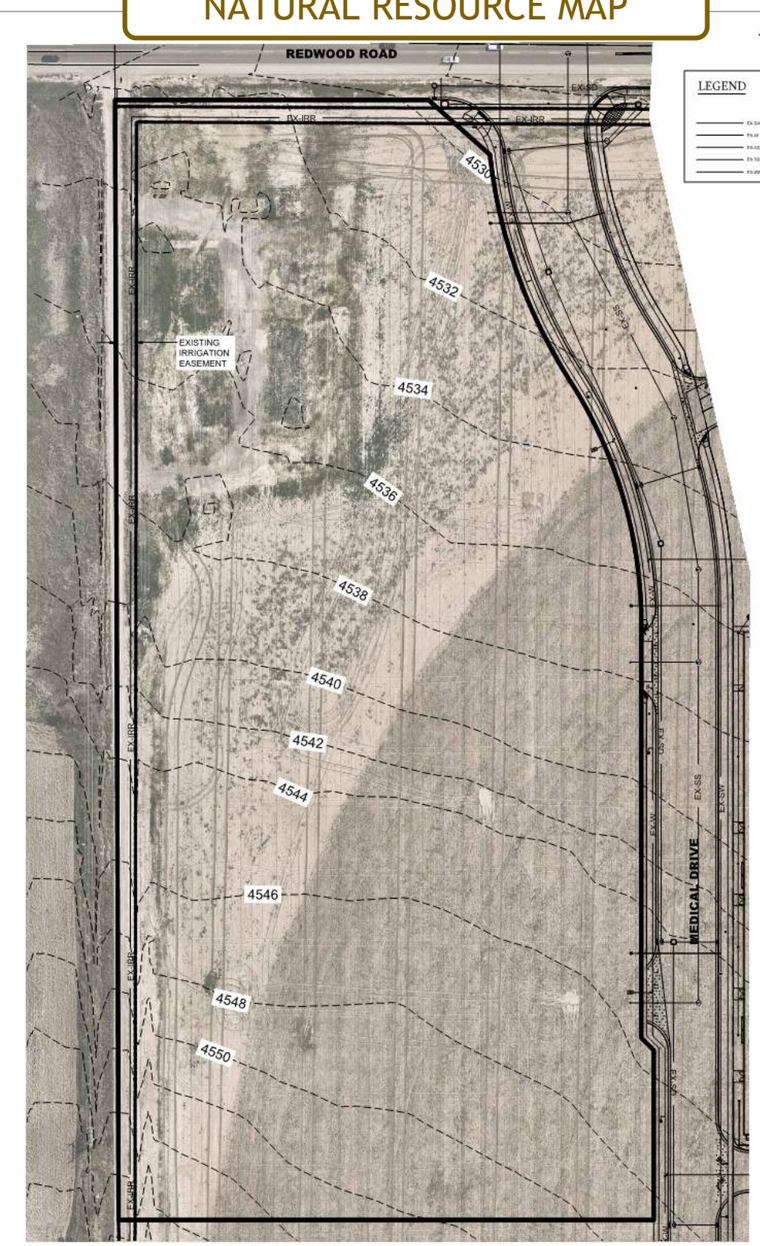


ADDITIONAL ELEMENTS

The Natural Resource Inventory Map contains information regarding specific site elements such as:

- **Waterways.** There are no existing waterways traversing the site.
- **Geological Information.** Geological information has been obtained from Utah County Hazards Mapping as published by Utah County Public Works Department, in coordination with USGS, MAG and other applicable agencies:
  - This area of the project falls within a low to moderate potential for liquefaction.
  - No flood hazards have been identified. The project area is within flood zone "X" according to FIRM map 4955170115B, dated 17 July, 2002.
  - No landslides hazards have been identified in the project site.
  - No rock fall hazards have been identified in the project site.
  - No wildfire hazards have been identified in the project site.
  - No dam failure risks have been identified in the project site.
  - No avalanche hazards have been identified in the project site.
- **Fault Lines.** According to Utah County Hazards Mapping as published by Utah County Public Works Department, no fault lines or fault ruptures are identified within the project.
- **General Soils Data.** A geotechnical investigation has been conducted on the development. A copy of the investigation results has been included in Appendix D. Excerpts from the investigation include:
  - Based on our observations, native soils consisted of Lean CLAY (CL), Silty SAND (SM), and Poorly Graded GRAVEL with silt (GP-GM).
  - The site is covered by approximately 12 to 24 of inches of topsoil, which will need to be removed before constructing footings.
  - Groundwater was not encountered in any of the Test Pits. The CPT explorations encountered groundwater at a depth of approximately 29 to 43 feet below existing grade.
  - Based on our liquefaction analysis up to ¼ inch of liquefaction induced settlement could occur during a seismic event. This estimate is a cumulative sum of numerous small layers, most of which are 4 to 6 inches or less in thickness. It is our judgment that liquefaction should not impact the proposed development at the site.
  - Footings should be established entirely on competent native soils or on a zone of structural fill extending to competent native soils a minimum of 6 feet below existing grade. All footings or structural fill placed beneath footings should extend a minimum of 6 feet below existing grade to get below the collapsible soils. Footings established in this manner may be designed using an allowable bearing capacity of **1,500 psf** or if placed on a zone of structural fill having a minimum thickness of 24 inches the bearing capacity may be increased to **2,000 psf** (see section 6.3). Due to the variable nature of the subsurface soil conditions, IGES should observe all foundation excavations prior to placing concrete. To reduce the potential for excessive differential settlement, transition zones between fill and native soil are not recommended.
  - Flexible (asphalt) and rigid (concrete) pavement sections have been prepared for parking lot, drives and heavy traffic areas. These pavement section designs have been completed for a 40-yr life expectancy and are summarized in Section 6.7 of this report.
  - Active, at-rest and passive lateral earth pressure coefficients of 0.30, 0.50 and 3.0 respectively and seismic active lateral earth pressure coefficient of0.75.

NATURAL RESOURCE MAP



- Concrete slabs-on-grade should be constructed over at least 4 inches of compacted gravel overlying native soils or a zone of structural fill that is at least12 inches thick. The slab may be designed with a modulus of subgrade reaction of **120 psi/inch**.

- **Slopes.** There are no slopes in the project greater than 30-percent.
- **Statement of Findings.** A statement regarding the findings of this submittal can be found in the Findings section towards the end of the document.
- **Environmental Issues.**
  - **Wetlands.** No wetlands are sources of surface or shallow groundwater have been identified in the project site.
  - **Historical Sites.** No historical sites have been identified in the project site.
  - **Existing Trees.** No existing trees are present on the site.
    - **Traffic Study.** A full traffic study has been included within Appendix E of the Community Plan.
- **Compliance Issues.**
  - **Architectural Standards.** Architectural design of the building will be similar to what is shown in the rendering and typical elevations found in Appendix F.
  - **Common Area Maintenance.** No common area maintenance is anticipated for this project.

CONCEPTUAL PLANS

A. **Wildlife Mitigation Plans**. The United States Fish and Wildlife Service has been contacted to determine whether there are any endangered species or wildlife that needs to be mitigated at this time. The Division responded and do not have any concerns due to the current agricultural use of the land.

B. **Open Space Management Plans.** All the proposed open space as discussed above will be owned and maintained by the Church of Jesus Christ of Latter-day Saints including the 30-foot landscape and utility easement/buffer along Redwood Road. The planter islands within the City right-of-way along each property boundary will be owned by the City but maintained by the Church of Jesus Christ of Latter-day Saints. This includes the frontage along State Route 68 (Redwood Road) outside of the 30-foot landscape and utility easement/buffer.

C. **Hazardous Material Remediation Plans.** No hazardous materials have been identified within the site. Should any hazardous materials be identified through further geotechnical investigation or site observation, acceptable mitigation must be completed prior to development.

DESIGN GUIDELINES

The following evaluates various design guideline items as required within the Community and Village Plan requirements:

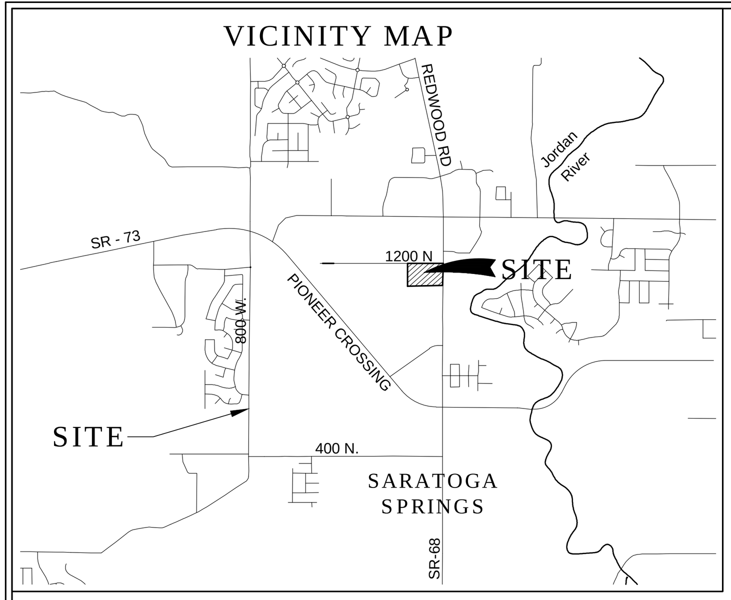
- **Architectural Standards.** There are a total of two different buildings anticipated within Saratoga Springs UT Welfare Complex. Each of the buildings will be described below with the general architectural standards anticipated with each use. Each building will be constructed of high-quality materials and have high quality architectural design. Final design and materials will be determined at the building permit phase and approved by City Staff. The grounds around these buildings will be beautifully landscaped with trees, shrubs, flowers and grasses.
    - **Building #1.** This building shall be the Bishop's Storehouse for the Church of Jesus Christ of Latter-day Saints and will be comprised of a single floor above grade. Architectural design of the building will be similar to what is shown in the previous rendering with final design to be reviewed at site plan approval.
    - **Building #2.** This building shall be a single-story Deseret Industries for the Church of Jesus Christ of Latter-day Saints. Architectural design of the building will be similar to what is shown in the previous rendering with final design to be reviewed at site plan approval.
- **Floor Area Ratios –** The approximate anticipated building footprints on a 9.83-acre site (Lot 2) produces an FAR of 0.20 maximum.

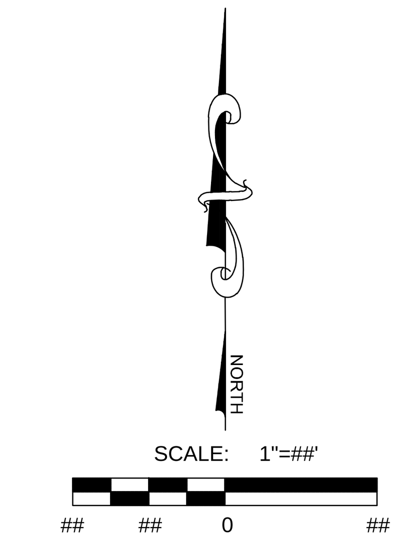
FINDINGS

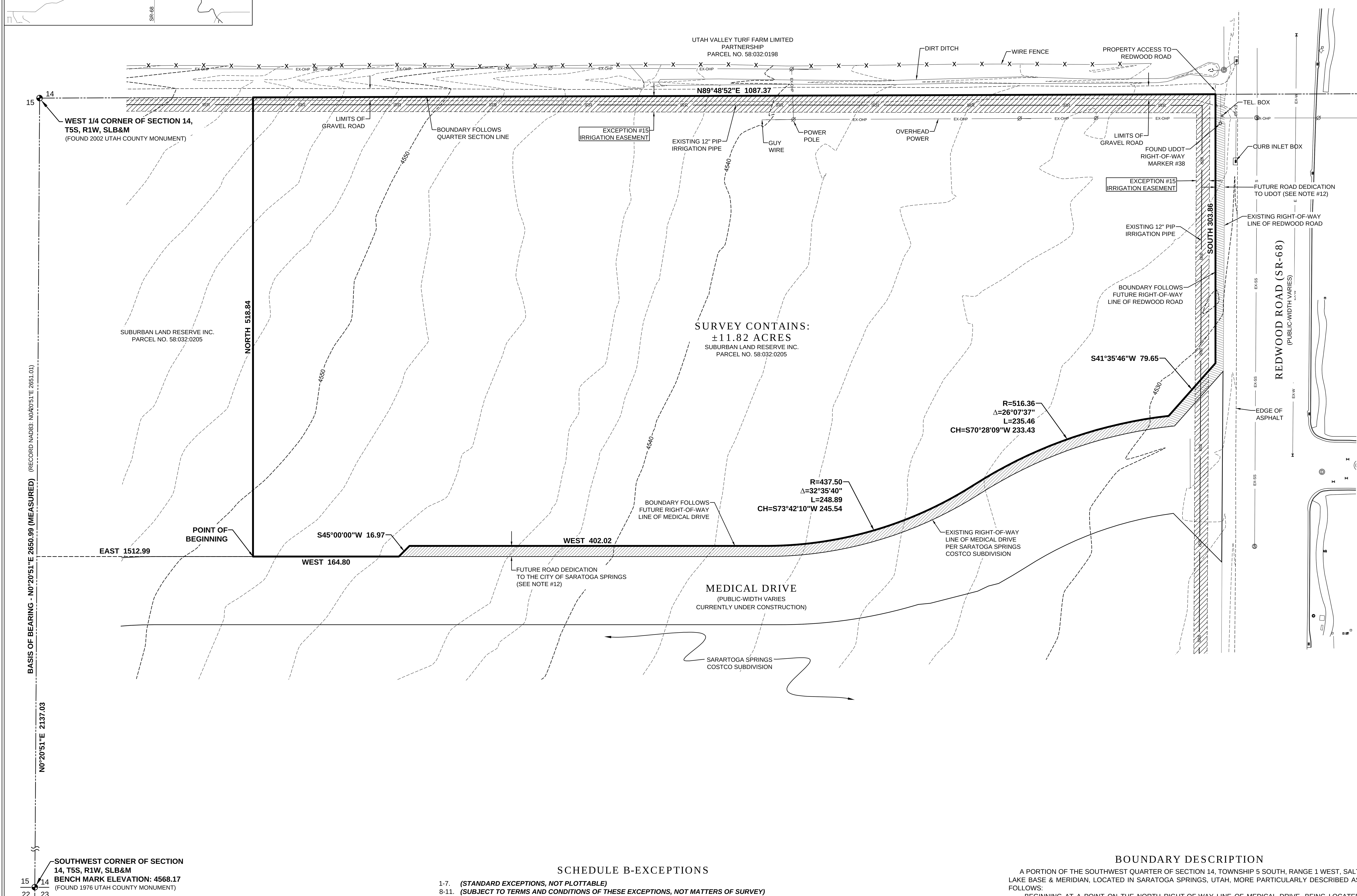
The proposed Saratoga Springs UT Welfare Complex is consistent with the goals, objectives and policies outlined within the District Area Plan (DAP) for Saratoga Springs. The project will provide irreplaceable value and honor to the surrounding area with the services provided to the local community. The Church of Jesus Christ of Latter-day Saints will do all they can to provide the civic service to the region and see this proposed Welfare Complex as a worthy extension and symbol for those values within the City of Saratoga Springs.

APPENDIX A – ALTA SURVEY

ALTA/NSPS LAND TITLE SURVEY







NOTES

1. The purpose of this survey is to provide an ALTA/ACSM Land Title Survey of the area shown hereon for the clients own intents and purposes.
2. The Basis of Bearing for this survey is N0Á20'51"E along the Section Line from the Southwest Corner to the West 1/4 Corner of Section 14, Township 5 South, Range 1 West, Salt Lake Base and Meridian. Deeds and plats of record have been rotated to the above mentioned basis of bearing.
3. This survey does not guarantee, grant, transfer or imply fee title ownership of any portion of this property in whole or part to any party or persons. This survey makes reference to owners names, documents and deed lines which are depicted hereon to the best of the surveyor's ability, however all information shown hereon should be verified by county records, title companies and other qualified professionals to meet the specific purposes and intents of the client. Furthermore, the filing of this survey with the respective county in which the property is situated does not serve as an instrument to subdivide, transfer, sell, or trade any portion of the property shown hereon. It is recommended that a qualified title company and/or other qualified professionals be contacted to address any and all questions regarding property ownership, title and the transfer of real property.
4. A title report prepared by Bartlett Title Insurance Agency, Inc., Commitment No. BT-17594 2ND Amended, Effective Date: April 10, 2020 was used in the preparation of this survey and LEI Consulting Engineers and Surveyors, Inc. is entitled to rely on the accuracy of those reports, and is not liable for errors and omissions based on the reliance of said title reports. All easements and title exceptions shown hereon are referenced from said report.
5. The benchmark for the topographic information provided hereon is the found 1976 Utah County Monument at the Southwest Corner of said Section 14, with an elevation of 4,568.17 feet. Contours are shown hereon at one (1) foot intervals.
6. This drawing, its design, and invention thereof, is the property of LEI Consulting Engineers and Surveyors, Inc. and is submitted to, and is for the exclusive use of, the client referenced on the Survey. Only copies authorized in writing and individually signed and sealed by the Surveyor may be used as the official work of the Surveyor. This drawing and any copy thereof may not be relied upon for any purpose, by any party, except as stated in the agreement between LEI Consulting Engineers and Surveyors, Inc., and its client.
7. This drawing and any copy thereof, may also not be relied upon for any purpose under any of the following conditions:
   A. Original and any copies not individually signed and sealed by Surveyor.
   B. Dependent monuments and data set, or published, by others and used by the Surveyor are subsequently found to be in error.
   C. Improvements shown have been altered, changed, or added to, subsequent to the Survey.
8. Except as specifically stated or shown on this plan, this survey does not purport to reflect any of the following which may be applicable to the properties shown hereon: easements, encumbrances, building setback lines, restrictive covenants, subdivision restrictions, zoning or other land use restrictions and any other facts that an accurate and current title search may disclose. Regarding any issues not specifically stated or shown on the survey, client is advised to seek the services of a competent title company.
9. Underground utilities have been shown hereon based on observed evidence. Additional underground utilities including but not limited to: power, phone, cable TV, water, sewer and sprinkler lines may exist within the boundaries of this survey and blue stakes should be contacted prior to digging or in order to add the locations of such utilities to this survey. Engineers, contractors, and others that rely on this information should be cautioned that the locations, elevations, and pipe sizes of the existing utilities may not to be relied on as being exact or complete. Additional exploration, verification and relocation of existing utilities will be the sole responsibility of the contractor prior to or during construction of any additional improvements.
10. #5 rebar and cap have been set at all lot corners unless noted otherwise.
11. This property is within Flood Zone "X" according to the Flood Insurance Rate Map Panel No. 4955170115 B, Effective Date: July 17, 2002.
12. There is additional right-of-way dedication that will be required along Medical Drive and Redwood road for the development of these roadways. The subject property boundary follows the future right-of-way lines of Medical Drive and Redwood Road after the above stated dedication occurs. This additional road dedication was determined from legal descriptions provided by Sunrise Engineering in conjunction with the development of the Costco site south of Medical Drive. No additional widening and/or street dedication is know at the time of this survey.
13. There are no buildings located on this property.
14. The address listed on the title report for this property is 34 West Market Street. However, this does not appear to be the actual address of the property since it is not located on Market Street. The Utah County Recorder does not show a physical address for this parcel.
15. Medical Drive is currently under construction. No additional earth moving or building construction was observed.
16. A wetland delineation was not provide as part of the preparation of this survey.

SCHEDULE B-EXCEPTIONS

1-7. ***(STANDARD EXCEPTIONS, NOT PLOTTABLE)***
8-11. ***(SUBJECT TO TERMS AND CONDITIONS OF THESE EXCEPTIONS, NOT MATTERS OF SURVEY)***
12. Grant of Right-of-Way and the terms, conditions and limitations contained therein, in favor of Knight Power Company, a corporation, recorded December 07, 1911 aSs Entry No. 4852 in Book 128 at Page 155 of Official Records.
(BLANKET EASEMENT AND RIGHT-OF-WAY OVER A PORTION OF THE PROPERTY FOR POWER TRANSMISSION LINES AS SHOWN ON SHEET #2. EXISTING POWER LINES HAVE BEEN SHOWN HEREON)
13. Declaration of Irrigation and Access Easement executed by Suburban Land Reserve, Inc., a Utah corporation, recorded October 16, 2019, as Entry No. 106287:2019 of official records.
(IRRIGATION EASEMENT IS SHOWN HEREON)

BOUNDARY DESCRIPTION

A PORTION OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 5 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN, LOCATED IN SARATOGA SPRINGS, UTAH, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH RIGHT-OF-WAY LINE OF MEDICAL DRIVE, BEING LOCATED N0Á20'51"E ALONG THE SECTION LINE 2137.03 FEET AND EAST 1512.99 FEET FROM THE SOUTHWEST CORNER OF SECTION 14, TOWNSHIP 5 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN; THENCE NORTH 518.84 FEET TO THE QUARTER SECTION LINE; THENCE N89Á48'52"E ALONG THE QUARTER SECTION LINE 1087.37 FEET; THENCE SOUTH 303.86 FEET; THENCE S41Á35'46"W 79.65 FEET; THENCE SOUTHWESTERLY ALONG THE ARC OF A 516.36 FOOT RADIUS NON-TANGENT CURVE TO THE LEFT (RADIUS BEARS: S6Á28"05"E) 235.46 FEET THROUGH A CENTRAL ANGLE OF 26Á07'37" (CHORD: S70Á28'09"W 233.43 FEET); THENCE ALONG THE ARC OF A 437.50 FOOT RADIUS CURVE TO THE RIGHT 248.89 FEET THROUGH A CENTRAL ANGLE OF 32Á35'40" (CHORD: S73Á42'10"W 245.54 FEET); THENCE WEST 402.02 FEET; THENCE S45Á00'00"W 16.97 FEET TO THE NORTH RIGHT-OF-WAY LINE OF MEDICAL DRIVE; THENCE WEST ALONG SAID RIGHT-OF-WAY LINE 164.80 FEET TO THE POINT OF BEGINNING.

CONTAINS: Ñ11.82 ACRES
Ñ514,686 SQ. FT.

SURVEYOR'S CERTIFICATE

To: SUBURBAN LAND RESERVE, INC., THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS, and BARTLETT TITLE INSURANCE AGENCY, INC., and their respective successors and assigns, as follows:

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2016 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes items 1, 2, 3, 4, 5, 7(a), 7(b)(1), 13, 16, 17 and 18 of Table A thereof. The field work was completed on March 1, 2019.

Chad A. Poulsen, PLS

May 14, 2020
Date

STATE OF UTAH
CHAD A. POULSEN
No. 501182
PROFESSIONAL LAND SURVEYOR
5/14/2020

LEI
- A Utah Corporation -
ENGINEERS
SURVEYORS
PLANNERS
3302 N. Main Street
Spanish Fork, UT 84660
Phone: 801.798.0555
Fax: 801.798.9393
office@lei-eng.com
www.lei-eng.com

ALTA/NSPS LAND TITLE SURVEY
LOCATION: SW 1/4 SECTION 14, T5S, R1W, SLB&M, SARATOGA SPRINGS, UTAH

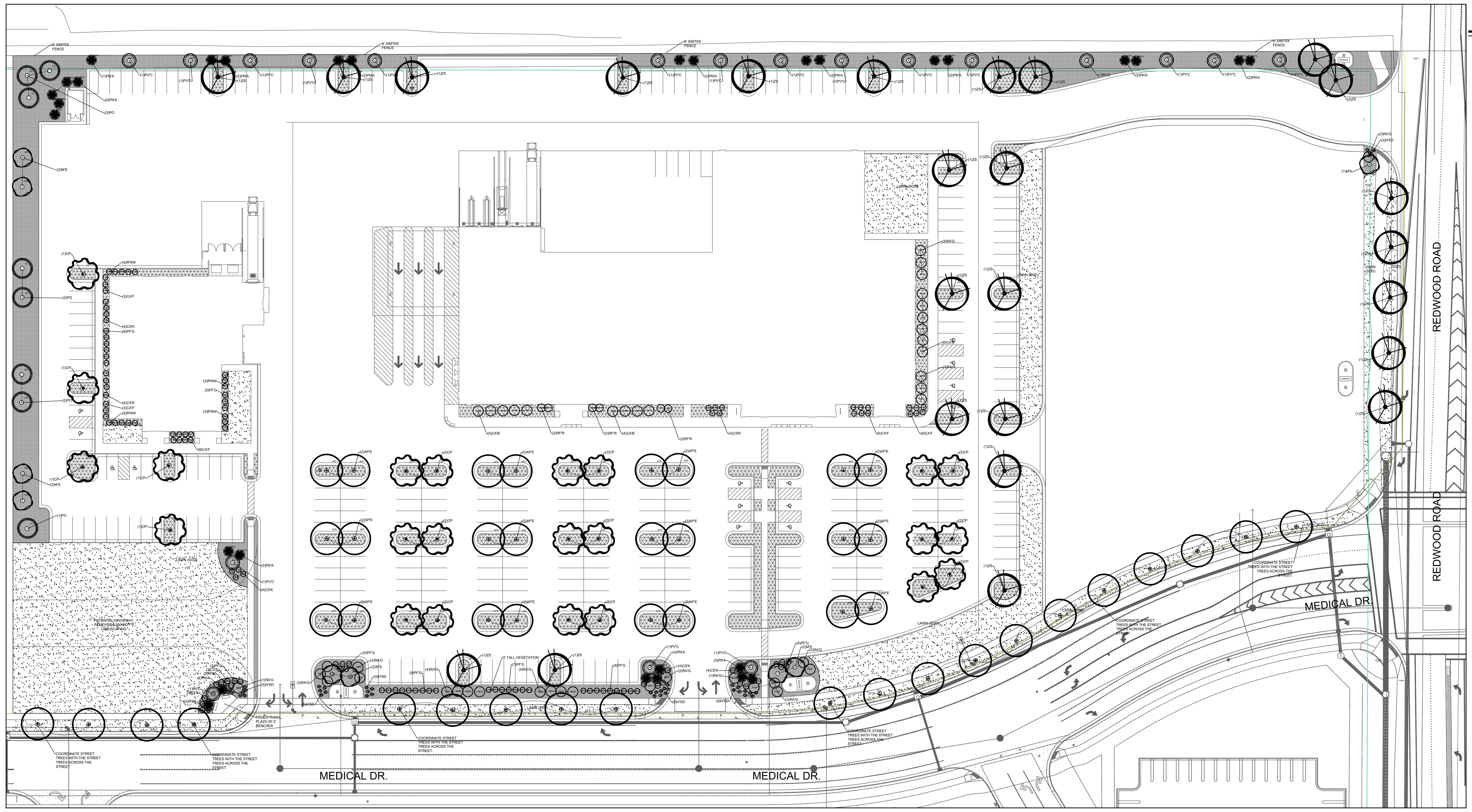
PREPARED FOR: JWR & ASSOCIATES
PROPERTY OF: SUBURBAN LAND RESERVE INC.

REVISIONS
1 -
2 -
3 -
4 -
5 -

LEI PROJECT #:	2019-0012
DRAWN BY:	CAP
DESIGNED BY:	CAP
SCALE:	1"=##'
DATE:	05/14/2020
SHEET	1

U:\0_LEI PROJECTS\2019\2019-0012 DI STOREHOUSE BLDG SITES - SS\CAD\19-0012 DI STOREHOUSE ALTA SURVEY.DWG 5/13/2020 1:45 PM

APPENDIX B – LANDSCAPE PLANS



SITE CALCULATIONS

TOTAL SITE W/ FUTURE RETAIL LOT: 529,303 SQ FT

TOTAL SITE WITHOUT FUTURE RETAIL LOT: 446,860 SQ FT

TOTAL LANDSCAPE AREA: 98,643 SQ FT (22%)

WITHOUT DRIVE AISLE ON THE SOUTHWEST: 90,643 SQ FT. (20%)

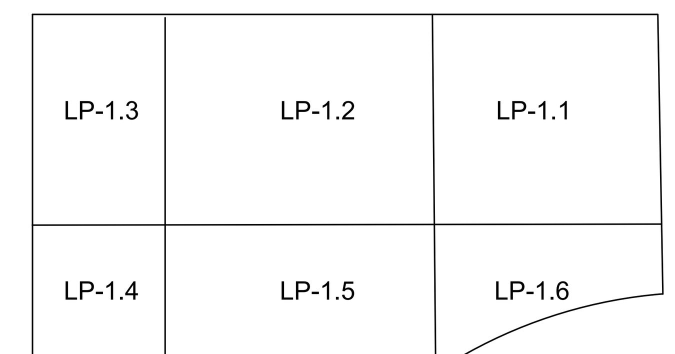
	REQUIRED:	PROVIDED:
SITE TREES:		
DECIDUOUS	**39**	**39**
EVERGREEN	**37**	**37**
SHRUBS	**57**	**139 -5 GAL**
		PARKING BUFFER 35
STREET TREES:		
MEDICAL DR.	**17**	**17**
REDWOOD RD.	**6**	**6**
PARKING ISLAND TREES	**69**	**69**
	TOTAL	**146**

3' CIRCLE UNDER TREES

50% DROUGHT TOLERANT

MINIMUM TWO COLORS OF ROCK

REFERENCE MAP



TREE LEGEND (TOTAL PLANT COUNT)

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
AP'E	ACER PLATANOIDES 'EMERALD QUEEN'	EMERALD QUEEN MAPLE	24	2" CAL.	MODERATE	
CP	CRATAEGUS PHAENOPYRUM	WASHINGTON HAWTHORN	23	2" CAL	LOW	
PO	PICEA OMORIKA	SERBIAN SPRUCE	8	6'-8' TALL	LOW	
PN'A	PINUS NIGRA 'ARNOLD SENTINEL'	ARNOLD SENTINEL AUSTRIAN BLACK PINE	30	6'-8' TALL	LOW	
M'S	MALUS X 'SPRING SNOW' CRABAPPLE	SPRING SNOW CRABAPPLE	9	2" CAL.	LOW	
PV'C	PRUNUS VIRGINIANA 'CANADA RED'	CANADA RED CHOKECHERRY	19	2" CAL.	LOW	
ZS	ZELKOVA SERRATA	JAPANESE ZELKOVA	25	2" CAL.	LOW	
	STREET TREES MATCHING TREES ACROSS THE STREET		20	2" CAL.	LOW	

SHRUB LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'B	BUDDLEIA ALTERNIFOLIA	BUTTERFLY BUSH	15	5 GAL	LOW	
PF'G	POTENTILLA FRUITICOSA 'GOLDFINGER'	GOLDFINGER POTENTILLA	47	5 GAL	LOW	
CS'K	CORNUS SERICEA 'KELSEYI'	KELSEYI DOGWOOD	31	5 GAL	MODERATE	
R'NW	ROSA X 'NEARLY WILD'	NEARLY WILD ROSE	16	5 GAL	HIGH	
RF'R	RHAMNUS FRANGULA 'TALL HEDGE'	TALL HEDGE BUCKTHORN	6	5 GAL	HIGH	
RA'G	RHUS AROMATICA 'AUTUMN AMBER'	AUTUMN AMBER SUMAC	29	5 GAL	HIGH	

GRASSES LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'F	CALAMAGROSTIS A. 'FOERSTER'	FOERSTER FEATHER GRASS	26	2 GAL	HIGH	

PERENNIAL LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
H'SD	HEMEROCALLIS SP. 'STELLA DE ORO'	STELLA DE ORO DAYLILY	42	1 GAL.	MODERATE	

SITE MATERIALS

SYMBOL	SITE MATERIAL	QUANTITY	SPECIAL NOTES
	LAWN (SOD) AREA	50,591 SQ.FT.	DROUGHT TOLERANT VARIETY *SEE NOTE BELOW
	1"-2" OCTOBER SKY GRAVEL (DeWitt 5 OZ. WEED BARRIER FABRIC TO BE INSTALLED IN ALL PLANTER AREAS)	18,606 SQ.FT. (172.2 CU.YD)	LOCATED WHERE SPECIFIED
	1" OQUIRRH GRAVEL (DEWITT 5 OZ. WEED BARRIER FABRIC TO BE INSTALLED IN ALL PLANTER AREAS)	27,966 SQ.FT. (259 CU.YD)	LOCATED WHERE SPECIFIED

LANDSCAPE PLAN SPECIFICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes landscape procedures for the Project including all labor, materials, and installation necessary, but not limited to, the following:

1. Soil Amendments
2. Fine Grading
3. Cultivation
4. Landscape Edging
5. Turf Planting
6. Furnish and Installing Plant
7. Maintenance
8. Mowing
9. Weeding

1.2 SITE CONDITIONS

A. Examination: Before submitting a Bid, each Contractor shall carefully examine the Contract Documents; shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the Bid the cost of all items required by the Contract Documents are at a variance with the applicable laws, building codes, rules, regulations, or contain obvious erroneous or uncoordinated information, the Contractor shall promptly notify the Project Representative and the necessary changes shall be accomplished by Addendum.

B. Protection: Contractor to conduct the Work in such a manner to protect all existing underground utilities or structures. Contractor to repair or replace any damaged utility or structure using identical materials to match existing at no expense to the Owner.

C. Irrigation System: Do not begin planting until the irrigation system is completely installed, is adjusted for full coverage and is completely operational.

1.3 PERMITS

A. Blue Stake/ Dig Line: When digging is required, "Blue Stake" or "Dig Line" the work site and identify the approximate location of all known underground utilities or structures.

1.4 PLANT DELIVERY, QUALITY, AND AVAILABILITY

A. Unauthorized substitutions will not be accepted. If proof is submitted that specific plants or plant sizes are unobtainable, written substitution requests will be considered for the nearest equivalent plant or size. All substitution requests must be made in writing and preferably before the bid due date.

1.5 FINAL INSPECTION

A. All plants will be inspected at the time of Final Inspection prior to receiving a Landscape Substantial Completion for conformance to specified planting procedures, and for general appearance and vitality. Any plant not approved by the Project Representative will be rejected and replaced immediately.

1.6 LANDSCAPE SUBSTANTIAL COMPLETION

A. A Substantial Completion Certificate will only be issued by the Project Representative for "landscape and irrigation" in their entirety. Substantial Completion will not be proportioned to be designated areas of a project.

1.7 MAINTENANCE

A. Plant Material: The Contractor is responsible to maintain all planted materials in a healthy and growing condition for 30 days after receiving a Landscape Substantial Completion at which time the Guarantee period commences. This maintenance is to include mowing, weeding, cultivating, fertilizing, monitoring water schedules, controlling insects and diseases, re-guying and staking, and all other operations of care necessary for the promotion of root growth and plant life so that all plants are in a condition satisfactory at the end of the guarantee period. The Contractor shall be held responsible for failure to monitor watering operations and shall replace any and all plant material that is lost due to improper application of water.

1.8 GUARANTEE

A. Guarantee: A guarantee period of one year shall begin from end of maintenance period and final acceptance for trees, shrubs, and ground covers. All plants shall grow and be healthy for the guarantee period and trees shall live and grow in acceptable upright position. Any plant not alive, in poor health, or in poor condition at the end of the guarantee period will be replaced immediately. Any plant will only need to be replaced once during the guarantee period. Contractor to provide documentation showing where each plant to be replaced is located. Any outside factors, such as vandalism or lack of maintenance on the part of the Owner, shall not be part of the guarantee

PART II - PRODUCTS

2.1 LANDSCAPE MATERIALS

A. Tree Staking: All trees shall be staked for one year warranty period. All trees not plumb shall be replaced. Staked trees shall use vinyl tree ties and tree stakes two (2) inch by two (2) by eight (8) foot common pine stakes used as shown on the details.

B. Tree Wrap: Tree wrap is not to be used.

C. Mulch: See Plans. All planter beds to receive a minimum 4" layer for trees, shrubs, and perennials and 1" for groundcovers.

D. Weed Barrier: DeWitt 5 oz. weed barrier fabric. Manufactured by DeWitt Company, dewittcompany.com or approved equal.

E. Tree, Shrub, and Grass Backfill Mixture; Backfill mixture to be 50% native soil and 50% topsoil, thoroughly mixed together prior to placement.

F. Topsoil: Required for turf areas, planter beds and Backfill Mixture. Acceptable topsoil shall meet the following standards:

a. PH: 5.5-7.5

b. EC (electrical conductivity): < 2.0 mmhos per centimeter

c. SAR (sodium absorption ration): < 3.0

d. % OM (percent organic matter): >1%

e. Texture (particle size per USDA soil classification): Sand <70%; Clay < 30%; Silt < 70%, Stone fragments (gravel or any soil particle greater than two (2) mm in size) < 5% by volume.

G. Turf Sod: All sod shall be 18 month old as specified on plans (or approved equal) that has been cut fresh the morning of installation. Only sod that has been grown on a commercial sod farm shall be used. Only use sod from a single source.

H. Landscape Edging: Headers and Edging six (6) inches by four (4) inches extruded concrete curb made up of the following materials:

a. Washed mortar sand free of organic material.

b. Portland Cement (see concrete spec. below for type)

c. Reinforced fiber - Specifically produced for compatibility with aggressive alkaline environment of Portland cement-based composites.

d. Only potable water for mixing.

PART III - EXECUTION

3.1 GRADING

A. Topsoil Preparation: Grade planting areas according to the grading plan. Eliminate uneven areas and low spots. Provide for proper grading and drainage.

B. Topsoil Placement: Slope surfaced away from building at two (2) percent slope with no pockets of standing water. Establish finish grades of one (1) inches for planters below grade of adjacent paved surfaced. Provide neat, smooth, and uniform finish grades. Remove surplus sub-soil and topsoil from the site.

C. Compaction: compaction under hard surface areas (asphalt paths and concrete surfaces) shall be ninety-five (95) percent. Compaction under planting areas shall be between eighty-five (85) and ninety (90) percent.

3.2 TURF GRADING

A. The surface on which the sod is to be laid shall be firm and free from footprints, depressions, or undulations of any kind. The surface shall be free of all materials larger than 1/2" in diameter.

B. The finish grade of the topsoil adjacent to all sidewalks, mow-strips, etc. prior to the laying of sod, shall be set such that the crown of the grass shall be at the same level as the adjacent concrete or hard surface. No exceptions.

3.3 PLANTING OPERATIONS

A. Review the exact locations of all trees and shrubs with the Project Representative for approval prior to the digging of any holes. Prepare all holes according to the details on the drawings.

B. Water plants immediately upon arrival at the site. Maintain in moist condition until planted.

C. Before planting, locate all underground utilities prior to digging. Do not place plants on or near utility lines.

D. The tree planting hole should be the same depth as the root ball, and three times the diameter of the root ball.

E. Trees must be placed on undisturbed soil at the bottom of the planting hole.

F. The tree hole depth shall be determined so that the tree may be set slightly high of finish grade, 1" to 2" above the base of the trunk flare, using the top of the root ball as a guide.

G. Plant immediately after removal of container for container plants.

H. Set tree on soil and remove all burlap, wire baskets, twine, wrappings, etc. before beginning and backfilling operations. Do not use planting stock if the ball is cracked or broken before or during planting operation.

I. Apply vitamin B-1 root stimulator at the rate of one (1) tablespoon per gallon.

J. Upon completion of backfilling operation, thoroughly water tree to completely settle the soil and fill any voids that may have occurred. Use a watering hose, not the area irrigation system. If additional prepared topsoil mixture needs to be added. It should be a courser mix as required to establish finish grade as indicated on the drawings.

K. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches. All cuts, scars, and bruises shall be properly treated according to the direction of the Project Representative. Proper pruning techniques shall be used. Do not leave stubs and do not cut the leader branch. Improper pruning shall be cause for rejection of the plant material.

L. Prepare a watering circle of 2' diameter around the trunk. For conifers, extend the watering well to the drip line of the tree canopy. Place mulch around the planted trees.

3.4 TURF - SOD LAYING

A. Top Soil Amendments: Prior to laying sod, commercial fertilizer shall be applied and incorporated into the upper four (4) inches of the topsoil at a rate of four pounds of nitrogen per one thousand (1,000) square feet. Adjust fertilization mixture and rate of application as needed to meet recommendations given by topsoil analysis. Include other amendments as required.

B. Fertilization: Three weeks after sod placement fertilize the turf at a rate of ½ pound of nitrogen per 1000 square feet. Use fertilizer specified above. Adjust fertilization mixture and rates to meet recommendations given by topsoil analysis.

C. Sod Availability and Condition: The Contractor shall satisfy himself as to the existing conditions prior to any construction. The Contractor shall be fully responsible for furnishing and lay all sod required on the plans. He shall furnish new sod as specified above and lay it so as too completely satisfy the intent and meaning of the plans and specification at no extra cost to the owner. In the case of plans and specification at no extra cost to the owner. In the case of any discrepancy in the amount of sod to be removed or amount to be used, it shall be the Contractor's responsibility to report such to the Project Representative prior to commencing the work.

D. Sod Laying: The surface upon which the new sod to be laid will be prepared as specified above. Areas where sod is to be laid shall be cut trimmed, or shaped to receive full width sod (minimum twelve (12) inches). No partial strip or pieces will be accepted.

E. Sod shall be tamped lightly as each piece is set to insure that good contact is made between edges and also the ground. Sod laid on any sloped areas shall be anchored with wooden dowels or other materials which are accepted by the grass sod industry.

F. Apply water directly after laying sod. Rainfall is not acceptable.

G. Watering of the sod shall be the complete responsibility of the Contractor by whatever means necessary to establish the sod in an acceptable manner to the end of the Maintenance period. If an irrigation system is in place on the site, but for whatever reason, water is not available in the system. It is the responsibility of the Contractor to water the sod by whatever means, until the sod is accepted by the Project Representative.

H. Protection of the newly laid sod shall be the complete responsibility of the Contractor. The Contractor shall provide acceptable visual barriers, to include barricades set appropriate distances with strings or tapes between barriers, as an indication of new work. The Contractor is to restore any damaged areas caused by others (including vehicular traffic), erosion, etc, until such time as the lawn is accepted by the Owner.

I. All sod that has not been laid within 24 hours shall be deemed unacceptable and will be removed from the site.

3.5 WEED BARRIER

A. Cut a slit or x at each plant location no larger than necessary to install plant.

B. Overlap rows of fabric min. 6"

C. Stable fabric edges and overlaps to ground.

END OF SECTION

LANDSCAPE GENERAL NOTES

INSTALLER RESPONSIBILITIES AND LIABILITIES

1. THESE PLANS ARE FOR BASIC DESIGN LAYOUT AND INFORMATION. THE INSTALLER IS REQUIRED TO REFER TO THEIR INDIVIDUAL TRADE - SCOPE OF WORK. OWNER ASSUMES NO LIABILITIES FOR INADEQUATE ENGINEERING CALCULATIONS. MANUFACTURER PRODUCT DEFECTS, INSTALLATION OF ANY LANDSCAPING AND COMPONENTS, OR TIME EXECUTION.
2. THE INSTALLER OF ALL LANDSCAPING AND IRRIGATION SYSTEMS ARE LIABLE AND RESPONSIBLE FOR ALL JURISDICTIONAL AND CODE REQUIREMENTS, TIME EXECUTIONS, AND INSTALLED PRODUCTS AND MATERIALS.

GRADING AND DRAINAGE REQUIREMENTS

1. ALL GRADING IS TO SLOPE AWAY FROM THE STRUCTURE PER CODE.
2. FINISHED GRADE IS NOT PERMITTED BY CODE TO DRAIN ON NEIGHBORING PROPERTIES
3. 6" MIN. FOUNDATION LEFT EXPOSED AT ALL CONDITIONS
4. LANDSCAPER TO MAINTAIN OR IMPROVE EXISTING FINAL GRADE AND PROPER DRAINAGE ESTABLISHED BY THE EXCAVATOR'S FINAL GRADE ACTIVITIES INCLUDING ANY MAINTENANCE, PRESERVATION, OR EXAGGERATION OF SLOPES, BERMS, AND SWALES.
5. IF ANY SWALE, BERM, OR GRADE HAS BEEN DAMAGED OR IS INCORRECT TO ENSURE CORRECT WATER FLOW THE TRADE CONTRACTOR IS RESPONSIBLE TO FIX STATED ISSUE.
6. ROOF RUN-OFF DEVICES SHOULD BE INSTALLED TO COLLECT AND DISCHARGE ALL ROOF RUNOFF A MINIMUM OF 10 FEET FROM FOUNDATION ELEMENTS OR BEYOND THE LIMITS OF BACKFILL AROUND THE FOUNDATION WALLS; WHICHEVER DISTANCE IS GREATER.
7. THE GROUND SURFACE WITHIN 10 FEET OF THE FOUNDATIONS SHOULD BE SLOPED TO DRAIN AWAY FROM THE STRUCTURE WITH A MINIMUM FALL OF 6 INCHES.

LANDSCAPING REQUIREMENTS

1. ALL LANDSCAPING IS TO BE INSTALLED PER ALL GOVERNING JURISDICTIONS I.E. INTERNATIONAL BUILDING CODE, CITY CODES.
2. NON-COMPLIANCE TO ALL GOVERNING JURISDICTION REQUIREMENTS AND REGULATION ARE THE RESPONSIBILITY OF THE LANDSCAPING INSTALLER.
3. ALL PLANTED LANDSCAPING IS TO BE INSTALLED ACCORDING TO THE NURSERY CARE AND INSTALLATION INSTRUCTIONS WHERE PURCHASED AND BASED ON INDIVIDUAL SOIL CONDITIONS AND SITE CONDITIONS.

LANDSCAPE NOTES

1. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR VERIFYING QUANTITIES OF ALL MATERIALS FOR BIDDING AND INSTALLATION PURPOSES. IF DISCREPANCIES EXIST, THE PLAN SHALL DICTATE QUANTITIES TO BE USED.
2. PLANT MATERIAL TO BE INSTALLED PER PLANT LEGEND. IF SUBSTITUTIONS ARE WANTED, PROPOSED LANDSCAPE CHANGES MUST BE SUBMITTED TO THE LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO PLANTING.
3. NEW LAWN AREAS TO BE SODDED WITH DROUGHT TOLERANT VARIETY. FINE LEVEL ALL AREAS PRIOR TO LAYING SOD.
4. SANDY LOAM TOPSOIL TO BE IMPLEMENTED AT THE FOLLOWING DEPTHS: 6" TOPSOIL (WITH 2" HUMUS MIXED INTO TOPSOIL PRIOR TO SPREADING) IN ALL NEW PLANTER AREAS AND 4" IN ALL NEW LAWN AREAS. PLANTER BEDS TO BE EXCAVATED AS NECESSARY IN ORDER TO ACCOMMODATE NEW TOPSOIL AND/OR PLANTER BED MULCH TO REACH FINISHED GRADE.
5. 4"X6" EXTRUDED CONCRETE MOW CURB TO BE INSTALLED BETWEEN ALL LAWN AND PLANTER AREAS PER PLAN. ANY TREES LOCATED IN LAWN MUST HAVE A 4' CONCRETE TREE RING.
6. DeWitt 5 OZ. WEED BARRIER FABRIC TO BE INSTALLED IN ALL PLANTER AREAS EXCEPT UNDER ANNUAL PLANTING AREAS AS SHOWN ON PLAN.
7. ROCK MULCH TO BE IMPLEMENTED AT THE FOLLOWING DEPTHS: 4" IN ALL TREE, SHRUB, AND PERENNIAL PLANTER AREAS; ANNUAL PLANTING AREAS AS SHOWN ON PLAN TO RECEIVE 4" OF SOIL AID MATERIAL. PULL BARK MULCH MIN. 3" AWAY FROM BASE OF ALL PERENNIALS AND SHRUBS AND MIN. 6" AWAY FROM ALL TREES.
8. CONTRACTOR TO PROVIDE NEW AUTOMATIC UNDERGROUND IRRIGATION SYSTEM TO BE INSTALLED IN ALL LANDSCAPE AREAS. ALL LAWN AREA TO RECEIVE 100% HEAD TO HEAD COVERAGE WITH SPRAY AND ROTARY SPRINKLER HEADS. ALL PLANTER AREAS NEED TO RECEIVE A FULL DRIP SYSTEM TO EACH TREE AND SHRUB ON PROJECT. SEE IRRIGATION PLAN.

ISSUE DATE: 06-30-2020

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PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 30' 60' 120' 240'

GRAPHIC SCALE: 1" = 60'

PROJECT INFORMATION

DI STOREHOUSE

SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
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LANDSCAPE ARCHITECT / PLANNER

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LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY AINSWORTH
8128121-5301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM: JTA

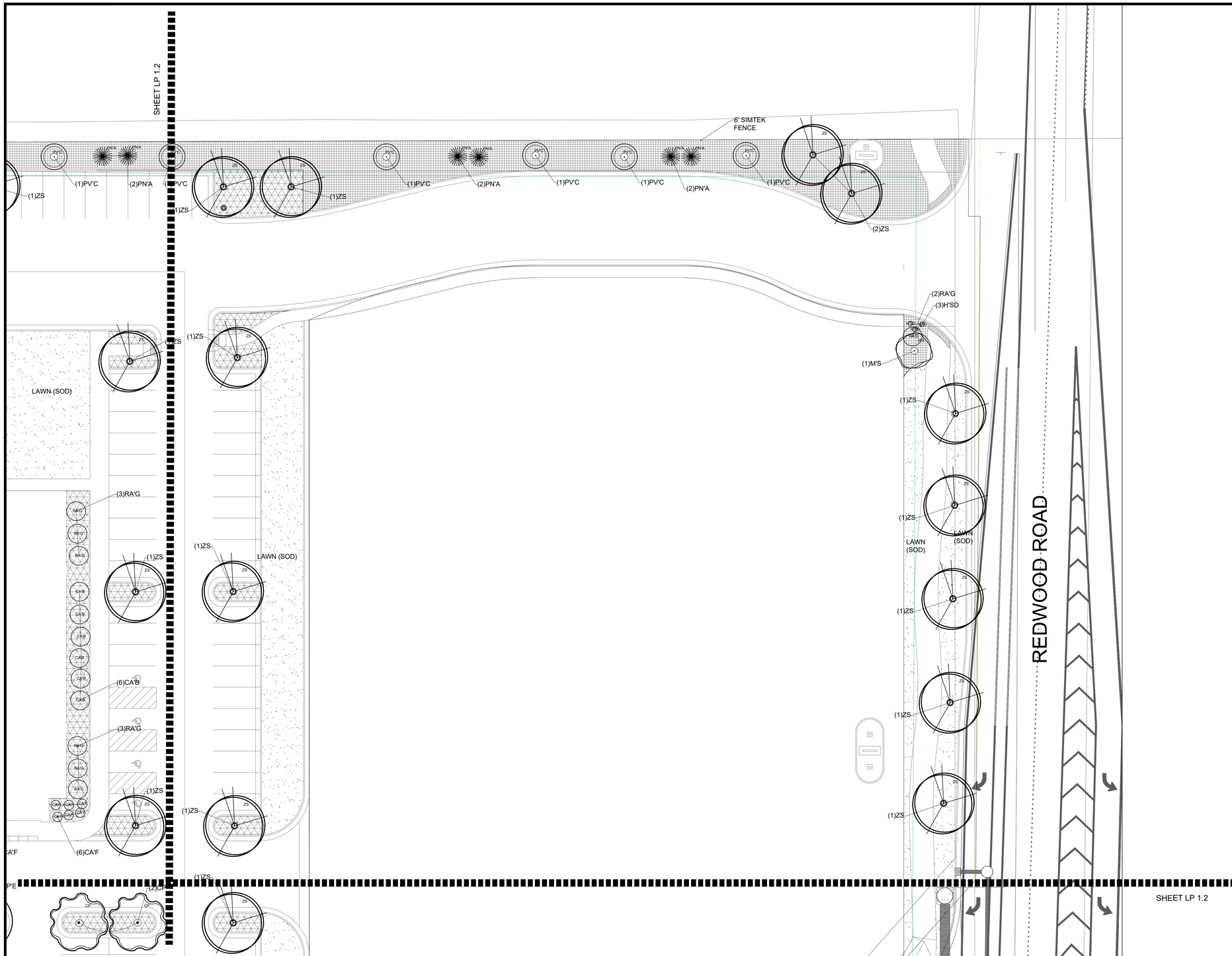
DRAWN: KBA

CHECKED: TM

PLOT DATE: 7/1/2020

LANDSCAPE PLAN

LP-1.0



TREE LEGEND (TOTAL PLANT COUNT)

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
AP'E	ACER PLATANOIDES 'EMERALD QUEEN'	EMERALD QUEEN MAPLE	24	2" CAL.	MODERATE	
CP	CRATAEGUS PHAENOPYRUM	WASHINGTON HAWTHORN	23	2" CAL	LOW	
PO	PICEA OMORIKA	SERBIAN SPRUCE	8	6'-8' TALL	LOW	
PN'A	PINUS NIGRA 'ARNOLD SENTINEL'	ARNOLD SENTINEL AUSTRIAN BLACK PINE	30	6'-8' TALL	LOW	
M'S	MALUS X 'SPRING SNOW' CRABAPPLE	SPRING SNOW CRABAPPLE	9	2" CAL.	LOW	
PV'C	PRUNUS VIRGINIANA 'CANADA RED'	CANADA RED CHOKECHERRY	19	2" CAL.	LOW	
ZS	ZELKOVA SERRATA	JAPANESE ZELKOVA	25	2" CAL.	LOW	
	STREET TREES MATCHING TREES ACROSS THE STREET		20	2" CAL.	LOW	

SHRUB LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'B	BUDDLEIA ALTERNIFOLIA	BUTTERFLY BUSH	15	5 GAL	LOW	
PF'G	POTENTILLA FRUITICOSA 'GOLDFINGER'	GOLDFINGER POTENTILLA	47	5 GAL	LOW	
CS'K	CORNUS SERICEA 'KELSEYI'	KELSEYI DOGWOOD	31	5 GAL	MODERATE	
R'NW	ROSA X 'NEARLY WILD'	NEARLY WILD ROSE	16	5 GAL	HIGH	
RF'R	RHAMNUS FRANGULA 'TALL HEDGE'	TALL HEDGE BUCKTHORN	6	5 GAL	HIGH	
RA'G	RHUS AROMATICA 'AUTUMN AMBER'	AUTUMN AMBER SUMAC	29	5 GAL	HIGH	

GRASSES LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'F	CALAMAGROSTIS A. 'FOERSTER'	FOERSTER FEATHER GRASS	26	2 GAL	HIGH	

PERENNIAL LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
H'SD	HEMEROCALLIS SP. 'STELLA DE ORO'	STELLA DE ORO DAYLILY	42	1 GAL.	MODERATE	

SITE MATERIALS

SYMBOL	SITE MATERIAL	QUANTITY	SPECIAL NOTES
	LAWN (SOD) AREA	50,591 SQ.FT.	DROUGHT TOLERANT VARIETY *SEE NOTE BELOW
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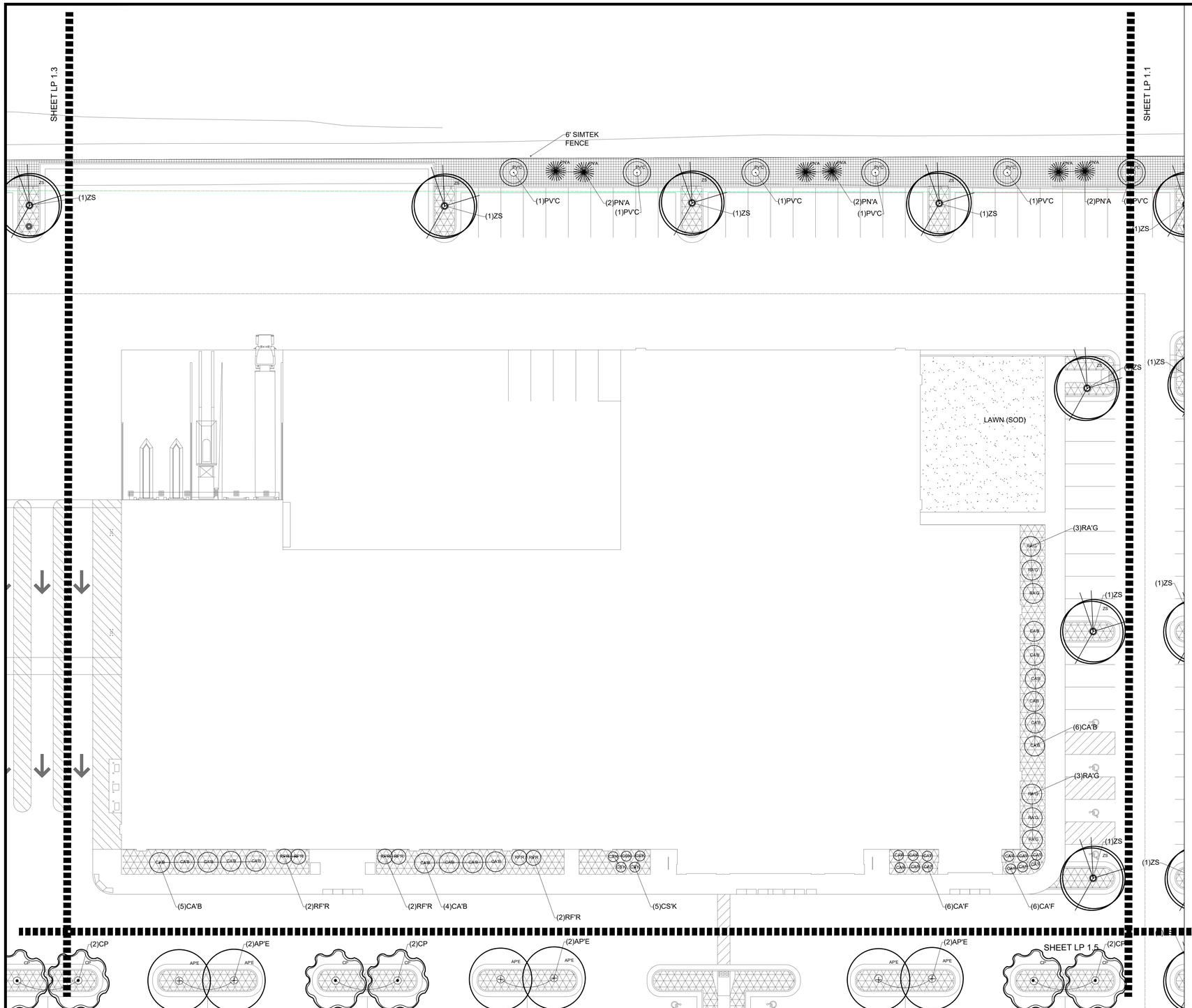
JEREMY ANDREWS
5128121-5501
06/30/2020
UTAH
STATE OF UTAH

PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	7/1/2020

LANDSCAPE PLAN

LP-1.1



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SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
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R'NW	ROSA X 'NEARLY WILD'	NEARLY WILD ROSE	16	5 GAL	HIGH	
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GRASSES LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'F	CALAMAGROSTIS A. 'FOERSTER'	FOERSTER FEATHER GRASS	26	2 GAL	HIGH	

PERENNIAL LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
H'SD	HEMEROCALLIS SP. 'STELLA DE ORO'	STELLA DE ORO DAYLILY	42	1 GAL.	MODERATE	

SITE MATERIALS

SYMBOL	SITE MATERIAL	QUANTITY	SPECIAL NOTES
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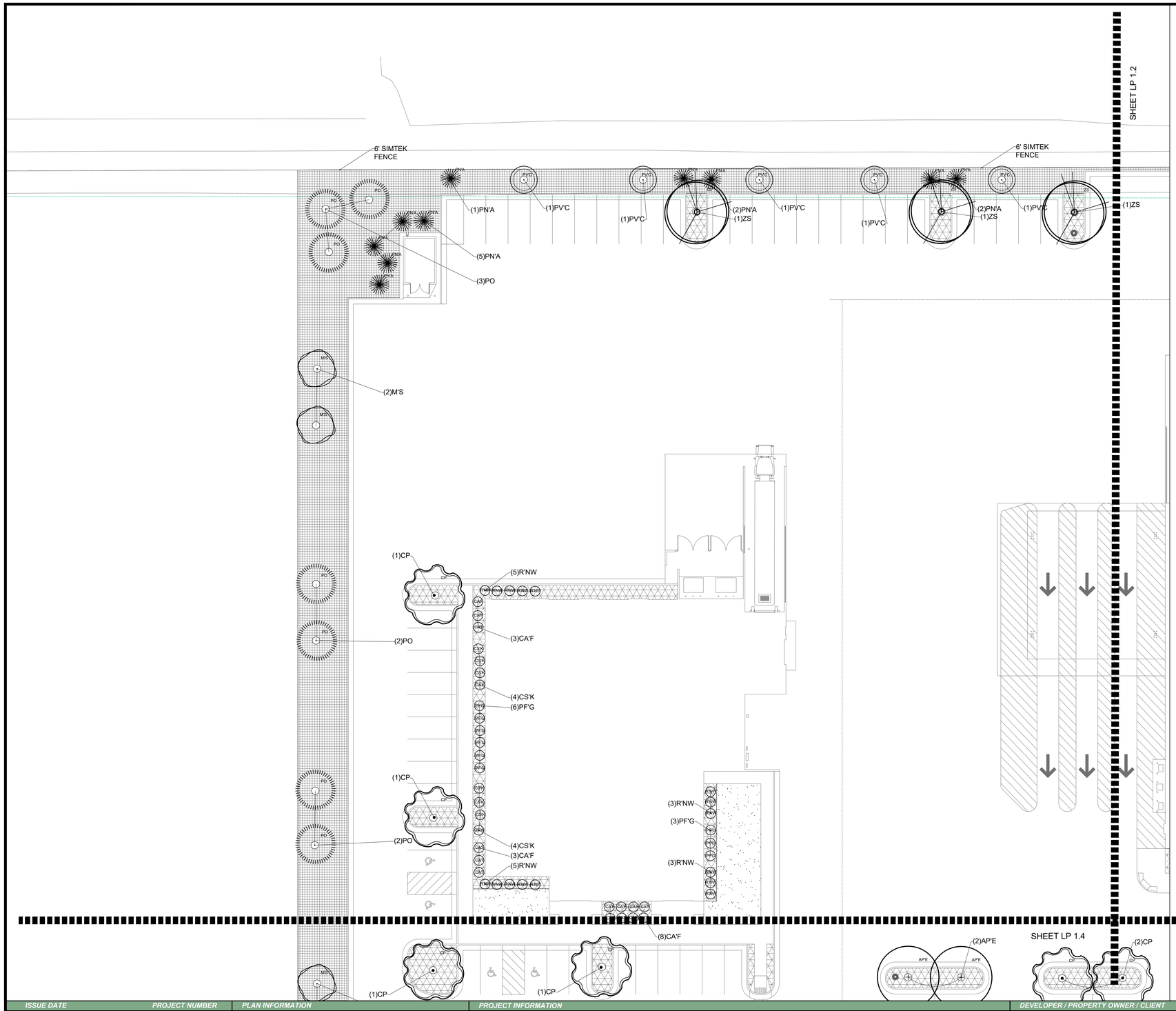
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT JEREMY ANDREWS 5128121-5301 06/30/2020 UPDATE STATE OF UTAH

PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	7/1/2020

LANDSCAPE PLAN

LP-1.2



TREE LEGEND (TOTAL PLANT COUNT)

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SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
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PERENNIAL LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
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SITE MATERIALS

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8128121-5501
06/30/2020
STATE OF UTAH

PM:	JTA
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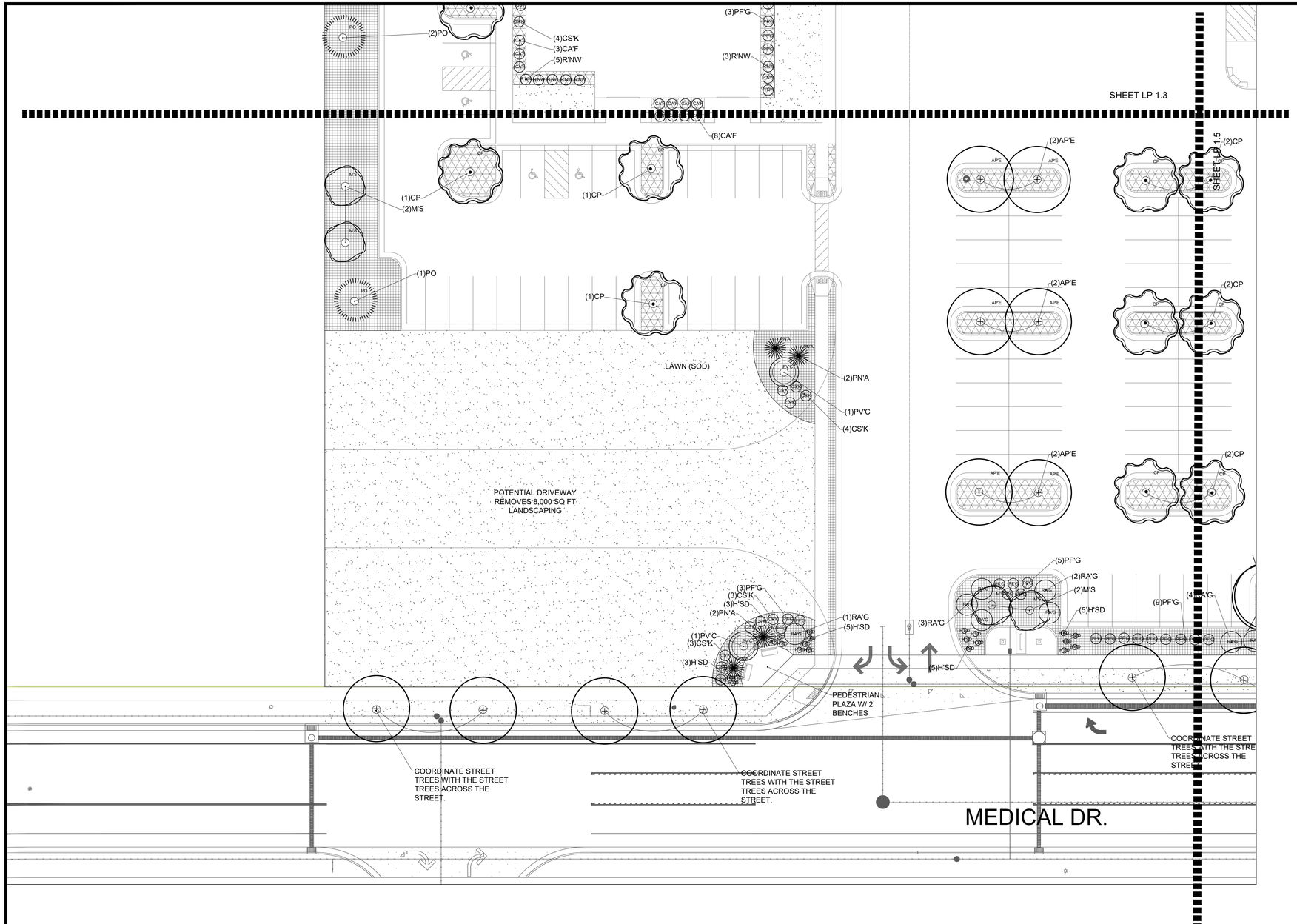
PLOT DATE:	7/1/2020

LANDSCAPE PLAN

LP-1.3



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PERENNIAL LEGEND

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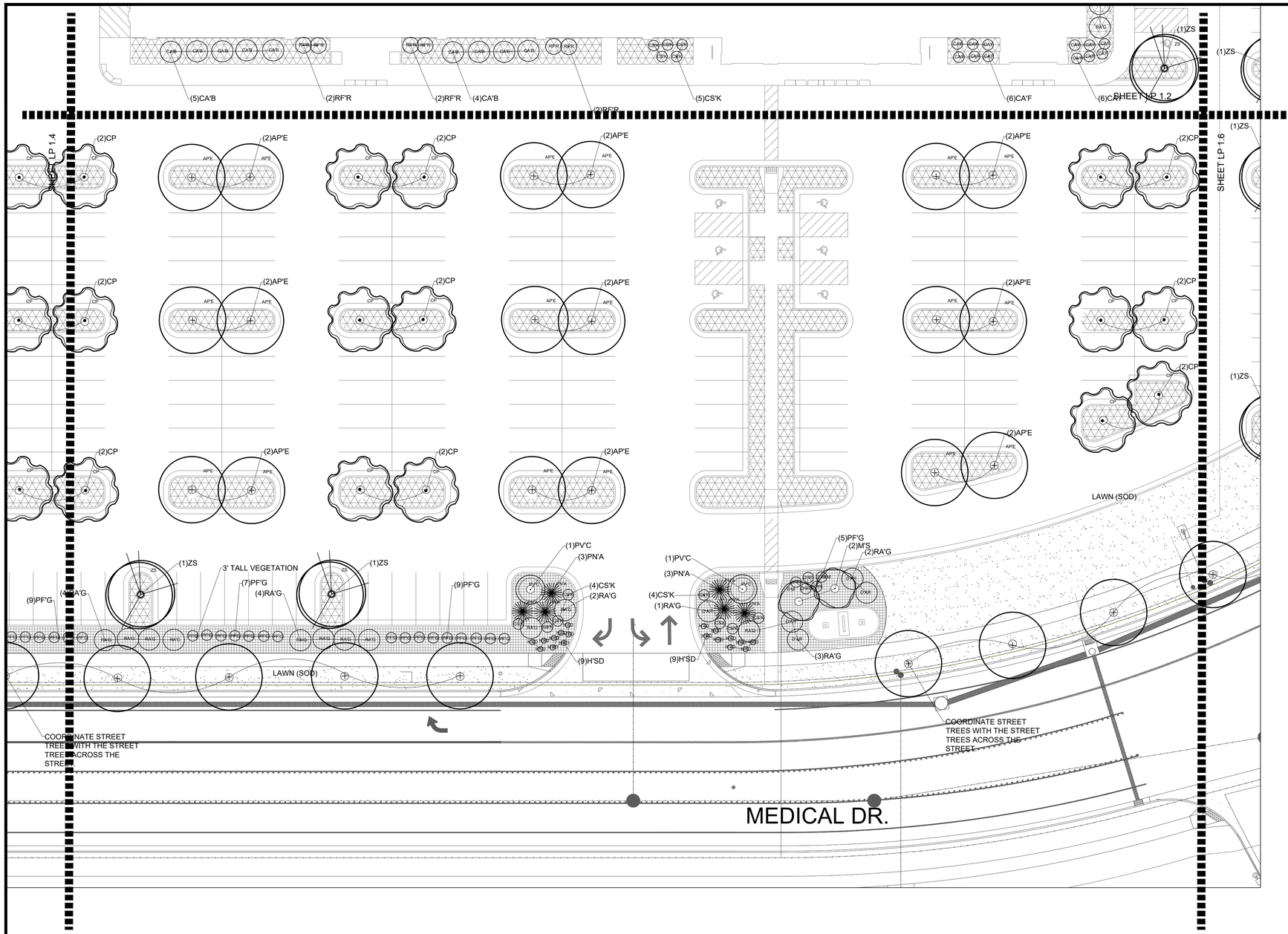
LANDSCAPE PLAN

LP-1.4



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PERENNIAL LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
H'SD	HEMEROCALLIS SP. 'STELLA DE ORO'	STELLA DE ORO DAYLILY	42	1 GAL.	MODERATE	

SITE MATERIALS

SYMBOL	SITE MATERIAL	QUANTITY	SPECIAL NOTES
	LAWN (SOD) AREA	50,591 SQ.FT.	DROUGHT TOLERANT VARIETY *SEE NOTE BELOW
	1"-2" OCTOBER SKY GRAVEL (DeWitt 5 OZ. WEED BARRIER FABRIC TO BE INSTALLED IN ALL PLANTER AREAS)	18,606 SQ.FT. (172.2 CU.YD)	LOCATED WHERE SPECIFIED
	1" QUJIRRH GRAVEL (DEWITT 5 OZ. WEED BARRIER FABRIC TO BE INSTALLED IN ALL PLANTER AREAS)	27,966 SQ.FT. (259 CU.YD)	LOCATED WHERE SPECIFIED

ISSUE DATE	PROJECT NUMBER
06-30-2020	UT19010

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1	XXXX	XX-XX-XX
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PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 10' 20' 40' 80'
GRAPHIC SCALE: 1" = 20'

PROJECT INFORMATION

DI STOREHOUSE

SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
LEI-ENGINEERING
3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER

PKJ DESIGN GROUP

PKJ DESIGN GROUP L.L.C.
3450 N. TRIUMPH BLVD. SUITE 102
LEHI, UTAH 84043 (801) 960-2698
www.pkjdesigngroup.com

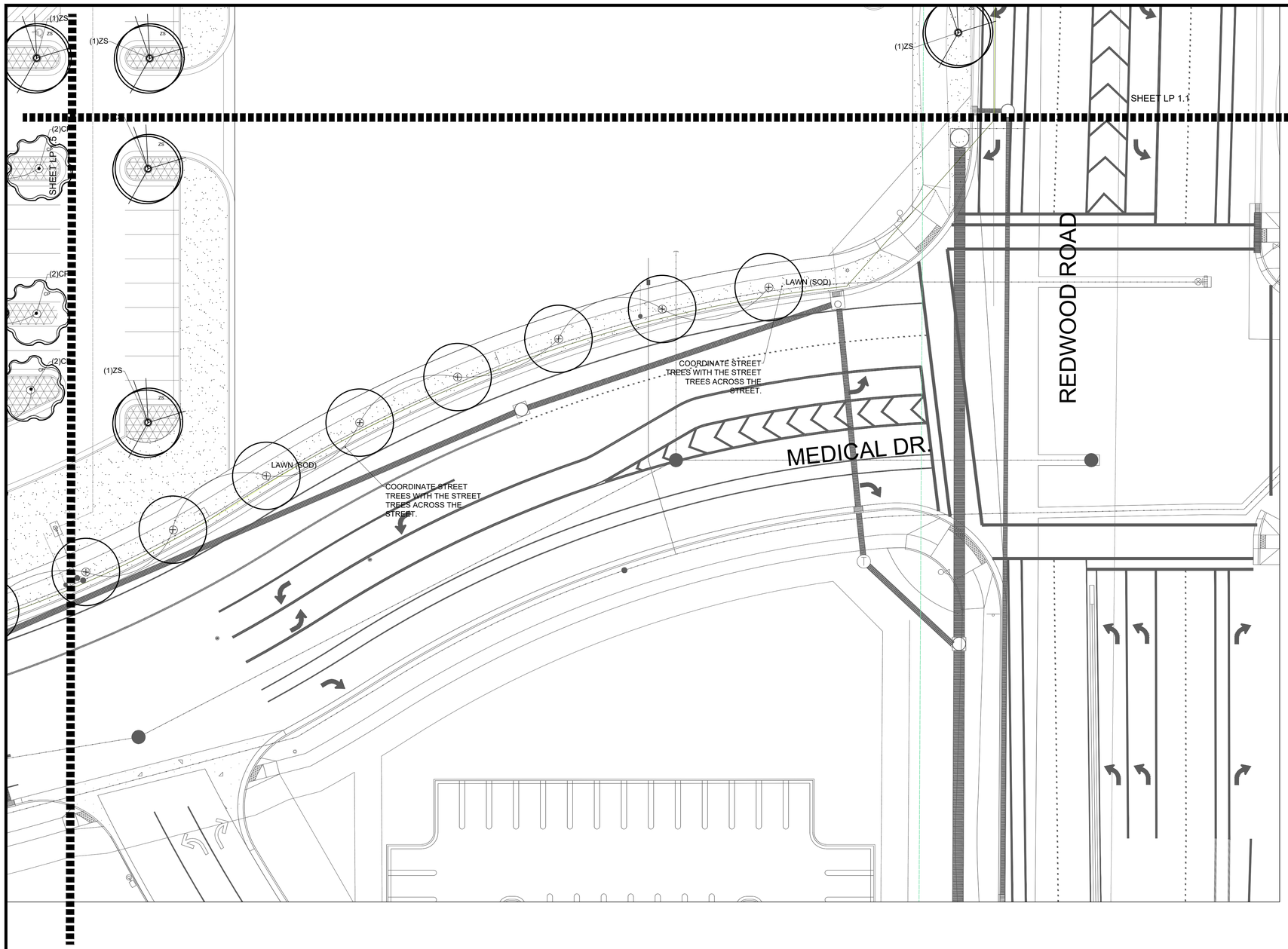
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY ANDRETH
811812-5501
06/30/2020
LICENSE NO.
STATE OF UTAH

PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	7/1/2020

LANDSCAPE PLAN

LP-1.5



TREE LEGEND (TOTAL PLANT COUNT)

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
AP'E	ACER PLATANOIDES 'EMERALD QUEEN'	EMERALD QUEEN MAPLE	24	2" CAL.	MODERATE	
CP	CRATAEGUS PHAENOPYRUM	WASHINGTON HAWTHORN	23	2" CAL	LOW	
PO	PICEA OMORIKA	SERBIAN SPRUCE	8	6'-8' TALL	LOW	
PN'A	PINUS NIGRA 'ARNOLD SENTINEL'	ARNOLD SENTINEL AUSTRIAN BLACK PINE	30	6'-8' TALL	LOW	
M'S	MALUS X 'SPRING SNOW' CRABAPPLE	SPRING SNOW CRABAPPLE	9	2" CAL.	LOW	
PV'C	PRUNUS VIRGINIANA 'CANADA RED'	CANADA RED CHOKECHERRY	19	2" CAL.	LOW	
ZS	ZELKOVA SERRATA	JAPANESE ZELKOVA	25	2" CAL.	LOW	
	STREET TREES MATCHING TREES ACROSS THE STREET		20	2" CAL.	LOW	

SHRUB LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'B	BUDDLEIA ALTERNIFOLIA	BUTTERFLY BUSH	15	5 GAL	LOW	
PF'G	POTENTILLA FRUITICOSA 'GOLDFINGER'	GOLDFINGER POTENTILLA	47	5 GAL	LOW	
CS'K	CORNUS SERICEA 'KELSEYI'	KELSEYI DOGWOOD	31	5 GAL	MODERATE	
R'NW	ROSA X 'NEARLY WILD'	NEARLY WILD ROSE	16	5 GAL	HIGH	
RF'R	RHAMNUS FRANGULA 'TALL HEDGE'	TALL HEDGE BUCKTHORN	6	5 GAL	HIGH	
RA'G	RHUS AROMATICA 'AUTUMN AMBER'	AUTUMN AMBER SUMAC	29	5 GAL	HIGH	

GRASSES LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
CA'F	CALAMAGROSTIS A. 'FOERSTER'	FOERSTER FEATHER GRASS	26	2 GAL	HIGH	

PERENNIAL LEGEND

SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	HYDROZONE	SPECIAL NOTES
H'SD	HEMEROCALLIS SP. 'STELLA DE ORO'	STELLA DE ORO DAYLILY	42	1 GAL.	MODERATE	

SITE MATERIALS

SYMBOL	SITE MATERIAL	QUANTITY	SPECIAL NOTES
	LAWN (SOD) AREA	50,591 SQ.FT.	DROUGHT TOLERANT VARIETY *SEE NOTE BELOW
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LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY T. ANDRETH
5128121-5601
06/04/2020
RENEW
STATE OF UTAH

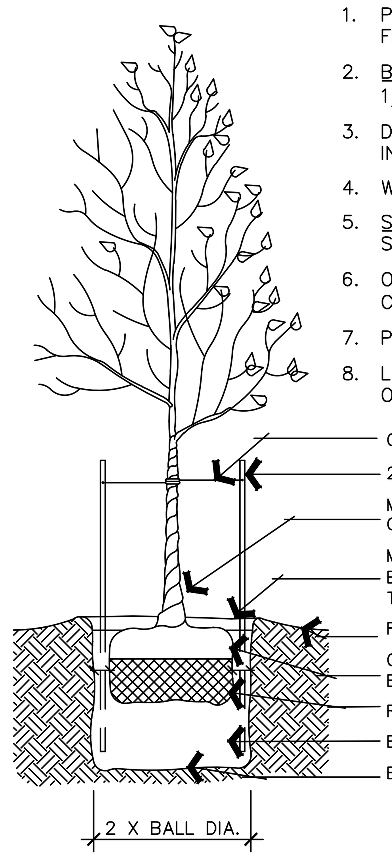
PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	7/1/2020

LANDSCAPE PLAN

LP-1.6

NOTES:

1. PLANT SO THAT THE TOP OF THE ROOT BALL IS EVEN WITH THE FINISHED GRADE.
2. BACKFILL MIX: 1/2 SANDY LOAM TOPSOIL + 1/4 ORGANIC MULCH, & 1/4 NATIVE SOILS.
3. DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKES.
4. WATER THOROUGHLY AFTER INSTALLATION.
5. STAKING IS REQUIRED: LOOSEN TREE STAKES AFTER FIRST GROWING SEASON AND REMOVE TREE STAKES AFTER SECOND GROWING SEASON.
6. OVER EXCAVATE PITS TO 3' DEPTH AND INSTALL ADDITIONAL COMPACTED TOPSOIL UNDER TREE.
7. PULL MULCH A MINIMUM OF 6" AWAY FROM TRUNK OF TREE.
8. LEAVE PLANT I.D. TAGS ON THE TREES UNTIL ACCEPTANCE BY THE OWNER. AFTER FINAL ACCEPTANCE, REMOVE I.D. TAGS.

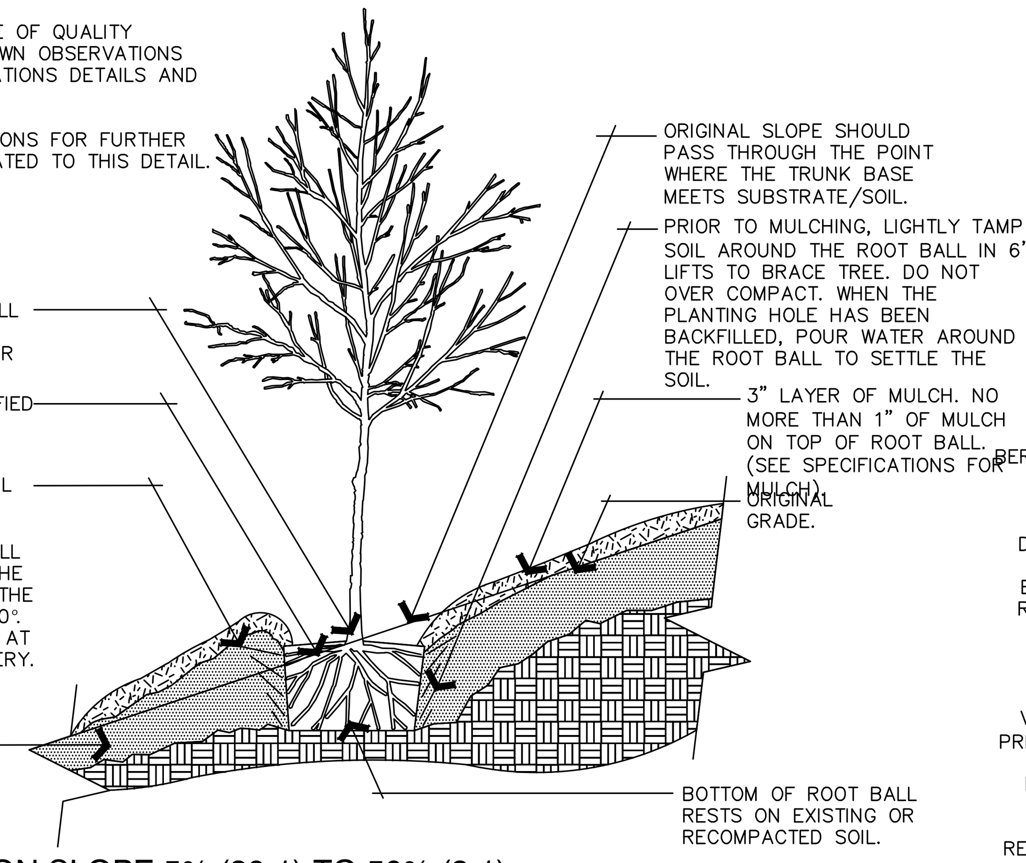


A DECIDUOUS TREE PLANTING DETAIL
NOT TO SCALE

PKJ DESIGN GROUP

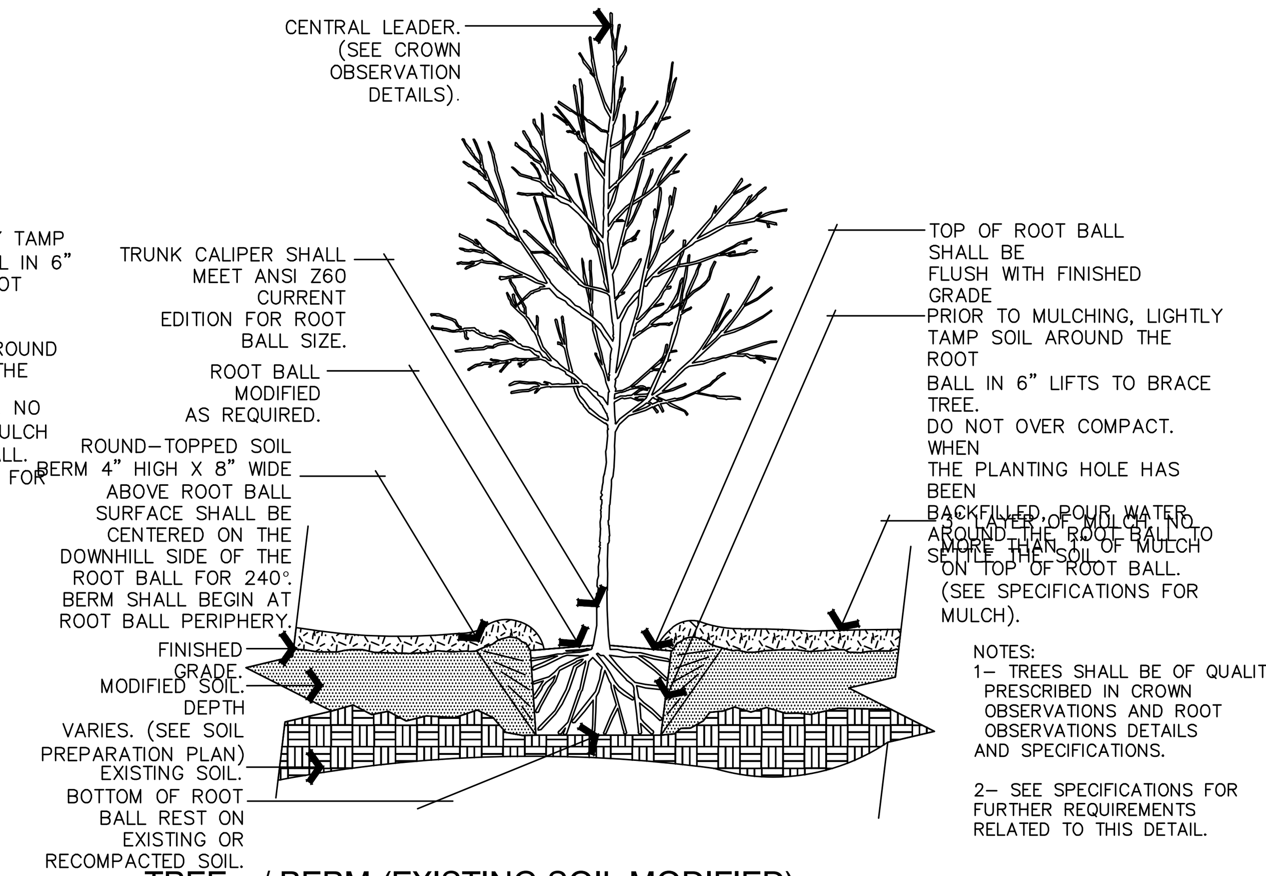
NOTES:
1– TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.

2– SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.



B TREE ON SLOPE 5% (20:1) TO 50% (2:1)
NOT TO SCALE

PKJ DESIGN GROUP



NOTES:
1– TREES SHALL BE OF QUALITY PRESCRIBED IN CROWN OBSERVATIONS AND ROOT OBSERVATIONS DETAILS AND SPECIFICATIONS.

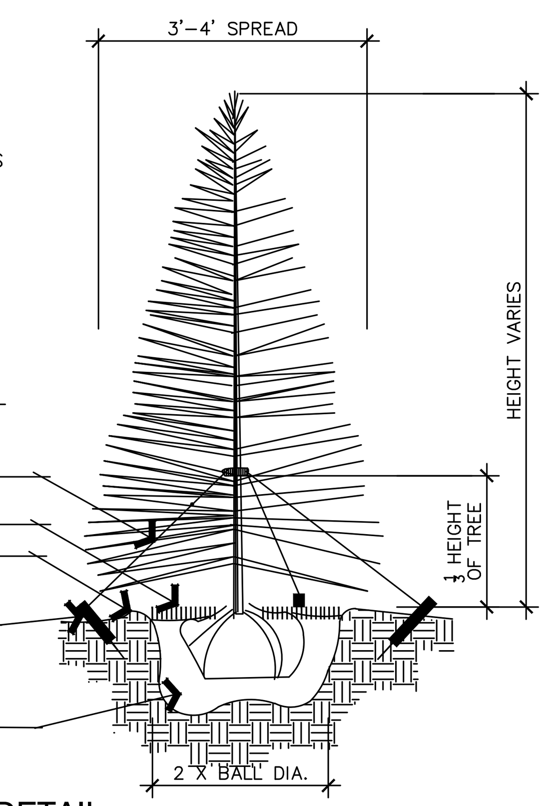
2– SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS RELATED TO THIS DETAIL.

C TREE w/ BERM (EXISTING SOIL MODIFIED)
NOT TO SCALE

PKJ DESIGN GROUP

NOTES:

1. PLANT SO THAT THE TOP OF THE ROOT BALL IS EVEN WITH THE FINISHED GRADE.
2. BACKFILL MIX: 1/2 SANDY LOAM TOPSOIL + 1/4 ORGANIC MULCH, & 1/4 NATIVE SOILS.
3. DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKES.
4. WATER THOROUGHLY AFTER INSTALLATION.
5. STAKING IS REQUIRED: LOOSEN TREE STAKES AFTER FIRST GROWING SEASON AND REMOVE TREE STAKES AFTER SECOND GROWING SEASON.
6. OVER EXCAVATE PITS TO 3' DEPTH AND INSTALL ADDITIONAL COMPACTED TOPSOIL UNDER TREE.
7. PULL COBBLE ROCK A MINIMUM OF 6" AWAY FROM TRUNK OF TREE.
8. LEAVE PLANT I.D. TAGS ON THE TREES UNTIL ACCEPTANCE BY THE OWNER. AFTER FINAL ACCEPTANCE, REMOVE I.D. TAGS.

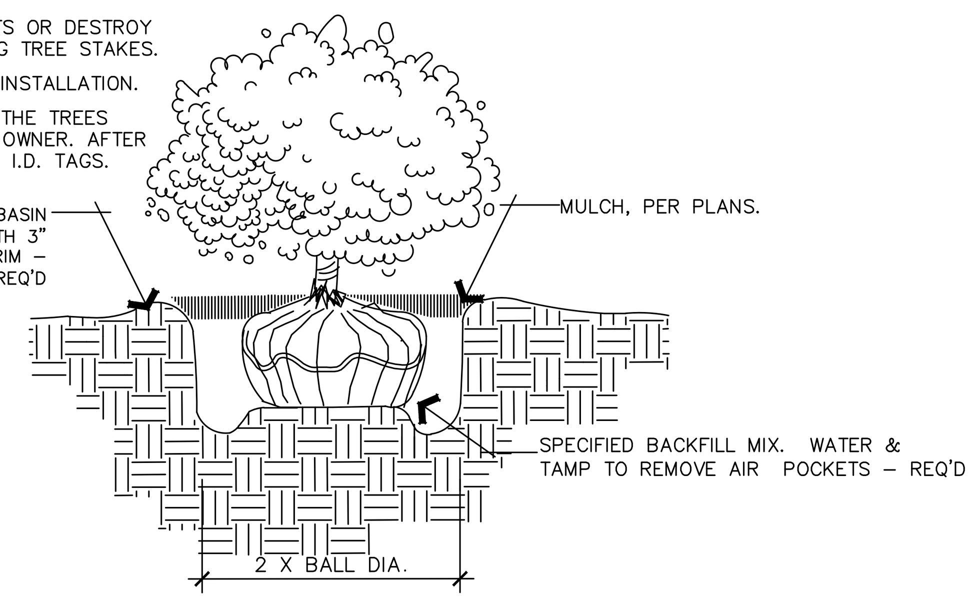


D EVERGREEN TREE PLANTING DETAIL
NOT TO SCALE

PKJ DESIGN GROUP

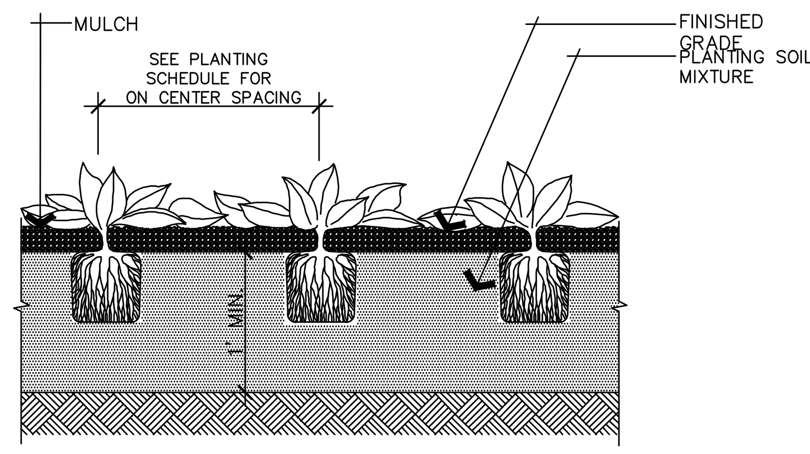
NOTES:

1. IF PLANT IS BALL & BURLAP, CUT AND REMOVE TOP 1/3 OF BURLAP FROM ROOT BALL.
2. IF PLANT IS CONTAINERIZED, SCARIFY ROOT BALL PRIOR TO PLANTING.
3. BACKFILL MIX: 1/2 SANDY LOAM + 1/4 ORGANIC MULCH + 1/4 NATIVE SOILS IF NATIVE SOILS ARE SUITABLE.
4. DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKES.
5. WATER THOROUGHLY AFTER INSTALLATION.
8. LEAVE PLANT I.D. TAGS ON THE TREES UNTIL ACCEPTANCE BY THE OWNER. AFTER FINAL ACCEPTANCE, REMOVE I.D. TAGS.



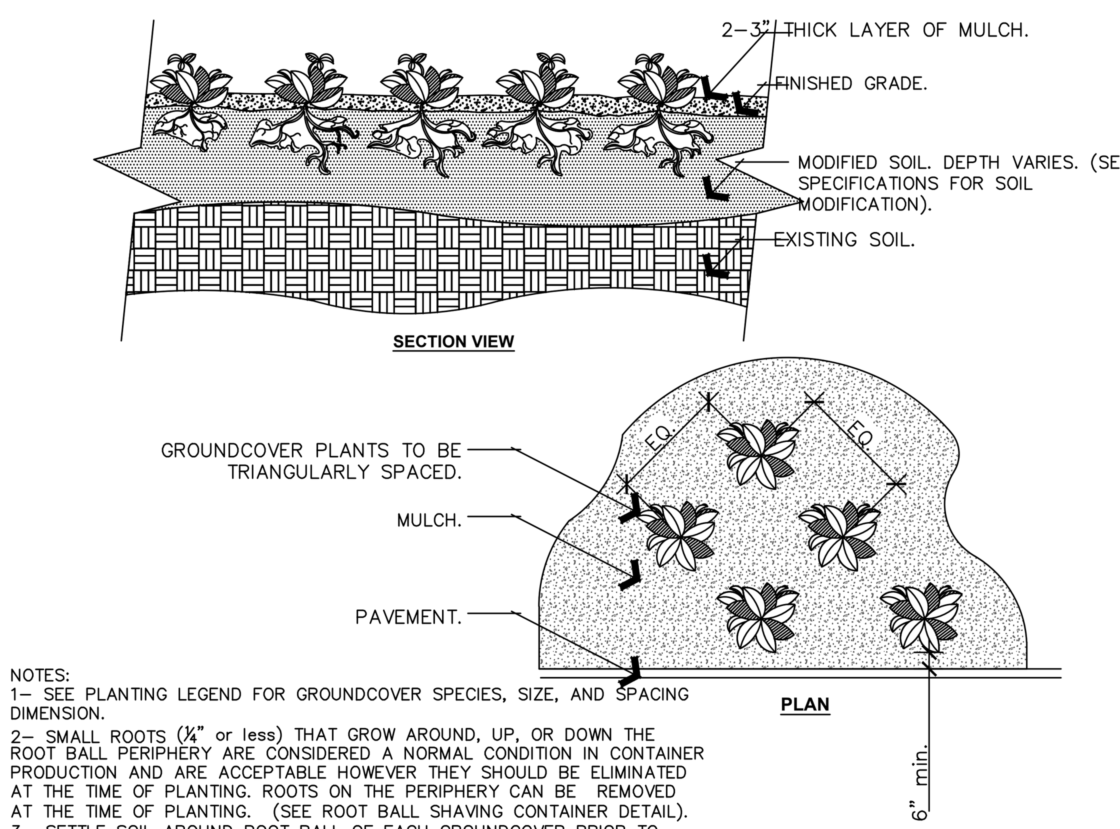
E SHRUB PLANTING DETAIL
NOT TO SCALE

PKJ DESIGN GROUP



F PERENNIAL PLANTING
NOT TO SCALE

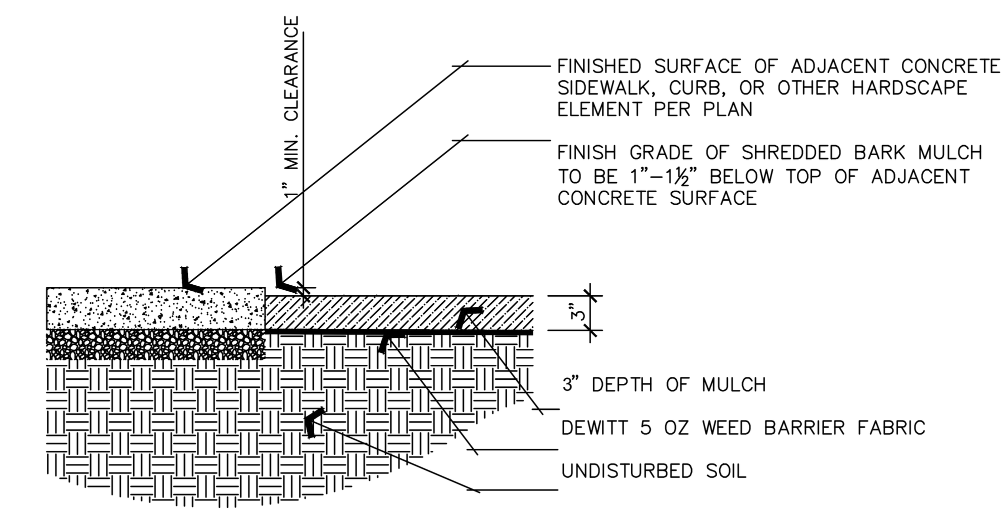
PKJ DESIGN GROUP



NOTES:
1– SEE PLANTING LEGEND FOR GROUNDCOVER SPECIES, SIZE, AND SPACING DIMENSION.
2– SMALL ROOTS (¼" or less) THAT GROW AROUND, UP, OR DOWN THE ROOT BALL PERIPHERY ARE CONSIDERED A NORMAL CONDITION IN CONTAINER PRODUCTION AND ARE ACCEPTABLE HOWEVER THEY SHOULD BE ELIMINATED AT THE TIME OF PLANTING. ROOTS ON THE PERIPHERY CAN BE REMOVED AT THE TIME OF PLANTING. (SEE ROOT BALL SHAVING CONTAINER DETAIL).
3– SETTLE SOIL AROUND ROOT BALL OF EACH GROUNDCOVER PRIOR TO MULCHING.

G GROUNDCOVER
NOT TO SCALE

PKJ DESIGN GROUP

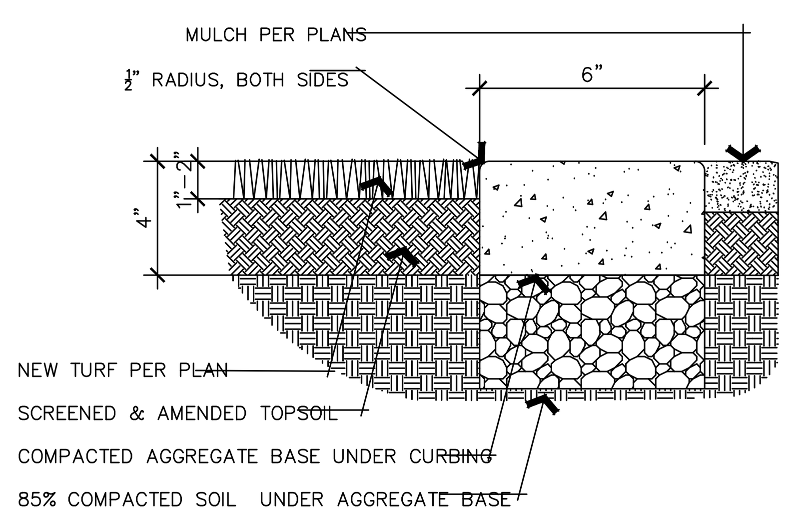


H MULCH DETAIL
NOT TO SCALE

PKJ DESIGN GROUP

NOTE:

1. PROVIDE CONTROL JOINT IN CONCRETE EDGE AT 10' INTERVALS, PROVIDE EXPANSION JOINTS EVERY 30'.



I CONCRETE MOWCURB DETAIL
NOT TO SCALE

PKJ DESIGN GROUP

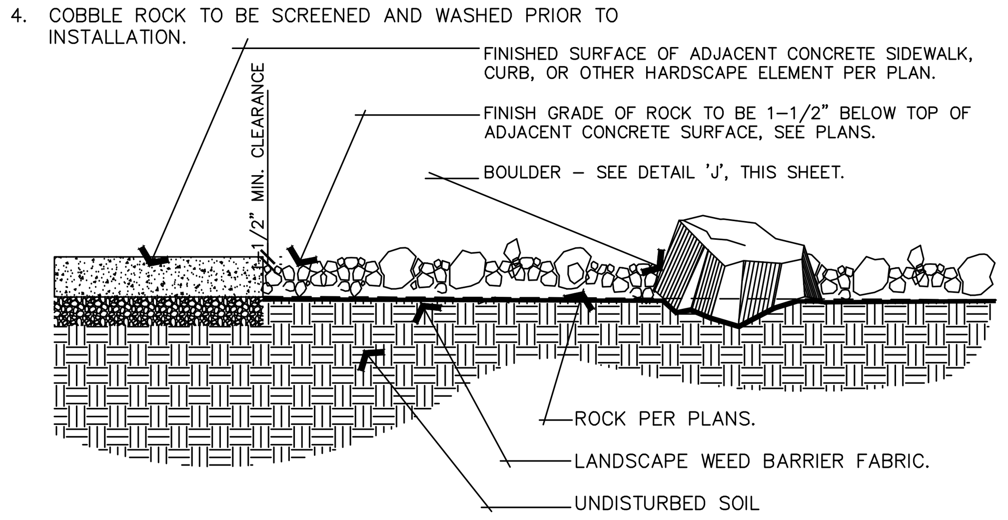
NOTE:
OWNER TO CONFIRM FENCE STYLE

J 6' SIMTEK FENCE
NOT TO SCALE

PKJ DESIGN GROUP

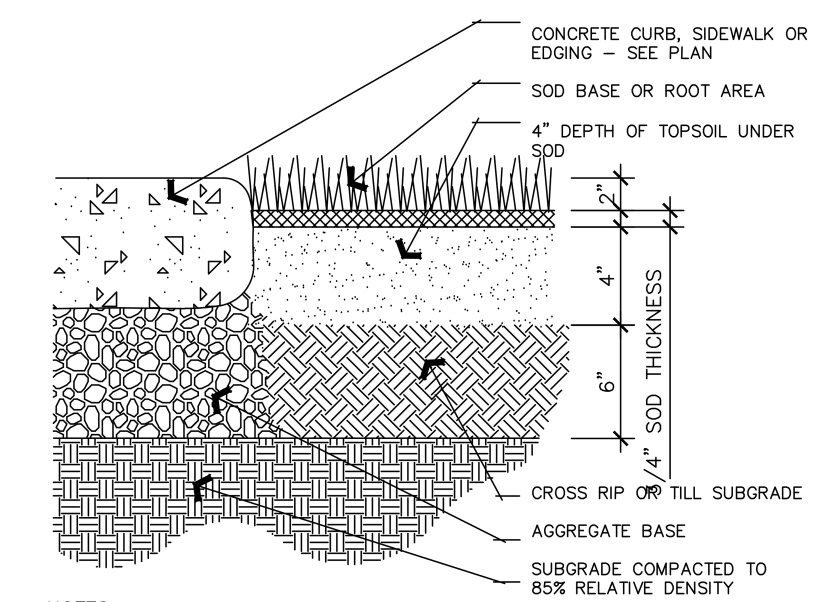
NOTES:

1. KEEP TOP OF COBBLE ROCK 1½" BELOW ADJACENT WALKS AND CURBS. DO NOT ALLOW COBBLE ROCK TO TOUCH THE TRUNK OF ANY PLANT. INSTALL COBBLE ROCK AFTER INSTALLATION OF WEED BARRIER FABRIC AND PLANT MATERIAL.
2. CONTRACTOR TO ENSURE THAT TOP OF WEED BARRIER FABRIC IS FREE OF SOILS AND DEBRIS PRIOR TO PLACING COBBLE ROCK.
3. SEE LANDSCAPE PLANS FOR ROCK TYPE AND DEPTH.
4. COBBLE ROCK TO BE SCREENED AND WASHED PRIOR TO INSTALLATION.



K COBBLE ROCK AND WEED BARRIER DETAIL
NOT TO SCALE

PKJ DESIGN GROUP



NOTES:

1. ENSURE FINISH GRADE IS 1"– 2" BELOW TOP OF CURB, WALK, OR EDGING.
2. TURF IS THE MOST HEALTHY AND WATER EFFICIENT WHEN MOWED AT A MIN. HEIGHT OF 2" – 2 ½".

L SOD LAYING DETAIL
NOT TO SCALE

PKJ DESIGN GROUP

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PM:	JTA
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LANDSCAPE PLAN

LP-2.5

DI / BISHOP'S STOREHOUSE

SARATOGA SPRINGS, UTAH

IRRIGATION SPECIFICATIONS

IRRIGATION SPECIFICATIONS

PART I - GENERAL

1.1 SUMMARY

Work to be done includes all labor, materials, equipment and services required to complete the Project irrigation system as indicated on the Construction Drawings, and as specified herein. Includes but is not limited to: Furnishing and installing underground and above ground sprinkler system complete with any accessories necessary for proper function and operation of the system. All plant material on the Project shall be irrigated. Removal and disposal of any existing sprinkler system components are not to be saved, which are disturbed during the construction process. Restoration of any altered or damaged existing landscape to original state and condition.

1.2 SYSTEM DESCRIPTION

A. Design of irrigation components: Locations of irrigation components on Construction Drawings may be approximate. Piping, sleeving and/or other components shown on Construction drawings may be shown schematically for graphic clarity and demonstration of component groupings and separations. All irrigation components shall be placed in landscaped areas, with the exception of pope and wire in sleeving under hardscapes. Actual routing of pipe, wire or other components may be altered due to site conditions not accounted for in the design process.

B. Construction requirements: Actual placement may vary as required to achieve a minimum of 100% coverage without overspray onto hardscape, buildings or other features.

C. Layout of Irrigation Components: During layout and staking, consult with Owner Approved Representative (hereafter referred to as OAR) to verify proper placement of irrigation components and to provide Contractor recommendations for changes, where revisions may be advisable. Small or minor adjustments to system layout are permissible to avoid existing field obstructions such as utility boxes or street light poles. Contractor shall place remote control valves in groups as practical to economize on quantity of manifold isolation valves. Quick coupler valves shall be placed with manifold groups and protected by manifold isolation valves. Quick coupler valves are shown on Construction Documents in approximate locations.

1.3 DEFINITIONS

A. Water Supply: Secondary water piping and components, furnished and installed by others to provide irrigation water to this Project, including but not limited to filter, saddles, nipples, spools, shut off valves, corporation stop valves, water meters, pressure regulation valves, and piping upstream of (or prior to) the Point of Connection.

B. Point of Connection: Location where the Contractor shall tie into the water supply. May require backflow preventor, saddle, nipples, spools, isolation valves or Stop and Waste valve for landscape irrigation needs and use.

C. Main Line Piping: Pressurized piping downstream of the Point of Connection to provide water to remote control valves and quick couplers. Normally under constant pressure.

D. Lateral Line Piping: Circuit piping downstream of remote control valves to provide water to sprinkler heads, sprinkler heads, drip systems or bubblers.

1.4 REFERENCES

A. The following standards will apply to the work of this Section:

a. ASTM-American Society for Testing and Materials

b. IA - The Irrigation Association: Main BMP Document, Landscape Irrigation Scheduling and Water Management Document.

1.5 SUBMITTALS

A. At least thirty (30) days prior to ordering of any materials, the Contractor shall provide manufacturer catalog cut sheet and current printed specifications for each element or component of the irrigation system. Submittals shall be in three ring binders or other similar bound form. Provide five copies of submittals to OAR for distribution. Place cover or index sheet indicating order in submittal document. No material shall be ordered, delivered or any work preceded in the field until the required submittals have need reviewed in its entirety and stamped approved. Delivered material shall match the approved samples.

B. Operation and Maintenance Manual:

a. At least thirty (30) days prior to final inspection, the Contractor shall provide Operation and Maintenance manual to OAR, containing:

i. Manufacturer catalog cut sheet and current printed specifications for each element or component of the irrigation system.

ii. Parts list for each operating element of the system

iii. Manufacturer printed literature on operation and maintenance of operating elements of the system.

iv. Section listing instructions for overall system operation and maintenance. Include directions for Spring Start-up and Winterization.

b. Project Record Copy

i. Maintain at project site one copy of all project documents clearly marked "Project Record Copy". Mark any deviation in material installation on Construction drawings. Maintain and update drawing at least weekly. Project Record Copy to be available to OAR on demand.

ii. Completed Project As-Built Drawings

1. Prior to final inspection, prepare and submit to OAR accurate as-built drawings
2. Show detail and dimension changes made during installation. Show significant details and dimensions that were not shown in original Contract Documents.
3. Field dimension locations of sleeving, points of connection, main line piping, wiring runs not contained in main line pipe trenches, valves and valve boxes, quick coupler valves.
4. Dimensions are to be taken from permanent constructed surfaces, features, or finished edges located at or above finished grade.
5. Controller Map: upon completion of system, place in each controller a color coded copy of the area that controller services: indicating zone number, type of plant material and location on project that zone services. Laminate map with heat shrink clear plastic.

1.6 QUALITY ASSURANCE

A. Acceptance: Do not install work of this section prior to acceptance by OAR of area to receive such work.

B. Regulatory Requirements: All work and materials shall be according to any and all rules, regulations or codes, whether they are State or Local laws and ordinances. Contract documents, drawings or specifications may not be construed or interpreted to permit work or materials not conforming to the above codes.

C. Adequate Water Supply: Water supply to this Project exists, installed by others. Connections to these supply lines shall be by this Contractor. Verify that proper connection is available to supply line and is of adequate size. Verify that secondary connection components may be installed if necessary. Perform static pressure test prior to commencement of work. Notify OAR in writing of problems encountered prior to proceeding.

D. Workmanship and Materials:

a. It is the intent of this specification that all material herein specified and shown on the construction documents shall be of the highest quality available and meeting the requirements specified.

b. All work shall be performed in accordance with the best standards of practice relating to the trade.

E. Contractor Qualifications:

a. Contractor shall provide document or resume including at least the following items:

i. That Contractor has been installing sprinklers on commercial projects for five previous consecutive years.

ii. Contractor is licensed to perform Landscape and Irrigation construction in the State of this Project.

iii. Contractor is bondable for the work to be performed.

iv. References of five projects of similar size and scope completed within the last five years. Three of the projects listed shall be local.

v. Listing of suppliers where materials will be obtained for use on this Project.

vi. Project site Foreman or Supervisor has at least five consecutive years of commercial irrigation installation experience. This person shall be a current Certified Irrigation Contractor in good standing as set forth by the Irrigation Association. This person shall be on Project site at least 75% of each working day.

vii. Evidence that Contractor currently employs workers in sufficient quantities to complete Project within time limits that are established by the Contract.

viii. All General laborers or workers on the Project shall be previously trained and familiar with sprinkler installation and have a minimum of one-year experience. Those workers performing tasks related to PVC pipe shall have certificates designated below.

1.7 DELIVERY-STORAGE-HANDLING

A. During delivery, installation and storage of materials for Project, all materials shall be protected from contamination, damage, vandalism, and prolonged exposure to sunlight. All material stored at Project site shall be neatly organized in a compact arrangement and storage shall not disrupt Project Owner or other trades on Project site. All material to be installed shall be handled by Contractor with care to avoid breakage or damage. Damaged materials attributed to Contractor shall be replaced with new at Contractor's expense.

1.8 SEQUENCING

A. Perform site survey, research utility records, contact utility location services. The Contractor shall familiarize himself with all hazards and utilities prior to work commencement. Install sleeving prior to installation of concrete, paving or other permanent site elements. Irrigation system Point of Connection components, backflow prevention and pressure regulation devices shall be installed and operational prior to all downstream components. All main lines shall be thoroughly flushed of all debris prior to installation of any sprinkler heads.

1.9 WARRANTY

A. Contractor shall provide one year Warranty. Warranty shall cover all materials, workmanship and labor. Warranty shall include filling and or repairing depressions or replacing turf or other plantings due to settlement of irrigation trenches or irrigation system elements. Valve boxes, sprinklers or other components settles from original finish grade shall be restored to proper grade. Irrigation system shall have been adjusted to provide proper, adequate coverage of irrigated areas.

1.10 OWNER'S INSTRUCTION

A. After system is installed, inspected, and approved, instruct Owner's Representatives in complete operation and maintenance procedures. Coordinate instruction with references to previously submitted Operation and Maintenance Manual.

1.11 MAINTENANCE

A. Furnish the following items to Owner's Representative:

a. Two quick coupler keys with hose swivels.

b. One of each type or size of quick coupler valve and remote control valve. Five percent of total quantities used of each sprinkler and sprinkler nozzle.

B. Provide the following services:

a. Winterize entire irrigation system installed under this contract. Winterize by 'blow-out' method using compressed air. Compressor shall be capable of minimum of 175 CFM. This operation shall occur at the end of first growing season after need for plant irrigation but prior to freezing. Compressor shall be capable of evacuation system of all water pressure regulation device. Compressor shall be regulated to not more than 60 PSI. Start up system the following spring after danger of freezing has passed. Contractor shall train Owner's Representative in proper start-up and winterization procedure.

PART 2 - PRODUCTS

2.1 GENERAL NOTES

A. Contractor shall provide materials to be used on this Project. Contractor shall not remove any material purchased for this Project from the Project Site, nor mix Project materials with other Contractor owned materials. Owner retains right to purchase and provide project material.

2.2 POINT OF CONNECTION

A. The Contractor shall connect onto existing irrigation or water main line as needed for Point(s) of Connection. Contractor shall install new main line as indicate.

2.3 CONNECTION ASSEMBLY

A. Secondary water shall be used on this Project. Install filter and RPZ as needed.

2.4 CONTROL SYSTEM

A. Power supply to the irrigation controller shall be provided for by this Contract.

B. Controller shall be as specified in the drawings. Controller shall be surge protected.

a. Installation of wall-mount controllers: Irrigation contractor shall be responsible for this task. Power configuration for wall-mount controllers shall be 120 VAC unless otherwise noted.

b. Locate Controller(s) in general location shown on Construction drawings. Coordinate power supply and breaker allocation with electrical contractor. Contractor shall be responsible for all power connections to Controllers, whether they are wall mount or pedestal mount. Contractor shall coordinate with electrical or other Project trades as needed to facilitate installation of power to controllers.

C. Wires connecting the remote control valves to the irrigation controller are single conductors, type PE. Wire construction shall incorporate a solid copper conductor and polyethylene (PE) insulation with a minimum thickness of 0.045 inches. The wires shall be UL listed for direct burial in irrigation systems and be rated at a minimum of 30 VAC. Paige Electric Co., LP specification number P7079D.

a. A minimum of 24" of additional wire shall be left at each valve, each splice box and at each controller.

b. Common wire shall be white in color, 12 gauge. Control wire shall be red in color, 14 gauge. Spare wire shall be looped within each valve box of the grouping it is to service.

D. RCV wire splicing connectors shall be 3M brand DBY or DBR. Wire splicing between controller and valves shall be avoided if at all possible. Any wire splices shall be contained within a valve box. Splices within a valve box that contains no control valves shall be stamped 'WIRE SPLICE' or 'WS' on box lid.

2.5 SLEEVING

A. Contractor shall be responsible to protect existing underground utilities and components. Sleeving minimum size shall be 2". Sleeving 2" through 4" in size shall be S/40 PVC solvent weld. Sleeving 6" and larger shall be CL 200 PVC gasketed. Sleeve diameter shall be at least two times the diameter of the pipe within the sleeve. Sleeves shall be extended 6" minimum beyond walk or edge of pavement. Wire or cable shall not be installed in the same sleeve as piping, but shall be installed in separate sleeves. Sleeve ends on sleeve sizes 4" and larger shall be capped with integral corresponding sized PVC slip cap, pressure fit, until used, to prevent contamination. Sleeves shall be installed at appropriate depths for main line pipe or lateral pipe.

2.6 MAIN LINE PIPE

A. All main line pipe 4" and larger shall be Class 200 gasketed bell end. All main line pipe 3" in size and smaller shall be Schedule 40 PVC solvent weld bell end.

a. Maximum flows allowed through main line pipe shall be:

3/4"	8 GPM
1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
2-1/2"	75 GPM
3"	110 GPM
4"	180 GPM

b. Main line pipe shall be buried with 24" cover

2.7 MAIN LINE FITTINGS

A. All main line fittings 3" and larger shall be gasketed ductile iron material. All ductile iron fittings having change of direction shall have proper concrete thrust block installed. All main line fittings smaller than 3" in size shall be Schedule 80 PVC.

2.8 ISOLATION VALVES

A. Isolation valves 3" and larger shall be Waterous brand model 2500 cast iron gate valve, resilient wedge, push on type, with 2" square operating nut. Place sleeve of 6" or larger pipe over top of valve vertically and then extend to grade. Place 10" round valve box over sleeve at grade.

B. Isolation valves 2-1/2" and smaller shall be Apollo brand 70 series brass ball valves, contained in a Carson Standard size valve box. Valves shall be installed with S/80 PVC TOE Nipples on both sides of the valve. Valve shall be placed so that the handle is vertical toward the top of the valve box in the 'off' position.

2.9 MANIFOLDS

A. Action Manifold fittings shall be used to create unions on both sides of each control valve, allowing the valve to be removed from the box without cutting piping. Valves shall be located in boxes with ample space surrounding them to allow access for maintenance and repair. Where practical, group remote control valves in close proximity, and protect each grouping with a manifold isolation valve as shown in details. Manifold Main Line (or Sub-Main Line) and all manifold components and isolation valves shall be at least as large as the largest diameter lateral served by the respective manifold.

2.10 REMOTE CONTROL VALVES

A. Remote control valves shall be as specified on the drawings. Remote control valves shall be located separately and individually in separate control boxes.

2.11 MANUAL CONTROL VALVES

A. Quick coupler valve shall be attached to the manifold sub-main line using a Lasco G17S212 swing joint assembly with snap-lock outlet and brass stabilizer elbow. Quick coupler valve shall be placed within a Carson 10" round valve box. Top of quick coupler valve cover shall allow for complete installation of valve box lid, but also allow for insertion and operation of key. Base of quick coupler valve and top of quick coupler swing joint shall be encased in ¾" gravel. Contractor shall not place quick coupler valves further than 200 feet apart, to allow for spot watering or supplemental irrigation of new plant material. Quick coupler valve at POC shall not be eliminated or relocated.

2.12 LATERAL LINE PIPE

A. All lateral piping shall be Schedule 40 PVC, solvent weld, and bell end. Lateral pipe shall be buried with 12-18" of cover typically. Lateral pipe shall be ¾", 1", 1 ¼", 1 ½" or 2" in size as indicated on Construction Drawings.

2.13 LATERAL LINE FITTINGS

A. All lateral line fittings shall be S/40 PVC

2.14 Spray Sprinklers

A. Spray head sprinklers shall be as specified on the drawings. Nozzles shall be as specified on the drawings.

2.15 VALVE BOXES

A. Carson valve boxes shall be used on this project. Sizes are as directed in these Specifications, detail sheets or plan sheets. Valve boxes shall be centered over the control valve or element they cover. Valve box shall be sized large enough to allow ample room for services access, removal or replacement of valve or element. Valve box shall be set to flush to finish grade of topsoil or barked areas. Contractor shall provide extensions or stack additional valve boxes as necessary to bring valve box pit to proper grade.

2.16 IMPORT BACKFILL

A. All main line pipe, lateral line pipe and other irrigation elements shall be bedded and backfilled with clean soil, free of rocks 1" and larger. Contractor shall furnish and install additional backfill material as necessary due to rocky conditions. Trenches and other elements shall be compacted and/or water settled to eliminate settling. Debris from trenching operations un-usable for fill shall be removed from project and disposed of properly by Contractor.

2.17 OTHER PRODUCTS

A. Substitution of equivalent products is subject to the OAR's approval and must be designated as accepted in writing.

a. The Contractor shall provide materials to make the system complete and operational.

PART 3 - EXECUTION

3

3.1 PREPARATION

A. Contractor shall repair or replace work damaged by irrigation system installation. If damaged work is new, replacement or the original installer of that work shall perform repairs. The existing landscape of this Project shall remain in place. Contractor shall protect and work around existing plant material. Coordination of trench and valve locations shall be laid out the OAR prior to any excavation occurring. Plant material deemed damaged by the OAR shall be replaced with new plant material at Contractor's expense. Contractor shall not cut existing tree roots larger than 2" to install this Project. Route pipe, wire and irrigation elements around tree canopy drip line to minimize damage to tree roots. Contractor shall have no part of existing system used by other portions of site landscape without water for without water for more than 24 hours at a time.

3.2 TRENCHING AND BACKFILING

A. Pulling of pipe shall not be permitted on this project. Over excavate trenches both in width and depth. Ensure base of trench is rock or debris free to protect pipe and wire. Grade trench base to ensure flat, even support of piping. Backfill with clean soil or import material. Contractor shall backfill no less than 2" around entire pipe with clean, rock free fill. Main line piping and fittings shall not be backfilled until OAR has inspected and pipe has passed pressure testing. Perform balance of backfill operation to eliminate any settling.

3.3 SLEEVING

A. Sleeve all piping and wiring that pass under paving or hardscape features. Wiring shall be placed in separate sleeving from piping. Sleeves shall be positioned relative to structures or obstructions to allow for pipe or wire within to be removed if necessary.

3.4 GRADES AND DRAINAGE

A. Place irrigation pipe and other elements at uniform grades. Winterization shall be by evacuation with compressed air. Automatic drains shall not be installed on this Project. Manual drains shall only be installed at POC where designated on Construction Drawings.

3.5 PVC PIPE

A. Install pipe to allow for expansion and contraction as recommended by pipe manufacturer.

B. Install main line pipes with 18" of cover, lateral line pipes with 12" of cover.

C. Drawings show diagrammatic or conceptual location of piping - Contractor shall install piping to minimize change of direction, avoid placement under large trees or large shrubs, avoid placement under hardscape features.

D. Plastic pipe shall be cut squarely. Burrs shall be removed. Spigot ends of pipes 3" and larger shall be beveled.

E. Pipe shall not be glued unless ambient temperature is at least 50 degress F. Pipe shall not be glued in rainy conditions unless properly tented. All solvent weld joints shall be assembled using IPS 711 glue and P70 primer according to manufacturer's specification, no exceptions. All workers performing glue operations shall provide evidence of certification. Glued main line pipe shall cure a minimum of 24 hours prior to being energized. Lateral lines shall cure a minimum of 2 hours prior to being energized and shall not remain under constant pressure unless cured for 24 hours.

F. Appropriate thrust blocking shall be performed on fittings 3" and larger. All threaded joints shall be wrapped with Teflon tape or paste unless directed by product manufacturer or sealing by o-ring.

3.6 CONTROLLERS

A. All grounding for pedestal controllers shall be as directed by controller manufacturer and ASIC guidelines, not to exceed a resistance reading of 5 OHMs.

B. Locate controllers in protected, inconspicuous places, when possible. Coordinate location of pedestal controllers with Landscape Architect to minimize visibility.

C. Coordinate location of wall mount controllers with building or electrical Contractor to facilitate electrical service and future maintenance needs. Wall mount shall be securely fastened to surface. If exterior mounted, wall mount controllers shall have electrical service wire and field control wire in separate, appropriate sized weatherproof electrical conduit, PVC pipe shall not be used.

D. Wire under hardscape surfaces shall be placed continuously in conduit. Contractor shall be responsible to coordinate sleeving needs for conduit or sweeps elbows from exterior to interior of building.

E. Pedestal controllers shall be placed upon VIT-Strong Box Quick Pad as per manufacturer's recommendations. Controllers shall be oriented such that Owner's Representative maintenance personnel may access easily and perform field system tests efficiently.

F. Place Standard valve box at base of controller or nearby to allow for three to five feet of slack field control wire to be placed at each controller. This Contractor shall provide conduit access if needed for Electrical Contractor. Electrical supply and installation, as well as hook-up to controller shall be by this Contractor.

3.7 VALVES

A. Isolation valves, remote control valves, and quick coupler valves shall be installed according to manufacturer recommendation and Contract Specifications and Details.

B. Valve boxes shall be set over valves so that all parts of the valve can be reached for service.

C. Valve box and lid shall be set to be flush with finished grade. Only o ne remote control valve may be installed in a Carson 1419124 box. Place a minimum of 4" of ¾" washed gravel beneath valve box for drainage. Bottom of remote control valve shall be a minimum of 2" above gravel.

3.8 SPRINKLER HEADS

A. No sprinkler shall be located closer than 6" to walls, fences, or buildings.

B. Heads adjacent to walks, curbs. Or paths shall be located at grade and 2" away from hardscape.

C. Control valves shall be opened and fully flush lateral line pipe and swing joints prior to installation of sprinklers.

D. Spray heads shall be installed and flushed again prior to installation of nozzles.

E. Contractor shall be responsible for adjustment if necessary due to grade changes during landscape construction.

3.9 FIELD QUALITY CONTROL

A. Main line pipes shall not be backfilled or accepted until the system has been tested for 2 hours at 100 psi.

B. Main line pressure test shall include all pipe and components from the point of connection to the upstream side of remote control valves. Test shall include all manifold components under constant pressure. Piping may be tested in sections that can be isolated.

C. Contractor shall provide pressurized water pump to increase or boost pressure where existing static pressure is less than 100 psi.

D. Schedule testing with OAR 48 hours in advance for approval.

E. Leaks or defects shall promptly be repaired or rectified at the Contractors expense and retested until able to pass testing.

F. Grounding resistance at pedestal controller shall also be tested and shall not exceed 5 OHMs.

3.10 ADJUSTMENT

A. Sprinkler heads shall be adjusted to proper height when installed. Changes in grade or adjustment of head height after installation shall be considered a part of the original contract and at Contractor's expense.

B. Adjust all sprinkler heads for arc, radius, proper trim and distribution to cover all landscaped areas that are to be irrigated.

C. Adjust sprinklers so they do not water buildings, structures, or other hardscape features.

D. Adjust run times of station to meet needs of plant material the station services.

3.11 CLEANING

A. Contractor shall be responsible for cleanliness of jobsite. Work areas shall be swept cleanly and picker up daily.

B. Open trenches or hazards shall be protected with yellow caution tape.

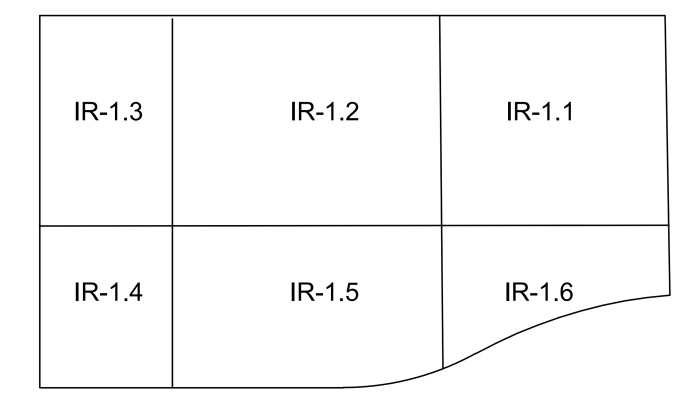
C. Contractor is responsible for removal and disposal offsite of trash and debris generated as a result of this Project.

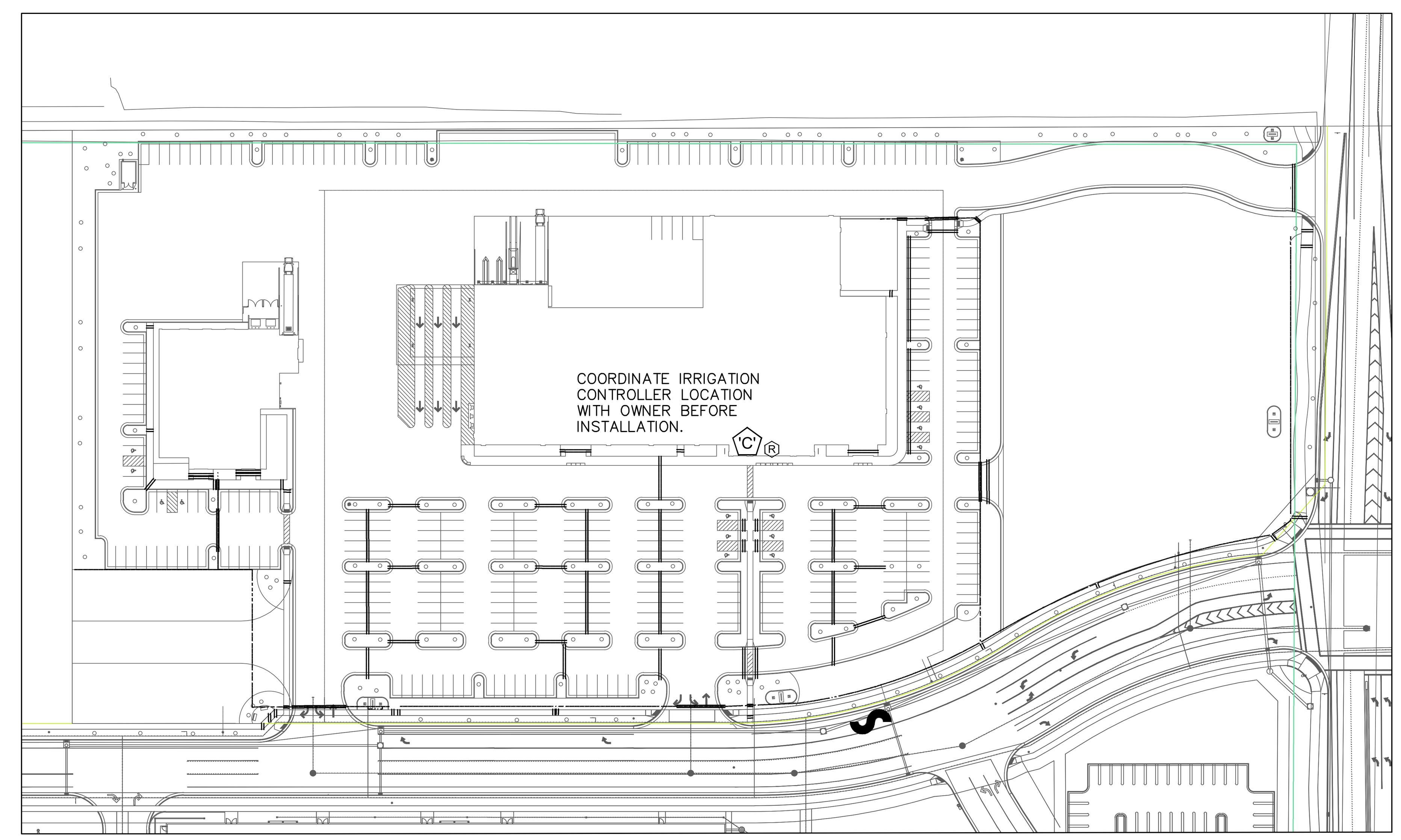
D. OAR shall perform periodic as well as a final cleanliness inspection.

E. Contractor shall leave Project in at least a 'broom clean' condition.

END OF SECTION

REFERENCE MAP





2" MAINLINE ROUTING ,CONTROLLER AND P.O.C. LOCATION OVERVIEW

ISSUE DATE: 06-30-2020
PROJECT NUMBER: UT19010

NO.	REVISION	DATE
1	XXXX	XX-XX-XX
2		
3		
4		
5		
6		
7		

PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 50' 100' 200' 400'
GRAPHIC SCALE: 1" = 100'

PROJECT INFORMATION

DI STOREHOUSE
SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
LEI-ENGINEERING
3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER

PKJ DESIGN GROUP
PKJ DESIGN GROUP L.L.C.
3450 N. TRIUMPH BLVD. SUITE 102
LEHI, UTAH 84043 (801) 960-2698
www.pkjdesigngroup.com

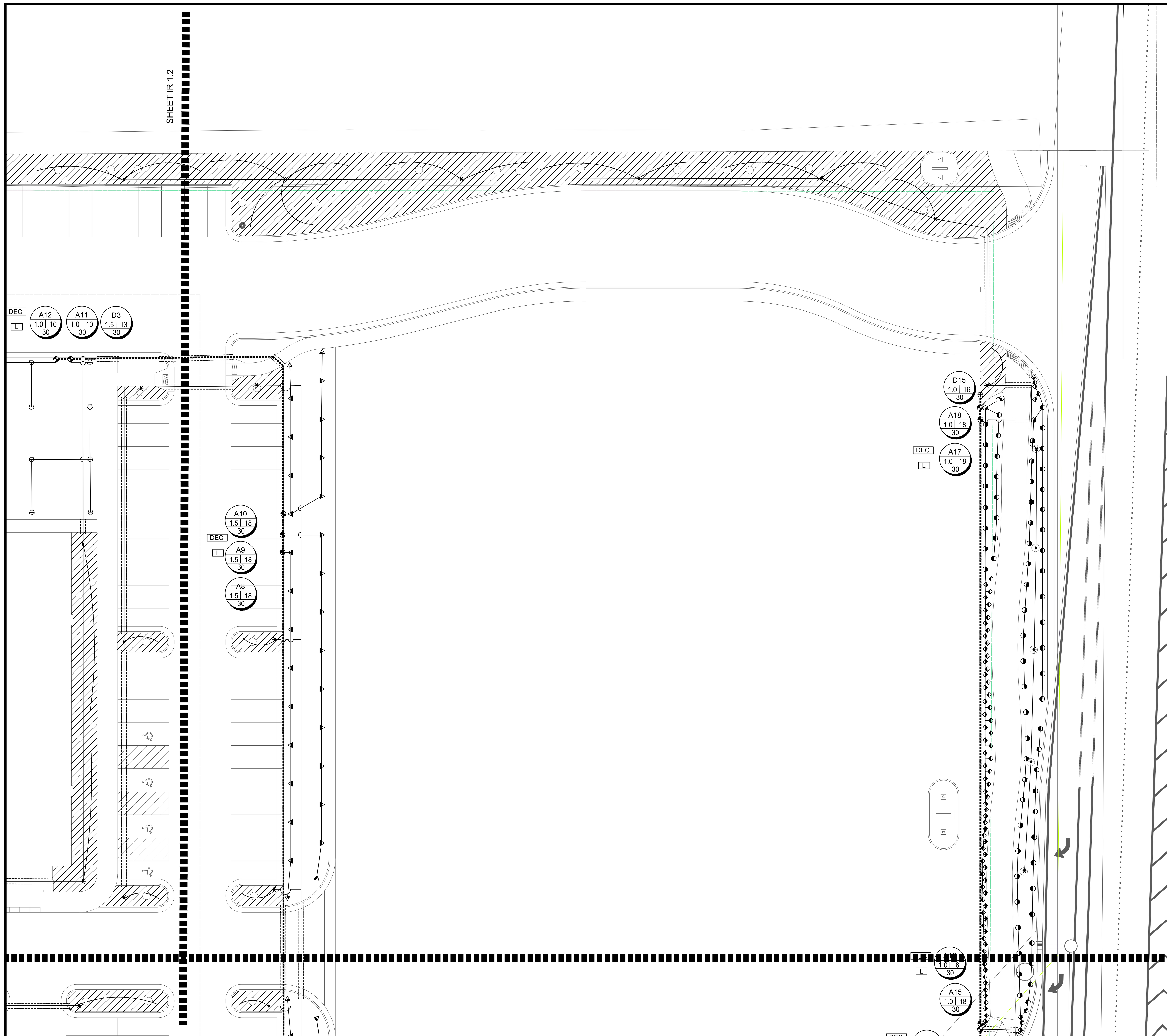
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY AINSWORTH
8128121-5301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM: JTA
DRAWN: KBA
CHECKED: TM
PLOT DATE: 7/1/2020

IRRIGATION PLAN

IR-1.0



IRRIGATION LEGEND

SYMBOL	MANUFACTURER–MODEL NUMBER	PAT.	RD.	PSI	GPM Q	GPM T	GPM H	GPM TT	GPM TQ	GPM F	QTY	REMARKS
	RAINBIRD RD04-S-PRS POP UP SPRAY 5 SERIES	Q,T,H,F	5'	30	.10	.15	.20	na	na	.40	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 8 U-SERIES	Q,T,H,F	8'	30	.26	.35	.52	na	na	1.05	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 10 U-SERIES	Q,T,H,F	10'	30	.39	.53	.79	na	na	1.58	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 U-SERIES	Q,T,H,TT	15'	30	.92	1.23	1.85	2.48	2.78	3.70	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 SST	SST	15'	30	1.21						--	
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 EST	EST	15'	30	.61							
	RAINBIRD 5000 SERIES MPR NOZZLES	Q,T,H,F	varies	30	varies	varies	varies	na	na	varies	--	
	RAINBIRD 8005 SERIES #8, #14, #26 NOZZLES	Q,T,H,F	65'	30	6.6	12.6	24.3	na	na	varies	--	
'C'	CONTROLLER: RAINBIRD ESP-LXD CONTROLLER WITH LIMR REMOTE KIT, PLACE IN LXMM PEDISTAL, CONTRACTOR TO ADJUST LOCATION WITH OWNER PRIOR TO CONSTRUCTION.										--	WALL MOUNT. COORDINATE WITH OWNER FOR EXACT LOCATION
DEC	VALVE DECODER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
L	LIGHTNING ARRESTER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
M	MASTER VALVE											SEE DETAIL
F	FLOW SENSOR											SEE DETAIL
R	RAINBIRD WR2-RC WIRELESS RAIN SHUT OFF DEVICE										--	SEE DETAIL
	POINT OF CONNECTION (SECONDARY WATER) SEE PLAN FOR SIZE										--	SEE DETAIL
	2" T SUPER AMIAD PLASTIC FILTER - INSTALL PER MANUFACTURE'S. RECOMMENDATIONS (130 MICRON)											SEE DETAIL
	QUICK COUPLER: RAINBIRD 44LRC INSTALL PER MANUFACTURER'S SPEC.										--	10" RND. VALVE BOX. SEE DETAIL
	ISOLATION BALL VALVE - LINE SIZED INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	REMOTE CONTROL VALVE: RAINBIRD PESB-NP-PRS-D AUTOMATIC CONTROL VALVE (SIZE AS NOTED ON PLAN)										--	SEE DETAIL JUMBO BOX-PURPLE LID
	DRIP CONTROL ZONE KIT: RAINBIRD XCZ-(PER PLAN)-PRBR-COM MED FLOW (SIZE AS NOTED ON PLAN)										--	SEE DETAIL
	DRIP CONNECTION. PROVIDE DRIP IRRIGATION TO ALL TREES, SHRUBS,AND PERENNIALS IN PLANTER AREAS										--	INSTALL FLUSH CAP. SEE DETAIL
	DRIP RWS-S-B-1401 (ROOT WATERING SYSTEM) PROVIDE 2 TO EACH TREE LOCATED IN THE LAWN AREAS.											SEE DETAIL
	SUB-MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 2" DIAMETER 24" MIN. COVER											SEE PIPE SIZING CHART
	LOOP MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 4" DIAMETER 24" MIN. COVER										--	SEE PIPE SIZING CHART
	LATERAL LINE: SCHEDULE 40 PVC WITH SCH. 40 FITTINGS. SEE PIPE SIZING CHART										--	SEE DETAIL
	DRIP LINE: RAINBIRD XFSP-09-18-100 OR EQUIVALENT										--	SEE DETAIL
	CLASS 200 SLEEVE PER PLAN										--	SEE DETAIL
NOT SHOWN	WIRE CHASE, SIZE TO BE TWICE THE DIAMETER OF THE WIRE BUNDLE WITHIN. 1.1/4" DIAMETER MINIMUM										--	SEE DETAIL
NOT SHOWN	14 GAUGE SOLID COPPER SINGLE STRAND CONTROL WIRE. INSTALL PER MANUFACTURER'S SPEC. PROVIDE 2 WIRE LOOP SYSTEM.										--	SEE DETAIL

DRIP ZONE

TYPE	PART NUMBER	EMITTER FLOW	EMITTER SPACING	ROW SPACING	RECOMMENDED ROW SPACING
XFSP DRIPLINE	XFS-09-18	.9 GPH	18"	18"	18-21 IN.

TOTAL DRIP ZONE FLOW	20 GPM	TIME TO APPLY 1/4" OF WATER	23
MAXIMUM LATERAL LENGTH OF TUBING	350 FT	REQUIRED NUMBER OF STAKES	500
TOTAL LENGTH OF ZONE DRIPLINE	2,000 FT (varies per plan)	NUMBER OF FLUSH POINTS	2
APPLICATION RATE	.64 INCH PER HOUR	SUGGESTED HEADER AND FOOTER PIPE SIZE	CLASS 200 1 1/4"

*NUMBERS MAY CHANGE DUE TO SIZE OF DRIP ZONE PER PLAN

90 Day Establishment Period Irrigation Schedule (April, May, June)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min	15 min	15 min	15 min	15 min	15 min	30 psi
Shrubs	Shrubs	25 min	0	25 min	0	25 min	0	25 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Regular Irrigation Schedule (see Seasonal Differential Chart)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min		15 min		15 min		30 psi
Shrubs	Shrubs	45 min		45 min		45 min		45 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Seasonal Differential

	April	May	June	July	August	Sept.	October
Turf	10 min	10 min	15 min	15 min	15 min	10 min	10 min
Shrubs	30 min	30 min	45 min	45 min	45 min	30 min	30 min

IRRIGATION NOTES

1. ALL CONNECTIONS ARE SECONDARY WATER AND SHOULD BE NOTED AS SUCH. THEREFORE ALL PARTS MUST MEET SECONDARY WATER STANDARDS.
2. ALL PIPE TO BE SCHEDULE 40 PVC PIPE. NO POLY PIPE SHALL BE INCLUDED. FITTINGS UP TO 1.1/2" MUST BE SCHEDULE 40 OR BETTER. FITTINGS LARGER THAN 1.1/2" MUST BE SCHEDULE 80 OR BETTER.
3. CONTRACTOR SHALL HAVE ALL UTILITIES BLUE STAKED PRIOR TO DIGGING. ANY DAMAGE TO THE UTILITIES SHALL BE REPAIRED AT THE EXPENSE OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER.
4. PLACE ALL IRRIGATION IN LANDSCAPE AREAS AND ON THE PROPERTY OF THE OWNER.
5. MODIFY LOCATION OF IRRIGATION COMPONENTS TO AVOID PLACING TREES, SHRUBS AND OTHER SITE ELEMENTS DIRECTLY OVER PIPE, PER PLANS. DO NOT LOCATE VALVE BOXES IN LAWN AREAS UNLESS DIRECTED TO BY LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL INSTALL A 1" THREADED TEE WITH 1" THREADED PLUG AT POINT OF CONNECTION IN ORDER TO BLOW OUT THE SYSTEM WITH AN AIR COMPRESSOR EACH FALL.
7. CONTRACTOR SHALL USE ONLY COMMERCIAL GRADE IRRIGATION PRODUCTS AND IS RESPONSIBLE FOR ENSURING ACCURATE COUNTS AND QUANTITIES OF ALL IRRIGATION MATERIALS FOR BIDDING AND INSTALLATION PURPOSES.
8. INSTALL DRIP IRRIGATION PER DETAILS. CONTRACTOR SHALL MAKE ADJUSTMENTS AS NECESSARY.
9. CONTRACTOR SHALL PROVIDE AND INSTALL SLEEVES FOR ALL PIPES AND WIRES UNDER PAVEMENT AND SIDEWALKS. SLEEVES SHALL BE 2 SIZES LARGER THAN PIPE INSIDE. ALL WIRE SHALL BE IN SEPARATE SLEEVES (NOT SHOWN). ALL CONTROL WIRE SHALL BE INSTALLED IN CLASS 200 PIPE. PLACE JUNCTION BOXES WHERE NECESSARY TO MINIMIZE LONG RUNS OR AT DIRECTIONAL CHANGES.
10. WATER LINES AND ELECTRICAL LINES MUST NOT SHARE CONDUITS. ALL WIRE CONNECTIONS MUST BE CONTAINED IN VALVE BOX WITH 3' OF EXTRA WIRE. WIRE TO BE CONNECTED TO MAIN LINE PIPE WHERE POSSIBLE WITH TAPE AT 25' INTERVALS. SLACK IN CONTROL WIRES REQUIRED AT EVERY CHANGE OF DIRECTION. WIRES MUST HAVE SEPARATE COLORS FOR COMMON, CONTROL AND SPARE. MINIMUM 1 SPARE WIRE FOR EVERY 5 VALVES. ALL CONTROL WIRES TO BE INSULATED 14 GAUGE COPPER. ALL SPARE WIRES MUST "HOME RUN" TO CONTROLLER AND SPARE WIRES AVAILABLE AT ALL VALVE MANIFOLDS AND CLUSTERS.
11. ALL SLEEVES INSTALLED SHALL BE DUCT TAPED TO PREVENT DIRT OR OTHER DEBRIS ENTERING PIPE. ALL SLEEVES SHALL BE IDENTIFIED BY WOOD OR PVC STAKES AND BE SPRAY PAINTED WITH MARKING PAINT. REMOVE STAKES ONCE IRRIGATION SYSTEM IS COMPLETE.
12. IRRIGATION SYSTEM MUST CONTAIN CHECK VALVES TO PREVENT LOW POINT DRAINAGE.
13. SPACE ALL SPRAY HEADS 2" AWAY FROM ANY HARDSCAPE.
14. CONTRACTOR SHALL MATCH PRECIPITATION RATES AS MUCH AS POSSIBLE FOR ALL LANDSCAPED AREAS. OVERHEAD IRRIGATION MUST HAVE A MINIMUM DU (DISTRIBUTION UNIFORMITY) OF 60%.
15. IRRIGATION CONTRACTOR SHALL PRESSURE TEST MAINLINE FOR LEAKS PRIOR TO BACKFILLING.
16. MAIN LINES SHALL BE 18" DEEP MIN. AND LATERAL LINES 12" DEEP MIN. NO ROCK GREATER THAN 1/2" DIAMETER SHALL BE ALLOWED IN TRENCHES. TRENCHING BACKFILL MATERIAL SHALL BE COMPACTED TO PROPER FINISHED GRADE.
17. ALL WORK SHALL BE IN ACCORDANCE WITH APPLICABLE CITY AND/OR COUNTY CODES. THE CONTRACTOR SHALL APPLY AND PAY FOR ALL NECESSARY PERMITS.
18. IRRIGATION INSTALLATION TO COMPLY WITH APPLICABLE CITY SPECIFICATIONS AND DRAWINGS.
19. ACTUAL INSTALLATION OF IRRIGATION SYSTEM MAY VARY SOMEWHAT FROM PLANS. THE CONTRACTOR IS RESPONSIBLE TO MAKE ADJUSTMENTS AS NEEDED TO ENSURE PROPER COVERAGE OF ALL LANDSCAPED AREAS.
20. CONTRACTOR SHALL INSTALL IRRIGATION SYSTEM WITH HEAD TO HEAD COVERAGE IN ALL TURF AREAS. USE VAN AND/OR U-SERIES NOZZLES AS NECESSARY TO PROVIDE PROPER COVERAGE AND TO KEEP WATER OFF OF BUILDINGS AND HARDSCAPES.
21. POWER TO CONTROLLER TO BE PROVIDED BY OWNER. OWNER TO SPECIFY EXACT LOCATION OF CONTROLLER. INSTALL PER MANUFACTURERS INSTRUCTIONS. CONTRACTOR SHALL INSTALL A RAIN SENSOR WITH CONTROLLER UNLESS OTHERWISE DIRECTED BY OWNER OR L.A.
22. INVESTIGATE TO MAKE SURE THAT THE IRRIGATION SYSTEM IS, IN FACT, BEING CONNECTED TO A SECONDARY SYSTEM. IF IT IS NOT CONNECTED TO SECONDARY, CONTACT THE OWNER AND LANDSCAPE ARCHITECT TO COORDINATE PROVISION AND INSTALLATION OF A BACKFLOW PREVENTOR.
23. LATERAL LINES SHALL BE NO SMALLER THAN 3/4". LANDSCAPE CONTRACTOR TO ENSURE THE FOLLOWING PIPE SIZES DO NOT EXCEED THE SUGGESTED GPM LISTED BELOW:

3/4"	8 GPM
1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
2-1/2"	75 GPM
3"	110 GPM
4"	180 GPM

SHEET IR 1.2

VALVE ID TAG

A1 — CONTROLLER NUMBER, VALVE NUMBER
1.0 — VALVE SIZE
18 — GALLONS PER MINUTE
55 — PSI AT LAST HEAD IN ZONE

NOTE:
1. VALVE ID TAGS ARE LOCATED NEAR VALVES IN THE ORDER THE VALVES APPEAR ON THE DRAWING

ISSUE DATE	PROJECT NUMBER
06-30-2020	UT19010

NO.	REVISION	DATE
1	XXXX	XX-XX-XX
2		
3		
4		
5		
6		
7		

PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 10' 20' 40' 80'
GRAPHIC SCALE: 1" = 20'

PROJECT INFORMATION

DI STOREHOUSE
SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
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REXBURG, ID 83440
(208)359-2309

Client / Engineer:
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3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER
PKJ DESIGN GROUP
PKJ DESIGN GROUP L.L.C.
3450 N. TRIUMPH BLVD. SUITE 102
LEHI, UTAH 84043 (801) 960-2698
www.pkjdesigngroup.com

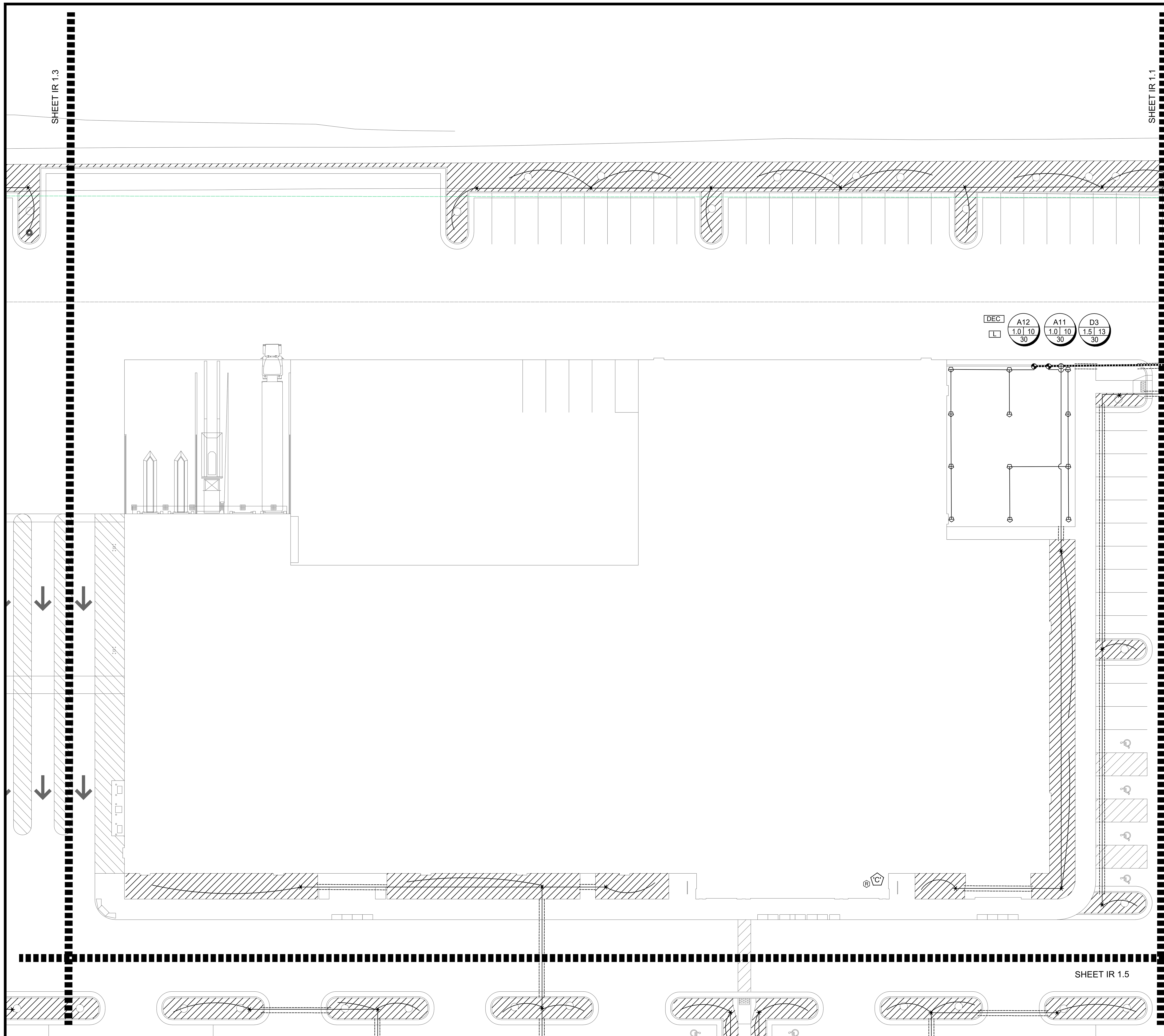
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY AINSWORTH
8128121-6301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM: JTA
DRAWN: KBA
CHECKED: TM
PLOT DATE: 1/23/2020

IRRIGATION PLAN

IR-1.1



IRRIGATION LEGEND

SYMBOL	MANUFACTURER–MODEL NUMBER	PAT.	RD.	PSI	GPM Q	GPM T	GPM H	GPM TT	GPM TQ	GPM F	QTY	REMARKS
	RAINBIRD RD04-S-PRS POP UP SPRAY 5 SERIES	Q,T,H,F	5'	30	.10	.15	.20	na	na	.40	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 8 U-SERIES	Q,T,H,F	8'	30	.26	.35	.52	na	na	1.05	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 10 U-SERIES	Q,T,H,F	10'	30	.39	.53	.79	na	na	1.58	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 U-SERIES	Q,T,H,TT	15'	30	.92	1.23	1.85	2.48	2.78	3.70	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 SST	SST	15'	30	1.21						--	
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 EST	EST	15'	30	.61							
	RAINBIRD 5000 SERIES MPR NOZZLES	Q,T,H,F	varies	30	varies	varies	varies	na	na	varies	--	
	RAINBIRD 8005 SERIES #8, #14, #26 NOZZLES	Q,T,H,F	65'	30	6.6	12.6	24.3	na	na	varies	--	
'C'	CONTROLLER: RAINBIRD ESP-LXD CONTROLLER WITH LIMR REMOTE KIT, PLACE IN LXMM PEDISTAL, CONTRACTOR TO ADJUST LOCATION WITH OWNER PRIOR TO CONSTRUCTION.										--	WALL MOUNT. COORDINATE WITH OWNER FOR EXACT LOCATION
DEC	VALVE DECODER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
L	LIGHTNING ARRESTER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
M	MASTER VALVE											SEE DETAIL
F	FLOW SENSOR											SEE DETAIL
R	RAINBIRD WR2-RC WIRELESS RAIN SHUT OFF DEVICE										--	SEE DETAIL
	POINT OF CONNECTION (SECONDARY WATER) SEE PLAN FOR SIZE										--	SEE DETAIL
	2" T SUPER AMIAD PLASTIC FILTER - INSTALL PER MANUFACTURE'S. RECOMMENDATIONS (130 MICRON)											SEE DETAIL
	QUICK COUPLER: RAINBIRD 44LRC INSTALL PER MANUFACTURER'S SPEC.										--	10" RND. VALVE BOX. SEE DETAIL
	ISOLATION BALL VALVE - LINE SIZED INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	REMOTE CONTROL VALVE: RAINBIRD PESB-NP-PRS-D AUTOMATIC CONTROL VALVE (SIZE AS NOTED ON PLAN)										--	SEE DETAIL JUMBO BOX-PURPLE LID
	DRIP CONTROL ZONE KIT: RAINBIRD XCZ-(PER PLAN)-PRBR-COM MED FLOW (SIZE AS NOTED ON PLAN)										--	SEE DETAIL
	DRIP CONNECTION. PROVIDE DRIP IRRIGATION TO ALL TREES, SHRUBS,AND PERENNIALS IN PLANTER AREAS										--	INSTALL FLUSH CAP. SEE DETAIL
	DRIP RWS-S-B-1401 (ROOT WATERING SYSTEM) PROVIDE 2 TO EACH TREE LOCATED IN THE LAWN AREAS.											SEE DETAIL
	SUB-MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 2" DIAMETER 24" MIN. COVER											SEE PIPE SIZING CHART
	LOOP MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 4" DIAMETER 24" MIN. COVER										--	SEE PIPE SIZING CHART
	LATERAL LINE: SCHEDULE 40 PVC WITH SCH. 40 FITTINGS. SEE PIPE SIZING CHART										--	SEE DETAIL
	DRIP LINE: RAINBIRD XFSP-09-18-100 OR EQUIVALENT										--	SEE DETAIL
	CLASS 200 SLEEVE PER PLAN										--	SEE DETAIL
NOT SHOWN	WIRE CHASE, SIZE TO BE TWICE THE DIAMETER OF THE WIRE BUNDLE WITHIN. 1.1/4" DIAMETER MINIMUM										--	SEE DETAIL
NOT SHOWN	14 GAUGE SOLID COPPER SINGLE STRAND CONTROL WIRE. INSTALL PER MANUFACTURER'S SPEC. PROVIDE 2 WIRE LOOP SYSTEM.										--	SEE DETAIL

DRIP ZONE

TYPE	PART NUMBER	EMITTER FLOW	EMITTER SPACING	ROW SPACING	RECOMMENDED ROW SPACING
XFSP DRIPLINE	XFS-09-18	.9 GPH	18"	18"	18-21 IN.

TOTAL DRIP ZONE FLOW	20 GPM	TIME TO APPLY 1/4" OF WATER	23
MAXIMUM LATERAL LENGTH OF TUBING	350 FT	REQUIRED NUMBER OF STAKES	500
TOTAL LENGTH OF ZONE DRIPLINE	2,000 FT (varies per plan)	NUMBER OF FLUSH POINTS	2
APPLICATION RATE	.64 INCH PER HOUR	SUGGESTED HEADER AND FOOTER PIPE SIZE	CLASS 200 1 1/4"

*NUMBERS MAY CHANGE DUE TO SIZE OF DRIP ZONE PER PLAN

90 Day Establishment Period Irrigation Schedule (April, May, June)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min	15 min	15 min	15 min	15 min	15 min	30 psi
Shrubs	Shrubs	25 min	0	25 min	0	25 min	0	25 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Regular Irrigation Schedule (see Seasonal Differential Chart)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min		15 min		15 min		30 psi
Shrubs	Shrubs	45 min		45 min		45 min		45 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Seasonal Differential

	April	May	June	July	August	Sept.	October
Turf	10 min	10 min	15 min	15 min	15 min	10 min	10 min
Shrubs	30 min	30 min	45 min	45 min	45 min	30 min	30 min

IRRIGATION NOTES

1. ALL CONNECTIONS ARE SECONDARY WATER AND SHOULD BE NOTED AS SUCH. THEREFORE ALL PARTS MUST MEET SECONDARY WATER STANDARDS.
2. ALL PIPE TO BE SCHEDULE 40 PVC PIPE. NO POLY PIPE SHALL BE INCLUDED. FITTINGS UP TO 1.1/2" MUST BE SCHEDULE 40 OR BETTER. FITTINGS LARGER THAN 1.1/2" MUST BE SCHEDULE 80 OR BETTER.
3. CONTRACTOR SHALL HAVE ALL UTILITIES BLUE STAKED PRIOR TO DIGGING. ANY DAMAGE TO THE UTILITIES SHALL BE REPAIRED AT THE EXPENSE OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER.
4. PLACE ALL IRRIGATION IN LANDSCAPE AREAS AND ON THE PROPERTY OF THE OWNER.
5. MODIFY LOCATION OF IRRIGATION COMPONENTS TO AVOID PLACING TREES, SHRUBS AND OTHER SITE ELEMENTS DIRECTLY OVER PIPE, PER PLANS. DO NOT LOCATE VALVE BOXES IN LAWN AREAS UNLESS DIRECTED TO BY LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL INSTALL A 1" THREADED TEE WITH 1" THREADED PLUG AT POINT OF CONNECTION IN ORDER TO BLOW OUT THE SYSTEM WITH AN AIR COMPRESSOR EACH FALL.
7. CONTRACTOR SHALL USE ONLY COMMERCIAL GRADE IRRIGATION PRODUCTS AND IS RESPONSIBLE FOR ENSURING ACCURATE COUNTS AND QUANTITIES OF ALL IRRIGATION MATERIALS FOR BIDDING AND INSTALLATION PURPOSES.
8. INSTALL DRIP IRRIGATION PER DETAILS. CONTRACTOR SHALL MAKE ADJUSTMENTS AS NECESSARY.
9. CONTRACTOR SHALL PROVIDE AND INSTALL SLEEVES FOR ALL PIPES AND WIRES UNDER PAVEMENT AND SIDEWALKS. SLEEVES SHALL BE 2 SIZES LARGER THAN PIPE INSIDE. ALL WIRE SHALL BE IN SEPARATE SLEEVES (NOT SHOWN). ALL CONTROL WIRE SHALL BE INSTALLED IN CLASS 200 PIPE. PLACE JUNCTION BOXES WHERE NECESSARY TO MINIMIZE LONG RUNS OR AT DIRECTIONAL CHANGES.
10. WATER LINES AND ELECTRICAL LINES MUST NOT SHARE CONDUITS. ALL WIRE CONNECTIONS MUST BE CONTAINED IN VALVE BOX WITH 3' OF EXTRA WIRE. WIRE TO BE CONNECTED TO MAIN LINE PIPE WHERE POSSIBLE WITH TAPE AT 25' INTERVALS. SLACK IN CONTROL WIRES REQUIRED AT EVERY CHANGE OF DIRECTION. WIRES MUST HAVE SEPARATE COLORS FOR COMMON, CONTROL AND SPARE. MINIMUM 1 SPARE WIRE FOR EVERY 5 VALVES. ALL CONTROL WIRES TO BE INSULATED 14 GAUGE COPPER. ALL SPARE WIRES MUST "HOME RUN" TO CONTROLLER AND SPARE WIRES AVAILABLE AT ALL VALVE MANIFOLDS AND CLUSTERS.
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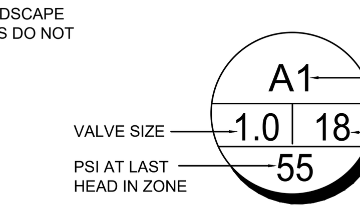
12. IRRIGATION SYSTEM MUST CONTAIN CHECK VALVES TO PREVENT LOW POINT DRAINAGE.
13. SPACE ALL SPRAY HEADS 2" AWAY FROM ANY HARDSCAPE.
14. CONTRACTOR SHALL MATCH PRECIPITATION RATES AS MUCH AS POSSIBLE FOR ALL LANDSCAPED AREAS. OVERHEAD IRRIGATION MUST HAVE A MINIMUM DU (DISTRIBUTION UNIFORMITY) OF 60%.
15. IRRIGATION CONTRACTOR SHALL PRESSURE TEST MAINLINE FOR LEAKS PRIOR TO BACKFILLING.
16. MAIN LINES SHALL BE 18" DEEP MIN. AND LATERAL LINES 12" DEEP MIN. NO ROCK GREATER THAN 1/2" DIAMETER SHALL BE ALLOWED IN TRENCHES. TRENCHING BACKFILL MATERIAL SHALL BE COMPACTED TO PROPER FINISHED GRADE.
17. ALL WORK SHALL BE IN ACCORDANCE WITH APPLICABLE CITY AND/OR COUNTY CODES. THE CONTRACTOR SHALL APPLY AND PAY FOR ALL NECESSARY PERMITS.
18. IRRIGATION INSTALLATION TO COMPLY WITH APPLICABLE CITY SPECIFICATIONS AND DRAWINGS.
19. ACTUAL INSTALLATION OF IRRIGATION SYSTEM MAY VARY SOMEWHAT FROM PLANS. THE CONTRACTOR IS RESPONSIBLE TO MAKE ADJUSTMENTS AS NEEDED TO ENSURE PROPER COVERAGE OF ALL LANDSCAPED AREAS.
20. CONTRACTOR SHALL INSTALL IRRIGATION SYSTEM WITH HEAD TO HEAD COVERAGE IN ALL TURF AREAS. USE VAN AND/OR U-SERIES NOZZLES AS NECESSARY TO PROVIDE PROPER COVERAGE AND TO KEEP WATER OFF OF BUILDINGS AND HARDSCAPES.
21. POWER TO CONTROLLER TO BE PROVIDED BY OWNER. OWNER TO SPECIFY EXACT LOCATION OF CONTROLLER. INSTALL PER MANUFACTURERS INSTRUCTIONS. CONTRACTOR SHALL INSTALL A RAIN SENSOR WITH CONTROLLER UNLESS OTHERWISE DIRECTED BY OWNER OR L.A.
22. INVESTIGATE TO MAKE SURE THAT THE IRRIGATION SYSTEM IS, IN FACT, BEING CONNECTED TO A SECONDARY SYSTEM. IF IT IS NOT CONNECTED TO SECONDARY, CONTACT THE OWNER AND LANDSCAPE ARCHITECT TO COORDINATE PROVISION AND INSTALLATION OF A BACKFLOW PREVENTOR.
23. LATERAL LINES SHALL BE NO SMALLER THAN 3/4". LANDSCAPE CONTRACTOR TO ENSURE THE FOLLOWING PIPE SIZES DO NOT EXCEED THE SUGGESTED GPM LISTED BELOW:

3/4"	8 GPM
1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
2-1/2"	75 GPM
3"	110 GPM
4"	180 GPM

VALVE ID TAG



NOTE:
1. VALVE ID TAGS ARE LOCATED NEAR VALVES IN THE ORDER THE VALVES APPEAR ON THE DRAWING

ISSUE DATE: 06-30-2020
PROJECT NUMBER: UT19010

NO.	REVISION	DATE
1	XXXX	XX-XX-XX
2		
3		
4		
5		
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7		

PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 10' 20' 40' 80'
GRAPHIC SCALE: 1" = 20'

PROJECT INFORMATION

DI STOREHOUSE
SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
LEI-ENGINEERING
3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER

PKJ DESIGN GROUP L.L.C.
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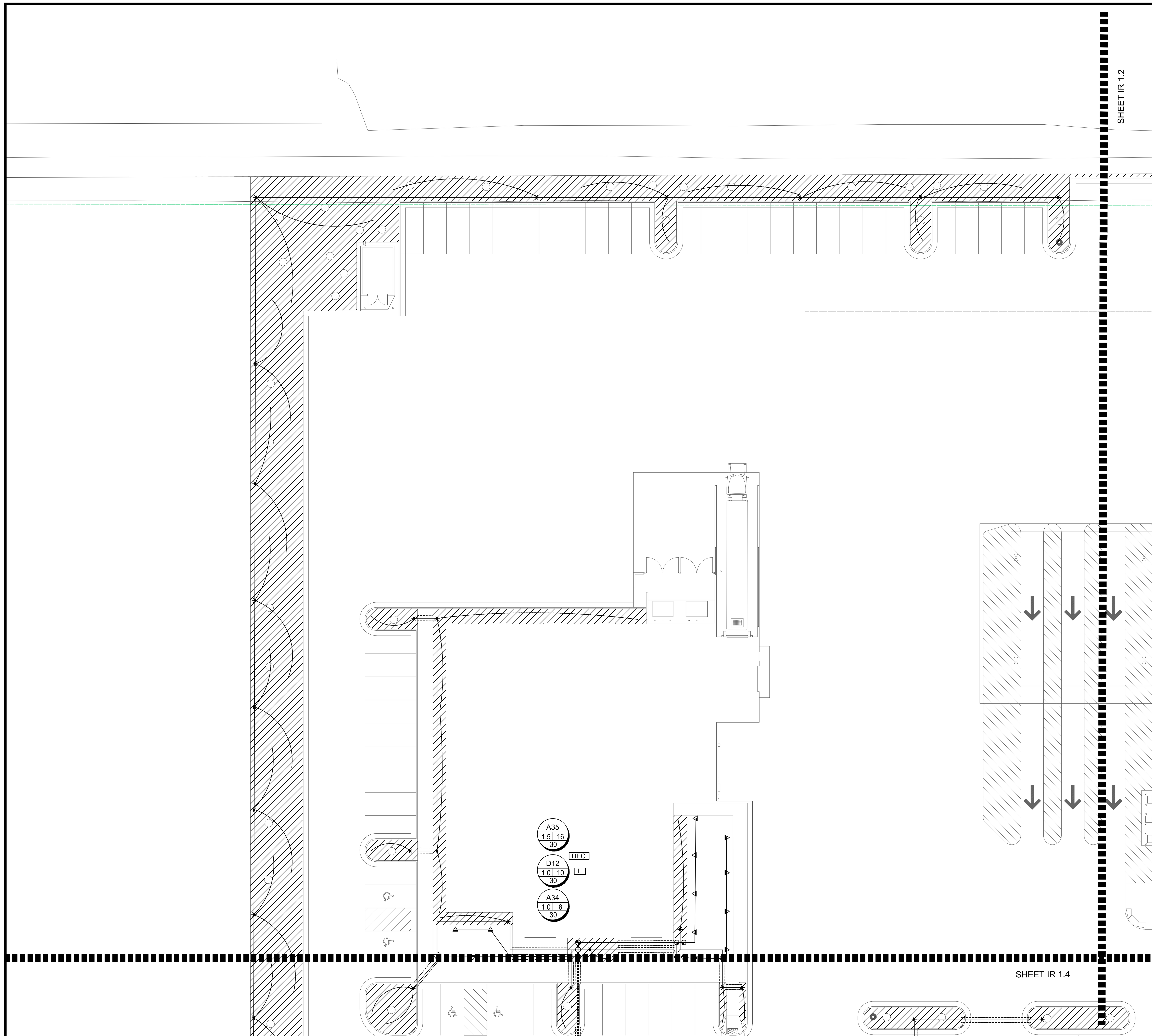
JEREMY AINSWORTH
8128121-6301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM: JTA
DRAWN: KBA
CHECKED: TM
PLOT DATE: 1/23/2020

IRRIGATION PLAN

IR-1.2



IRRIGATION LEGEND

SYMBOL	MANUFACTURER–MODEL NUMBER	PAT.	RD.	PSI	GPM Q	GPM T	GPM H	GPM TT	GPM TQ	GPM F	QTY	REMARKS
	RAINBIRD RD04-S-PRS POP UP SPRAY 5 SERIES	Q,T,H,F	5'	30	.10	.15	.20	na	na	.40	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 8 U-SERIES	Q,T,H,F	8'	30	.26	.35	.52	na	na	1.05	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 10 U-SERIES	Q,T,H,F	10'	30	.39	.53	.79	na	na	1.58	--	USE HE-VAN NOZZLES AS NECESSARY
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'C'	CONTROLLER: RAINBIRD ESP-LXD CONTROLLER WITH LIMR REMOTE KIT, PLACE IN LXMM PEDISTAL, CONTRACTOR TO ADJUST LOCATION WITH OWNER PRIOR TO CONSTRUCTION.										--	WALL MOUNT. COORDINATE WITH OWNER FOR EXACT LOCATION
DEC	VALVE DECODER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
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	MASTER VALVE											SEE DETAIL
	FLOW SENSOR											SEE DETAIL
	RAINBIRD WR2-RC WIRELESS RAIN SHUT OFF DEVICE										--	SEE DETAIL
	POINT OF CONNECTION (SECONDARY WATER) SEE PLAN FOR SIZE										--	SEE DETAIL
	2" T SUPER AMIAD PLASTIC FILTER - INSTALL PER MANUFACTURE'S. RECOMMENDATIONS (130 MICRON)											SEE DETAIL
	QUICK COUPLER: RAINBIRD 44LRC INSTALL PER MANUFACTURER'S SPEC.										--	10" RND. VALVE BOX. SEE DETAIL
	ISOLATION BALL VALVE - LINE SIZED INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	REMOTE CONTROL VALVE: RAINBIRD PESB-NP-PRS-D AUTOMATIC CONTROL VALVE (SIZE AS NOTED ON PLAN)										--	SEE DETAIL JUMBO BOX-PURPLE LID
	DRIP CONTROL ZONE KIT: RAINBIRD XCZ-(PER PLAN)-PRBR-COM MED FLOW (SIZE AS NOTED ON PLAN)										--	SEE DETAIL
	DRIP CONNECTION. PROVIDE DRIP IRRIGATION TO ALL TREES, SHRUBS,AND PERENNIALS IN PLANTER AREAS										--	INSTALL FLUSH CAP. SEE DETAIL
	DRIP RWS-S-B-1401 (ROOT WATERING SYSTEM) PROVIDE 2 TO EACH TREE LOCATED IN THE LAWN AREAS.											SEE DETAIL
	SUB-MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 2" DIAMETER 24" MIN. COVER											SEE PIPE SIZING CHART
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DRIP ZONE

TYPE	PART NUMBER	EMITTER FLOW	EMITTER SPACING	ROW SPACING	RECOMMENDED ROW SPACING
XFSP DRIPLINE	XFS-09-18	.9 GPH	18"	18"	18-21 IN.

TOTAL DRIP ZONE FLOW	20 GPM	TIME TO APPLY 1/4" OF WATER	23
MAXIMUM LATERAL LENGTH OF TUBING	350 FT	REQUIRED NUMBER OF STAKES	500
TOTAL LENGTH OF ZONE DRIPLINE	2,000 FT (varies per plan)	NUMBER OF FLUSH POINTS	2
APPLICATION RATE	.64 INCH PER HOUR	SUGGESTED HEADER AND FOOTER PIPE SIZE	CLASS 200 1 1/4"

*NUMBERS MAY CHANGE DUE TO SIZE OF DRIP ZONE PER PLAN

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12. IRRIGATION SYSTEM MUST CONTAIN CHECK VALVES TO PREVENT LOW POINT DRAINAGE.
13. SPACE ALL SPRAY HEADS 2" AWAY FROM ANY HARDSCAPE.
14. CONTRACTOR SHALL MATCH PRECIPITATION RATES AS MUCH AS POSSIBLE FOR ALL LANDSCAPED AREAS. OVERHEAD IRRIGATION MUST HAVE A MINIMUM DU (DISTRIBUTION UNIFORMITY) OF 60%.
15. IRRIGATION CONTRACTOR SHALL PRESSURE TEST MAINLINE FOR LEAKS PRIOR TO BACKFILLING.
16. MAIN LINES SHALL BE 18" DEEP MIN. AND LATERAL LINES 12" DEEP MIN. NO ROCK GREATER THAN 1/2" DIAMETER SHALL BE ALLOWED IN TRENCHES. TRENCHING BACKFILL MATERIAL SHALL BE COMPACTED TO PROPER FINISHED GRADE.
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3/4"	8 GPM
1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
2-1/2"	75 GPM
3"	110 GPM
4"	180 GPM

VALVE ID TAG

A1 — CONTROLLER NUMBER, VALVE NUMBER
VALVE SIZE — 1.0 | 18 — GALLONS PER MINUTE
PSI AT LAST HEAD IN ZONE — 55

NOTE:
1. VALVE ID TAGS ARE LOCATED NEAR VALVES IN THE ORDER THE VALVES APPEAR ON THE DRAWING

ISSUE DATE	PROJECT NUMBER
06-30-2020	UT19010

NO.	REVISION	DATE
1	XXXX	XX-XX-XX
2		
3		
4		
5		
6		
7		

PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 10' 20' 40' 80'
GRAPHIC SCALE: 1" = 20'

PROJECT INFORMATION

DI STOREHOUSE

SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
LEI-ENGINEERING
3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER
PKJ DESIGN GROUP
PKJ DESIGN GROUP L.L.C.
3450 N. TRIUMPH BLVD. SUITE 102
LEHI, UTAH 84043 (801) 960-2698
www.pkjdesigngroup.com

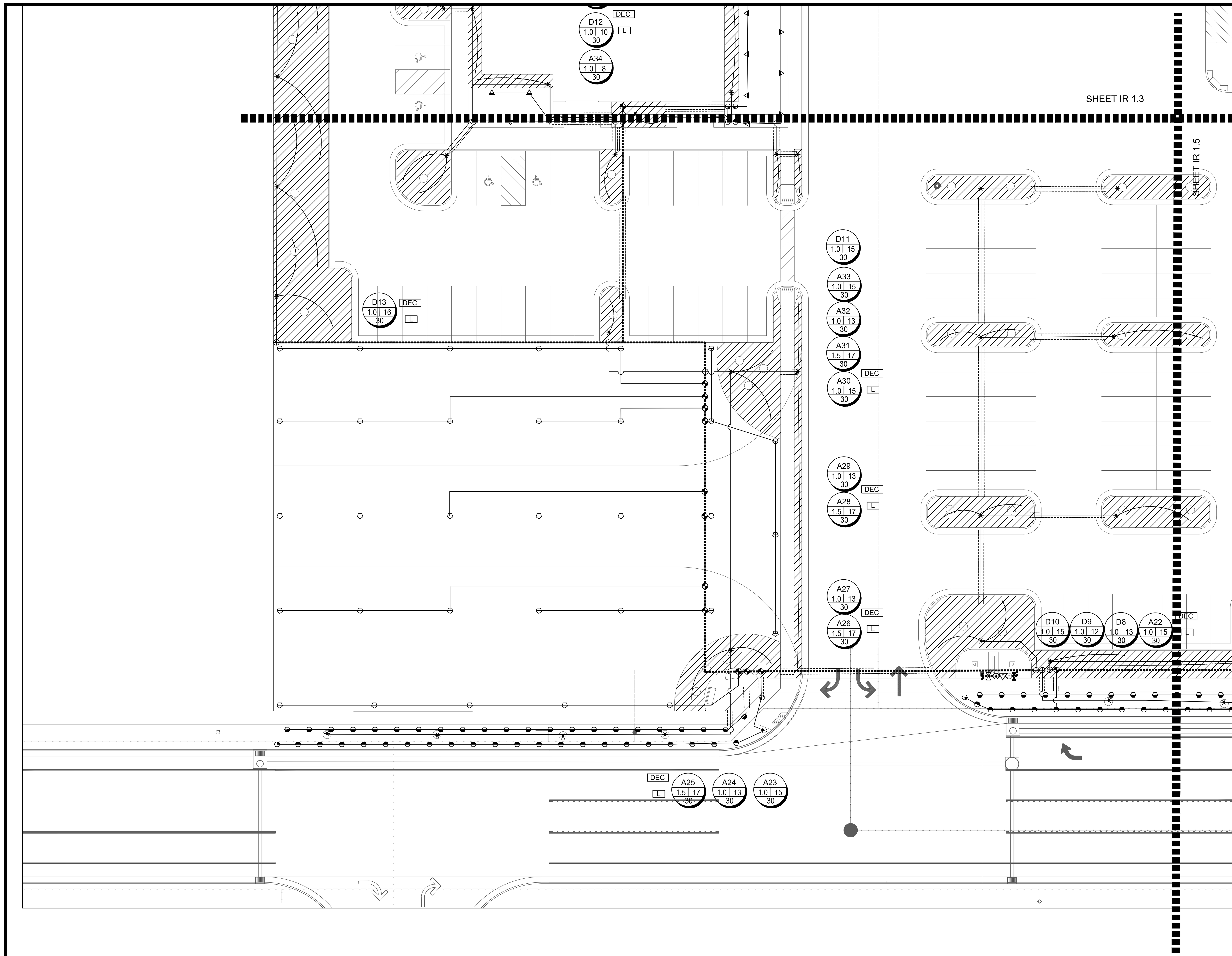
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY AINSWORTH
8128121-6301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM: JTA
DRAWN: KBA
CHECKED: TM
PLOT DATE: 1/23/2020

IRRIGATION PLAN

IR-1.3



IRRIGATION LEGEND

SYMBOL	MANUFACTURER-MODEL NUMBER	PAT.	RD.	PSI	GPM Q	GPM T	GPM H	GPM TT	GPM TQ	GPM F	QTY	REMARKS
	RAINBIRD RD04-S-PRS POP UP SPRAY 5 SERIES	Q,T,H,F	5'	30	.10	.15	.20	na	na	.40	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 8 U-SERIES	Q,T,H,F	8'	30	.26	.35	.52	na	na	1.05	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 10 U-SERIES	Q,T,H,F	10'	30	.39	.53	.79	na	na	1.58	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 U-SERIES	Q,T,H,TT	15'	30	.92	1.23	1.85	2.48	2.78	3.70	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 SST	SST	15'	30	1.21						--	
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 EST	EST	15'	30	.61							
	RAINBIRD 5000 SERIES MPR NOZZLES	Q,T,H,F	varies	30	varies	varies	varies	na	na	varies	--	
	RAINBIRD 8005 SERIES #8, #14, #26 NOZZLES	Q,T,H,F	65'	30	6.6	12.6	24.3	na	na	varies	--	
'C'	CONTROLLER: RAINBIRD ESP-LXD CONTROLLER WITH LIMR REMOTE KIT, PLACE IN LXMM PEDISTAL, CONTRACTOR TO ADJUST LOCATION WITH OWNER PRIOR TO CONSTRUCTION.										--	WALL MOUNT. COORDINATE WITH OWNER FOR EXACT LOCATION
DEC	VALVE DECODER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
L	LIGHTNING ARRESTER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	MASTER VALVE											SEE DETAIL
	FLOW SENSOR											SEE DETAIL
	RAINBIRD WR2-RC WIRELESS RAIN SHUT OFF DEVICE										--	SEE DETAIL
	POINT OF CONNECTION (SECONDARY WATER) SEE PLAN FOR SIZE										--	SEE DETAIL
	2" T SUPER AMIAD PLASTIC FILTER - INSTALL PER MANUFACTURE'S. RECOMMENDATIONS (130 MICRON)											SEE DETAIL
	QUICK COUPLER: RAINBIRD 44LRC INSTALL PER MANUFACTURER'S SPEC.										--	10" RND. VALVE BOX. SEE DETAIL
	ISOLATION BALL VALVE - LINE SIZED INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	REMOTE CONTROL VALVE: RAINBIRD PESB-NP-PRS-D AUTOMATIC CONTROL VALVE (SIZE AS NOTED ON PLAN)										--	SEE DETAIL JUMBO BOX-PURPLE LID
	DRIP CONTROL ZONE KIT: RAINBIRD XCZ-(PER PLAN)-PRBR-COM MED FLOW (SIZE AS NOTED ON PLAN)										--	SEE DETAIL
	DRIP CONNECTION. PROVIDE DRIP IRRIGATION TO ALL TREES, SHRUBS,AND PERENNIALS IN PLANTER AREAS										--	INSTALL FLUSH CAP. SEE DETAIL
	DRIP RWS-S-B-1401 (ROOT WATERING SYSTEM) PROVIDE 2 TO EACH TREE LOCATED IN THE LAWN AREAS.											SEE DETAIL
	SUB-MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 2" DIAMETER 24" MIN. COVER											SEE PIPE SIZING CHART
	LOOP MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 4" DIAMETER 24" MIN. COVER										--	SEE PIPE SIZING CHART
	LATERAL LINE: SCHEDULE 40 PVC WITH SCH. 40 FITTINGS. SEE PIPE SIZING CHART										--	SEE DETAIL
	DRIP LINE: RAINBIRD XFSP-09-18-100 OR EQUIVALENT										--	SEE DETAIL
	CLASS 200 SLEEVE PER PLAN										--	SEE DETAIL
NOT SHOWN	WIRE CHASE, SIZE TO BE TWICE THE DIAMETER OF THE WIRE BUNDLE WITHIN. 1.1/4" DIAMETER MINIMUM										--	SEE DETAIL
NOT SHOWN	14 GAUGE SOLID COPPER SINGLE STRAND CONTROL WIRE. INSTALL PER MANUFACTURER'S SPEC. PROVIDE 2 WIRE LOOP SYSTEM.										--	SEE DETAIL

DRIP ZONE

TYPE	PART NUMBER	EMITTER FLOW	EMITTER SPACING	ROW SPACING	RECOMMENDED ROW SPACING
XFSP DRIPLINE	XFS-09-18	.9 GPH	18"	18"	18-21 IN.

TOTAL DRIP ZONE FLOW	20 GPM	TIME TO APPLY 1/4" OF WATER	23
MAXIMUM LATERAL LENGTH OF TUBING	350 FT	REQUIRED NUMBER OF STAKES	500
TOTAL LENGTH OF ZONE DRIPLINE	2,000 FT (varies per plan)	NUMBER OF FLUSH POINTS	2
APPLICATION RATE	.64 INCH PER HOUR	SUGGESTED HEADER AND FOOTER PIPE SIZE	CLASS 200 1 1/4"

*NUMBERS MAY CHANGE DUE TO SIZE OF DRIP ZONE PER PLAN

90 Day Establishment Period Irrigation Schedule (April, May, June)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min	15 min	15 min	15 min	15 min	15 min	30 psi
Shrubs	Shrubs	25 min	0	25 min	0	25 min	0	25 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Regular Irrigation Schedule (see Seasonal Differential Chart)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min		15 min		15 min		30 psi
Shrubs	Shrubs	45 min		45 min		45 min		45 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Seasonal Differential

	April	May	June	July	August	Sept.	October
Turf	10 min	10 min	15 min	15 min	15 min	10 min	10 min
Shrubs	30 min	30 min	45 min	45 min	45 min	30 min	30 min

IRRIGATION NOTES

1. ALL CONNECTIONS ARE SECONDARY WATER AND SHOULD BE NOTED AS SUCH. THEREFORE ALL PARTS MUST MEET SECONDARY WATER STANDARDS.
2. ALL PIPE TO BE SCHEDULE 40 PVC PIPE. NO POLY PIPE SHALL BE INCLUDED. FITTINGS UP TO 1.1/2" MUST BE SCHEDULE 40 OR BETTER. FITTINGS LARGER THAN 1.1/2" MUST BE SCHEDULE 80 OR BETTER.
3. CONTRACTOR SHALL HAVE ALL UTILITIES BLUE STAKED PRIOR TO DIGGING. ANY DAMAGE TO THE UTILITIES SHALL BE REPAIRED AT THE EXPENSE OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER.
4. PLACE ALL IRRIGATION IN LANDSCAPE AREAS AND ON THE PROPERTY OF THE OWNER.
5. MODIFY LOCATION OF IRRIGATION COMPONENTS TO AVOID PLACING TREES, SHRUBS AND OTHER SITE ELEMENTS DIRECTLY OVER PIPE, PER PLANS. DO NOT LOCATE VALVE BOXES IN LAWN AREAS UNLESS DIRECTED TO BY LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL INSTALL A 1" THREADED TEE WITH 1" THREADED PLUG AT POINT OF CONNECTION IN ORDER TO BLOW OUT THE SYSTEM WITH AN AIR COMPRESSOR EACH FALL.
7. CONTRACTOR SHALL USE ONLY COMMERCIAL GRADE IRRIGATION PRODUCTS AND IS RESPONSIBLE FOR ENSURING ACCURATE COUNTS AND QUANTITIES OF ALL IRRIGATION MATERIALS FOR BIDDING AND INSTALLATION PURPOSES.
8. INSTALL DRIP IRRIGATION PER DETAILS. CONTRACTOR SHALL MAKE ADJUSTMENTS AS NECESSARY.
9. CONTRACTOR SHALL PROVIDE AND INSTALL SLEEVES FOR ALL PIPES AND WIRES UNDER PAVEMENT AND SIDEWALKS. SLEEVES SHALL BE 2 SIZES LARGER THAN PIPE INSIDE. ALL WIRE SHALL BE IN SEPARATE SLEEVES (NOT SHOWN). ALL CONTROL WIRE SHALL BE INSTALLED IN CLASS 200 PIPE. PLACE JUNCTION BOXES WHERE NECESSARY TO MINIMIZE LONG RUNS OR AT DIRECTIONAL CHANGES.
10. WATER LINES AND ELECTRICAL LINES MUST NOT SHARE CONDUITS. ALL WIRE CONNECTIONS MUST BE CONTAINED IN VALVE BOX WITH 3' OF EXTRA WIRE. WIRE TO BE CONNECTED TO MAIN LINE PIPE WHERE POSSIBLE WITH TAPE AT 25' INTERVALS. SLACK IN CONTROL WIRES REQUIRED AT EVERY CHANGE OF DIRECTION. WIRES MUST HAVE SEPARATE COLORS FOR COMMON, CONTROL AND SPARE. MINIMUM 1 SPARE WIRE FOR EVERY 5 VALVES. ALL CONTROL WIRES TO BE INSULATED 14 GAUGE COPPER. ALL SPARE WIRES MUST "HOME RUN" TO CONTROLLER AND SPARE WIRES AVAILABLE AT ALL VALVE MANIFOLDS AND CLUSTERS.
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12. IRRIGATION SYSTEM MUST CONTAIN CHECK VALVES TO PREVENT LOW POINT DRAINAGE.
13. SPACE ALL SPRAY HEADS 2" AWAY FROM ANY HARDSCAPE.
14. CONTRACTOR SHALL MATCH PRECIPITATION RATES AS MUCH AS POSSIBLE FOR ALL LANDSCAPED AREAS. OVERHEAD IRRIGATION MUST HAVE A MINIMUM DU (DISTRIBUTION UNIFORMITY) OF 60%.
15. IRRIGATION CONTRACTOR SHALL PRESSURE TEST MAINLINE FOR LEAKS PRIOR TO BACKFILLING.
16. MAIN LINES SHALL BE 18" DEEP MIN. AND LATERAL LINES 12" DEEP MIN. NO ROCK GREATER THAN 1/2" DIAMETER SHALL BE ALLOWED IN TRENCHES. TRENCHING BACKFILL MATERIAL SHALL BE COMPACTED TO PROPER FINISHED GRADE.
17. ALL WORK SHALL BE IN ACCORDANCE WITH APPLICABLE CITY AND/OR COUNTY CODES. THE CONTRACTOR SHALL APPLY AND PAY FOR ALL NECESSARY PERMITS.
18. IRRIGATION INSTALLATION TO COMPLY WITH APPLICABLE CITY SPECIFICATIONS AND DRAWINGS.
19. ACTUAL INSTALLATION OF IRRIGATION SYSTEM MAY VARY SOMEWHAT FROM PLANS. THE CONTRACTOR IS RESPONSIBLE TO MAKE ADJUSTMENTS AS NEEDED TO ENSURE PROPER COVERAGE OF ALL LANDSCAPED AREAS.
20. CONTRACTOR SHALL INSTALL IRRIGATION SYSTEM WITH HEAD TO HEAD COVERAGE IN ALL TURF AREAS. USE VAN AND/OR U-SERIES NOZZLES AS NECESSARY TO PROVIDE PROPER COVERAGE AND TO KEEP WATER OFF OF BUILDINGS AND HARDSCAPES.
21. POWER TO CONTROLLER TO BE PROVIDED BY OWNER. OWNER TO SPECIFY EXACT LOCATION OF CONTROLLER. INSTALL PER MANUFACTURERS INSTRUCTIONS. CONTRACTOR SHALL INSTALL A RAIN SENSOR WITH CONTROLLER UNLESS OTHERWISE DIRECTED BY OWNER OR L.A.
22. INVESTIGATE TO MAKE SURE THAT THE IRRIGATION SYSTEM IS, IN FACT, BEING CONNECTED TO A SECONDARY SYSTEM. IF IT IS NOT CONNECTED TO SECONDARY, CONTACT THE OWNER AND LANDSCAPE ARCHITECT TO COORDINATE PROVISION AND INSTALLATION OF A BACKFLOW PREVENTOR.
23. LATERAL LINES SHALL BE NO SMALLER THAN 3/4". LANDSCAPE CONTRACTOR TO ENSURE THE FOLLOWING PIPE SIZES DO NOT EXCEED THE SUGGESTED GPM LISTED BELOW:

3/4"	8 GPM
1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
2-1/2"	75 GPM
3"	110 GPM
4"	180 GPM

VALVE ID TAG

A1 — CONTROLLER NUMBER, VALVE NUMBER
1.0 — VALVE SIZE
18 — GALLONS PER MINUTE
55 — PSI AT LAST HEAD IN ZONE

NOTE:
1. VALVE ID TAGS ARE LOCATED NEAR VALVES IN THE ORDER THE VALVES APPEAR ON THE DRAWING

ISSUE DATE: 06-30-2020
PROJECT NUMBER: UT19010

NO.	REVISION	DATE
1	XXXX	XX-XX-XX
2		
3		
4		
5		
6		
7		

PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 10' 20' 40' 80'
GRAPHIC SCALE: 1" = 20'

PROJECT INFORMATION

DI STOREHOUSE

SARATOGA SPRINGS, UTAH

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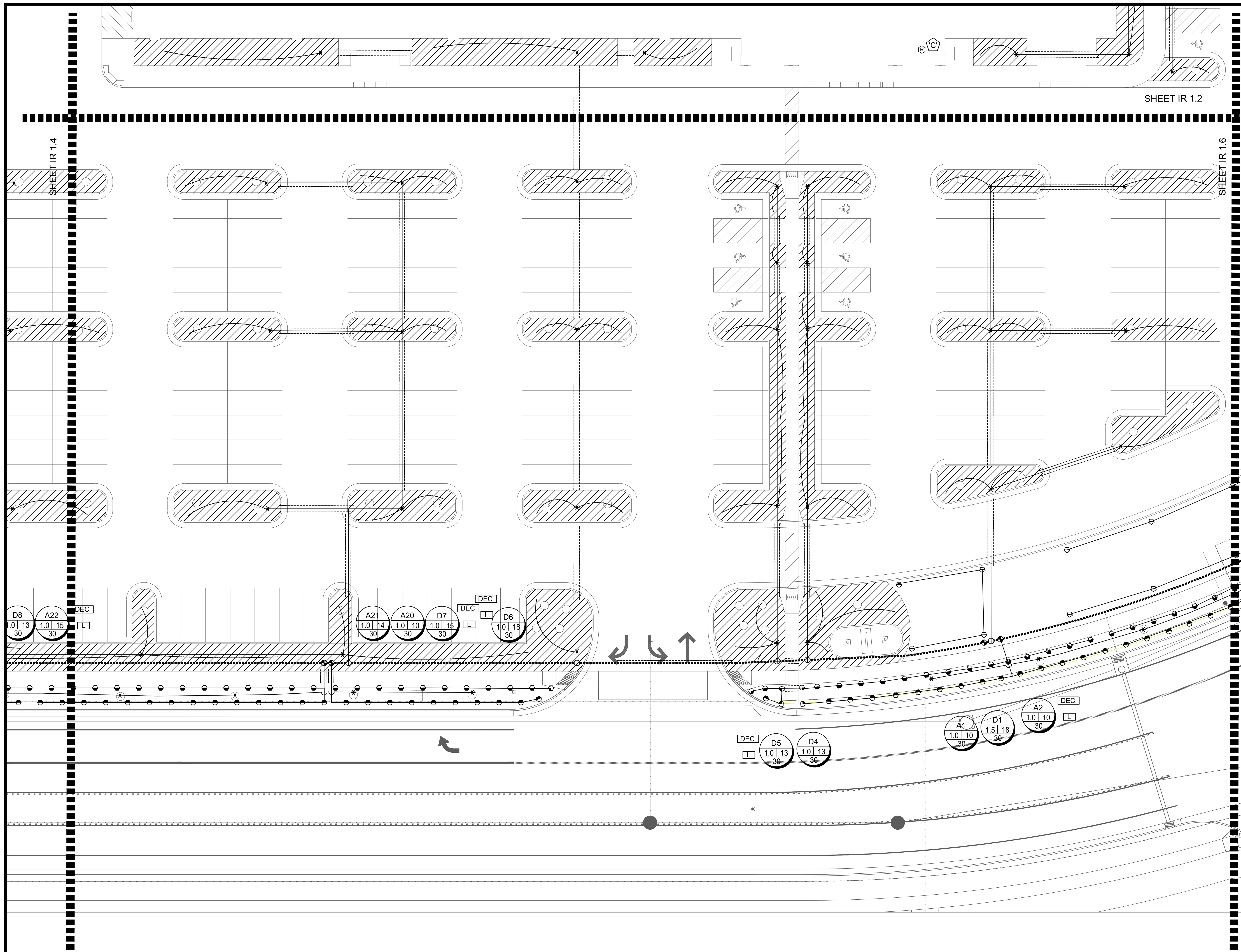
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY AINSWORTH
8128121-6301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM: JTA
DRAWN: KBA
CHECKED: TM
PLOT DATE: 1/23/2020

IRRIGATION PLAN

IR-1.4



IRRIGATION LEGEND

SYMBOL	MANUFACTURER–MODEL NUMBER	PAT.	RD.	PSI	GPM Q	GPM T	GPM H	GPM TT	GPM TQ	GPM F	QTY	REMARKS
	RAINBIRD RD04-S-PRS POP UP SPRAY 5 SERIES	Q,T,H,F	5'	30	.10	.15	.20	na	na	.40	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 8 U-SERIES	Q,T,H,F	8'	30	.26	.35	.52	na	na	1.05	--	USE HE-VAN NOZZLES AS NECESSARY
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DRIP ZONE

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Regular Irrigation Schedule (see Seasonal Differential Chart)

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1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
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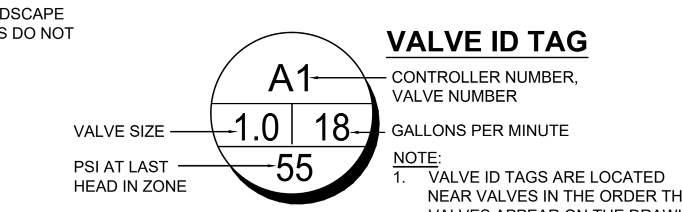
3"	110 GPM
4"	180 GPM

VALVE ID TAG



NOTE:
1. VALVE ID TAGS ARE LOCATED NEAR VALVES IN THE ORDER THE VALVES APPEAR ON THE DRAWING

ISSUE DATE	PROJECT NUMBER
06-30-2020	UT19010

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PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

N

0' 10' 20' 40' 80'
GRAPHIC SCALE: 1" = 20'

PROJECT INFORMATION

DI STOREHOUSE
SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
LEI-ENGINEERING
3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER

PKJ DESIGN GROUP
PKJ DESIGN GROUP L.L.C.
3450 N. TRIUMPH BLVD. SUITE 102
LEHI, UTAH 84043 (801) 960-2698
www.pkjdesigngroup.com

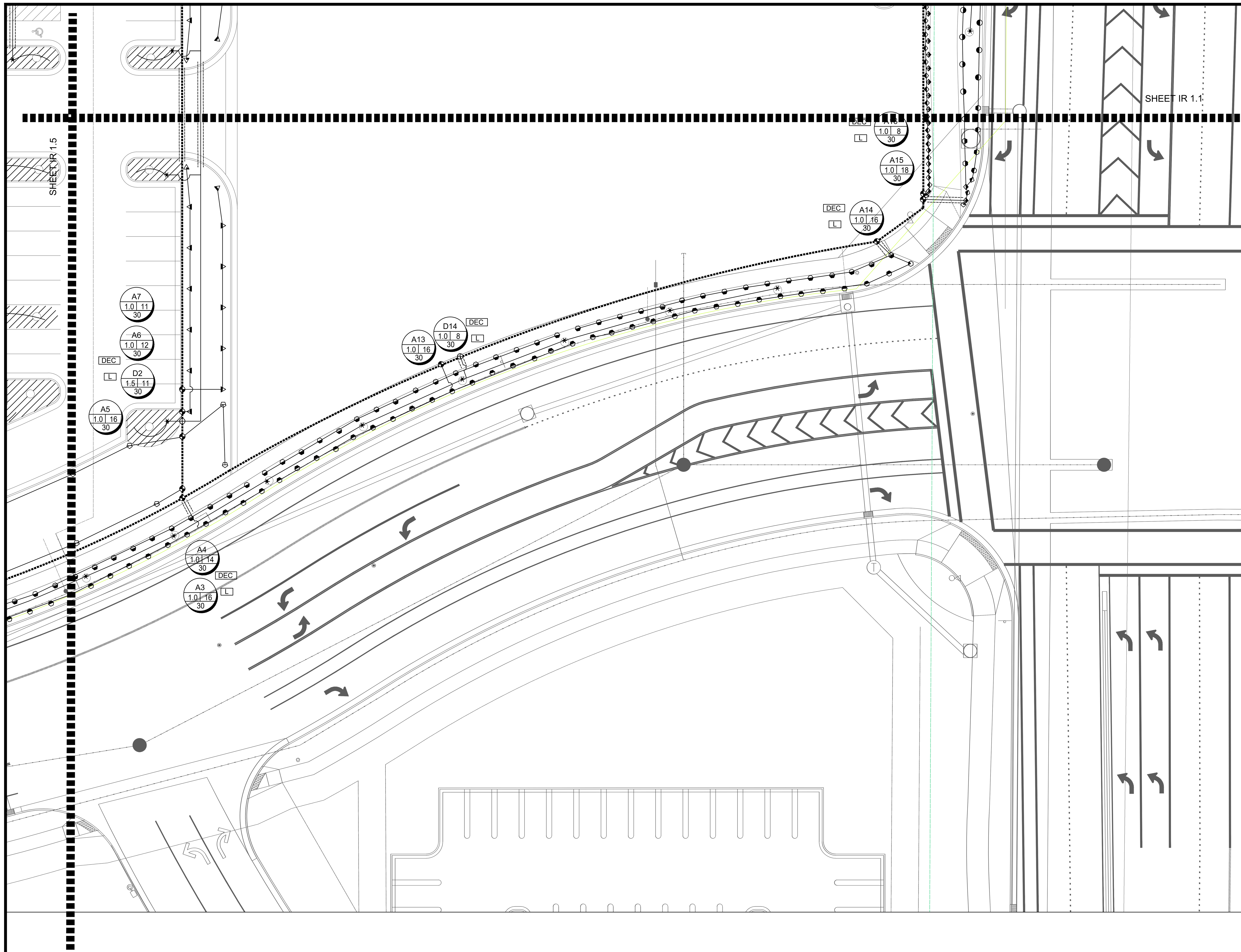
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT
JEREMY AINSWORTH
8128121-6301
06/30/2020
ELECTRONIC SEAL
STATE OF UTAH

PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	1/23/2020

IRRIGATION PLAN

IR-1.5



IRRIGATION LEGEND

SYMBOL	MANUFACTURER–MODEL NUMBER	PAT.	RD.	PSI	GPM Q	GPM T	GPM H	GPM TT	GPM TQ	GPM F	QTY	REMARKS
	RAINBIRD RD04-S-PRS POP UP SPRAY 5 SERIES	Q,T,H,F	5'	30	.10	.15	.20	na	na	.40	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 8 U-SERIES	Q,T,H,F	8'	30	.26	.35	.52	na	na	1.05	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 10 U-SERIES	Q,T,H,F	10'	30	.39	.53	.79	na	na	1.58	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 U-SERIES	Q,T,H,TT	15'	30	.92	1.23	1.85	2.48	2.78	3.70	--	USE HE-VAN NOZZLES AS NECESSARY
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 SST	SST	15'	30	1.21						--	
	RAINBIRD RD04-S-PRS POP UP SPRAY 15 EST	EST	15'	30	.61							
	RAINBIRD 5000 SERIES MPR NOZZLES	Q,T,H,F	varies	30	varies	varies	varies	na	na	varies	--	
	RAINBIRD 8005 SERIES #8, #14, #26 NOZZLES	Q,T,H,F	65'	30	6.6	12.6	24.3	na	na	varies	--	
'C'	CONTROLLER: RAINBIRD ESP-LXD CONTROLLER WITH LIMR REMOTE KIT, PLACE IN LXMM PEDISTAL, CONTRACTOR TO ADJUST LOCATION WITH OWNER PRIOR TO CONSTRUCTION.										--	WALL MOUNT. COORDINATE WITH OWNER FOR EXACT LOCATION
DEC	VALVE DECODER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
L	LIGHTNING ARRESTER (AT ALL VALVE GROUPINGS) INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	MASTER VALVE											SEE DETAIL
	FLOW SENSOR											SEE DETAIL
	RAINBIRD WR2-RC WIRELESS RAIN SHUT OFF DEVICE										--	SEE DETAIL
	POINT OF CONNECTION (SECONDARY WATER) SEE PLAN FOR SIZE										--	SEE DETAIL
	2" T SUPER AMIAD PLASTIC FILTER - INSTALL PER MANUFACTURE'S. RECOMMENDATIONS (130 MICRON)											SEE DETAIL
	QUICK COUPLER: RAINBIRD 44LRC INSTALL PER MANUFACTURER'S SPEC.										--	10" RND. VALVE BOX. SEE DETAIL
	ISOLATION BALL VALVE - LINE SIZED INSTALL PER MANUFACTURER'S SPEC.										--	SEE DETAIL
	REMOTE CONTROL VALVE: RAINBIRD PESB-NP-PRS-D AUTOMATIC CONTROL VALVE (SIZE AS NOTED ON PLAN)										--	SEE DETAIL JUMBO BOX-PURPLE LID
	DRIP CONTROL ZONE KIT: RAINBIRD XCZ-(PER PLAN)-PRBR-COM MED FLOW (SIZE AS NOTED ON PLAN)										--	SEE DETAIL
	DRIP CONNECTION. PROVIDE DRIP IRRIGATION TO ALL TREES, SHRUBS,AND PERENNIALS IN PLANTER AREAS										--	INSTALL FLUSH CAP. SEE DETAIL
	DRIP RWS-S-B-1401 (ROOT WATERING SYSTEM) PROVIDE 2 TO EACH TREE LOCATED IN THE LAWN AREAS.											SEE DETAIL
	SUB-MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 2" DIAMETER 24" MIN. COVER											SEE PIPE SIZING CHART
	LOOP MAINLINE: SCHEDULE 40 PVC WITH SCHEDULE 80 FITTINGS, 4" DIAMETER 24" MIN. COVER										--	SEE PIPE SIZING CHART
	LATERAL LINE: SCHEDULE 40 PVC WITH SCH. 40 FITTINGS. SEE PIPE SIZING CHART										--	SEE DETAIL
	DRIP LINE: RAINBIRD XFSP-09-18-100 OR EQUIVALENT										--	SEE DETAIL
	CLASS 200 SLEEVE PER PLAN										--	SEE DETAIL
NOT SHOWN	WIRE CHASE, SIZE TO BE TWICE THE DIAMETER OF THE WIRE BUNDLE WITHIN. 1.1/4" DIAMETER MINIMUM										--	SEE DETAIL
NOT SHOWN	14 GAUGE SOLID COPPER SINGLE STRAND CONTROL WIRE. INSTALL PER MANUFACTURER'S SPEC. PROVIDE 2 WIRE LOOP SYSTEM.										--	SEE DETAIL

DRIP ZONE

TYPE	PART NUMBER	EMITTER FLOW	EMITTER SPACING	ROW SPACING	RECOMMENDED ROW SPACING
XFSP DRIPLINE	XFS-09-18	.9 GPH	18"	18"	18-21 IN.

TOTAL DRIP ZONE FLOW	20 GPM	TIME TO APPLY 1/4" OF WATER	23
MAXIMUM LATERAL LENGTH OF TUBING	350 FT	REQUIRED NUMBER OF STAKES	500
TOTAL LENGTH OF ZONE DRIPLINE	2,000 FT (varies per plan)	NUMBER OF FLUSH POINTS	2
APPLICATION RATE	.64 INCH PER HOUR	SUGGESTED HEADER AND FOOTER PIPE SIZE	CLASS 200 1 1/4"

*NUMBERS MAY CHANGE DUE TO SIZE OF DRIP ZONE PER PLAN

90 Day Establishment Period Irrigation Schedule (April, May, June)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min	15 min	15 min	15 min	15 min	15 min	30 psi
Shrubs	Shrubs	25 min	0	25 min	0	25 min	0	25 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Regular Irrigation Schedule (see Seasonal Differential Chart)

	Type	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Operating Pressure
Turf	Turf	15 min	15 min		15 min		15 min		30 psi
Shrubs	Shrubs	45 min		45 min		45 min		45 min	40 psi

Note: Begin irrigation 4:00 am, only 1 cycle per day.

Seasonal Differential

	April	May	June	July	August	Sept.	October
Turf	10 min	10 min	15 min	15 min	15 min	10 min	10 min
Shrubs	30 min	30 min	45 min	45 min	45 min	30 min	30 min

IRRIGATION NOTES

1. ALL CONNECTIONS ARE SECONDARY WATER AND SHOULD BE NOTED AS SUCH. THEREFORE ALL PARTS MUST MEET SECONDARY WATER STANDARDS.
2. ALL PIPE TO BE SCHEDULE 40 PVC PIPE. NO POLY PIPE SHALL BE INCLUDED. FITTINGS UP TO 1.1/2" MUST BE SCHEDULE 40 OR BETTER. FITTINGS LARGER THAN 1.1/2" MUST BE SCHEDULE 80 OR BETTER.
3. CONTRACTOR SHALL HAVE ALL UTILITIES BLUE STAKED PRIOR TO DIGGING. ANY DAMAGE TO THE UTILITIES SHALL BE REPAIRED AT THE EXPENSE OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER.
4. PLACE ALL IRRIGATION IN LANDSCAPE AREAS AND ON THE PROPERTY OF THE OWNER.
5. MODIFY LOCATION OF IRRIGATION COMPONENTS TO AVOID PLACING TREES, SHRUBS AND OTHER SITE ELEMENTS DIRECTLY OVER PIPE, PER PLANS. DO NOT LOCATE VALVE BOXES IN LAWN AREAS UNLESS DIRECTED TO BY LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL INSTALL A 1" THREADED TEE WITH 1" THREADED PLUG AT POINT OF CONNECTION IN ORDER TO BLOW OUT THE SYSTEM WITH AN AIR COMPRESSOR EACH FALL.
7. CONTRACTOR SHALL USE ONLY COMMERCIAL GRADE IRRIGATION PRODUCTS AND IS RESPONSIBLE FOR ENSURING ACCURATE COUNTS AND QUANTITIES OF ALL IRRIGATION MATERIALS FOR BIDDING AND INSTALLATION PURPOSES.
8. INSTALL DRIP IRRIGATION PER DETAILS. CONTRACTOR SHALL MAKE ADJUSTMENTS AS NECESSARY.
9. CONTRACTOR SHALL PROVIDE AND INSTALL SLEEVES FOR ALL PIPES AND WIRES UNDER PAVEMENT AND SIDEWALKS. SLEEVES SHALL BE 2 SIZES LARGER THAN PIPE INSIDE. ALL WIRE SHALL BE IN SEPARATE SLEEVES (NOT SHOWN). ALL CONTROL WIRE SHALL BE INSTALLED IN CLASS 200 PIPE. PLACE JUNCTION BOXES WHERE NECESSARY TO MINIMIZE LONG RUNS OR AT DIRECTIONAL CHANGES.
10. WATER LINES AND ELECTRICAL LINES MUST NOT SHARE CONDUITS. ALL WIRE CONNECTIONS MUST BE CONTAINED IN VALVE BOX WITH 3' OF EXTRA WIRE. WIRE TO BE CONNECTED TO MAIN LINE PIPE WHERE POSSIBLE WITH TAPE AT 25' INTERVALS. SLACK IN CONTROL WIRES REQUIRED AT EVERY CHANGE OF DIRECTION. WIRES MUST HAVE SEPARATE COLORS FOR COMMON, CONTROL AND SPARE. MINIMUM 1 SPARE WIRE FOR EVERY 5 VALVES. ALL CONTROL WIRES TO BE INSULATED 14 GAUGE COPPER. ALL SPARE WIRES MUST "HOME RUN" TO CONTROLLER AND SPARE WIRES AVAILABLE AT ALL VALVE MANIFOLDS AND CLUSTERS.
11. ALL SLEEVES INSTALLED SHALL BE DUCT TAPED TO PREVENT DIRT OR OTHER DEBRIS ENTERING PIPE. ALL SLEEVES SHALL BE IDENTIFIED BY WOOD OR PVC STAKES AND BE SPRAY PAINTED WITH MARKING PAINT. REMOVE STAKES ONCE IRRIGATION SYSTEM IS COMPLETE.
12. IRRIGATION SYSTEM MUST CONTAIN CHECK VALVES TO PREVENT LOW POINT DRAINAGE.
13. SPACE ALL SPRAY HEADS 2" AWAY FROM ANY HARDSCAPE.
14. CONTRACTOR SHALL MATCH PRECIPITATION RATES AS MUCH AS POSSIBLE FOR ALL LANDSCAPED AREAS. OVERHEAD IRRIGATION MUST HAVE A MINIMUM DU (DISTRIBUTION UNIFORMITY) OF 60%.
15. IRRIGATION CONTRACTOR SHALL PRESSURE TEST MAINLINE FOR LEAKS PRIOR TO BACKFILLING.
16. MAIN LINES SHALL BE 18" DEEP MIN. AND LATERAL LINES 12" DEEP MIN. NO ROCK GREATER THAN 1/2" DIAMETER SHALL BE ALLOWED IN TRENCHES. TRENCHING BACKFILL MATERIAL SHALL BE COMPACTED TO PROPER FINISHED GRADE.
17. ALL WORK SHALL BE IN ACCORDANCE WITH APPLICABLE CITY AND/OR COUNTY CODES. THE CONTRACTOR SHALL APPLY AND PAY FOR ALL NECESSARY PERMITS.
18. IRRIGATION INSTALLATION TO COMPLY WITH APPLICABLE CITY SPECIFICATIONS AND DRAWINGS.
19. ACTUAL INSTALLATION OF IRRIGATION SYSTEM MAY VARY SOMEWHAT FROM PLANS. THE CONTRACTOR IS RESPONSIBLE TO MAKE ADJUSTMENTS AS NEEDED TO ENSURE PROPER COVERAGE OF ALL LANDSCAPED AREAS.
20. CONTRACTOR SHALL INSTALL IRRIGATION SYSTEM WITH HEAD TO HEAD COVERAGE IN ALL TURF AREAS. USE VAN AND/OR U-SERIES NOZZLES AS NECESSARY TO PROVIDE PROPER COVERAGE AND TO KEEP WATER OFF OF BUILDINGS AND HARDSCAPES.
21. POWER TO CONTROLLER TO BE PROVIDED BY OWNER. OWNER TO SPECIFY EXACT LOCATION OF CONTROLLER. INSTALL PER MANUFACTURERS INSTRUCTIONS. CONTRACTOR SHALL INSTALL A RAIN SENSOR WITH CONTROLLER UNLESS OTHERWISE DIRECTED BY OWNER OR L.A.
22. INVESTIGATE TO MAKE SURE THAT THE IRRIGATION SYSTEM IS, IN FACT, BEING CONNECTED TO A SECONDARY SYSTEM. IF IT IS NOT CONNECTED TO SECONDARY, CONTACT THE OWNER AND LANDSCAPE ARCHITECT TO COORDINATE PROVISION AND INSTALLATION OF A BACKFLOW PREVENTOR.
23. LATERAL LINES SHALL BE NO SMALLER THAN 3/4". LANDSCAPE CONTRACTOR TO ENSURE THE FOLLOWING PIPE SIZES DO NOT EXCEED THE SUGGESTED GPM LISTED BELOW:

3/4"	8 GPM
1"	12 GPM
1-1/2"	30 GPM
2"	53 GPM
2-1/2"	75 GPM
3"	110 GPM
4"	180 GPM

VALVE ID TAG

A1 — CONTROLLER NUMBER, VALVE NUMBER
VALVE SIZE — 1.0 | 18 — GALLONS PER MINUTE
PSI AT LAST HEAD IN ZONE — 55

NOTE:
1. VALVE ID TAGS ARE LOCATED NEAR VALVES IN THE ORDER THE VALVES APPEAR ON THE DRAWING

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ELECTRONIC SEAL
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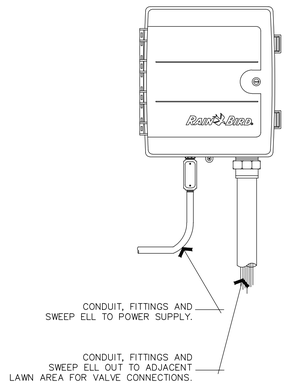
IRRIGATION PLAN

IR-1.6

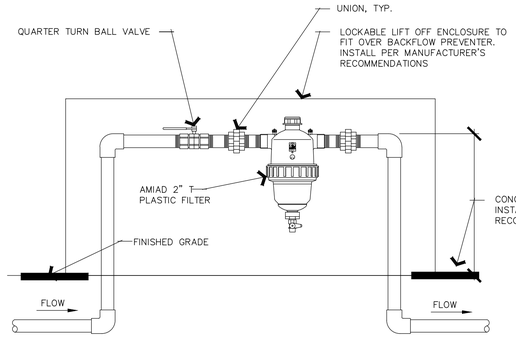


NOTES:

1. MOUNT CONTROLLER PER MANUFACTURER'S WRITTEN INSTRUCTIONS AND IN ACCORDANCE WITH ALL LOCAL CODES. EXACT LOCATION TO BE APPROVED BY OWNER. GROUND CONTROLLER PER MANUFACTURERS RECOMMENDATION AND SPECIFICATIONS. ELECTRICAL CONTRACTOR SHALL GROUND CONTROLLER AND PROVIDE SLEEVING FROM ADJACENT LAWN AREA TO CONTROLLER LOCATION.
2. CONNECT CONTROLLER TO POWER AND VALVES.
3. LANDSCAPE CONTRACTOR TO COORDINATE WITH ELECTRICAL CONTRACTOR TO ENSURE PROPER GROUNDING OF CONTROLLER TO BUILDING GROUNDING GRID.

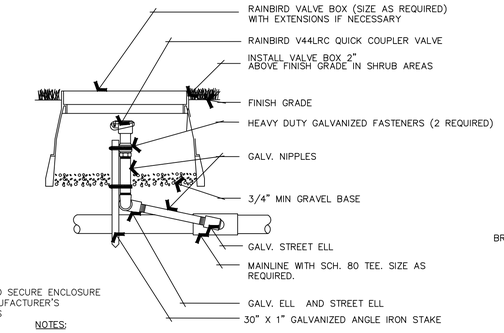
A RAINBIRD CONTROLLER DETAIL

NOT TO SCALE — PKJ DESIGN GROUP



B 2" PLASTIC FILTER DETAIL

NOT TO SCALE — PKJ DESIGN GROUP

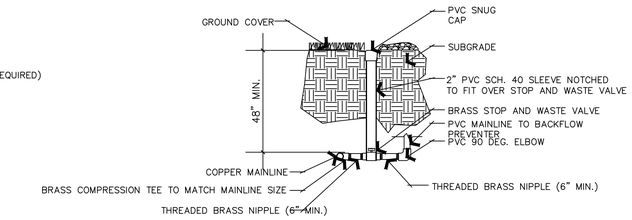


NOTES:

1. FLUSH ALL PIPING PRIOR TO INSTALLING VALVE.
2. WRAP ALL THREADS WITH TEFLON TAPE. 1 1/2 TO 2 WRAPS MAXIMUM.
3. COMPACT SOILS AROUND VALVE BOX TO 80% OF ORIGINAL DRY DENSITY.
4. INSTALL GEOFABRIC UNDER VALVE BOXES AND TAPE TO PIPE NIPPLES AND VALVE BOX.
5. BOX COLOR – GREEN IN TURF AND TAN IN PLANTER AREAS.
6. IRRIGATION SYSTEM TO BE BLOWN OUT WITH AIR COMPRESSOR THROUGH QUICK COUPLERS BEFORE FREEZING TEMPERATURES OCCUR, TYP.

C RAINBIRD QUICK COUPLER

NOT TO SCALE — PKJ DESIGN GROUP

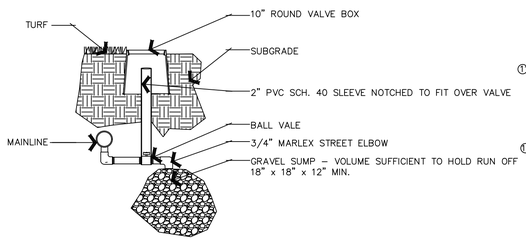


NOTES:

1. ALL PVC NIPPLES AND ELBOWS TO BE SCH. 40 UNLESS OTHERWISE NOTED.
2. PROVIDE VALVE KEY TO OWNER

D STOP AND WASTE VALVE ASSEMBLY

NOT TO SCALE — PKJ DESIGN GROUP

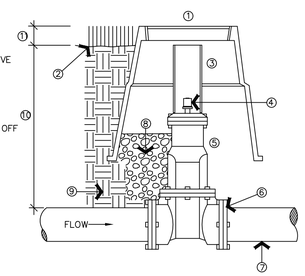


NOTES:

1. ALL PVC NIPPLES AND ELBOWS TO BE SCH. 80 UNLESS OTHERWISE NOTED.
2. PROVIDE VALVE KEY TO OWNER

E MANUAL DRAIN ASSEMBLY

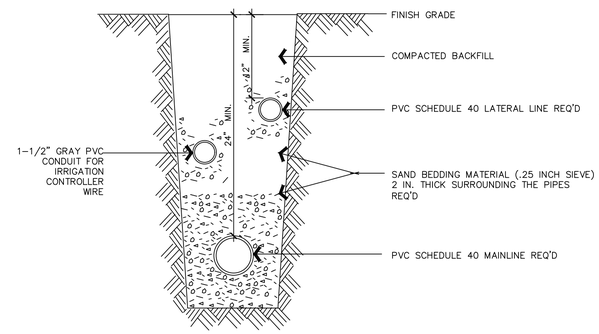
NOT TO SCALE — PKJ DESIGN GROUP



1. 10" ROUND GREEN PLASTIC VALVE BOX W/ BOLT LOCK, CARSON – BROOKS
2. FINISH GRADE
3. 6" PVC SCH. 40 PIPE SLEEVE, 4" – 6" BELOW GRADE
4. 2" SQUARE OPERATING NUT
5. FLANGE X FLANGE GATE VALVE SEE EQUIPMENT SCHEDULE
6. SCH. 80 FLANGE ADAPTER
7. MAIN WATER SUPPLY LINE
8. 6" MIN. GRAVEL
9. SUBGRADE COMPACTED TO 95%
10. DEPTH: 18" – 30"
11. SHRUBS – 2": SOD–1½"; SEED 1"

F GATE VALVE ASSEMBLY

NOT TO SCALE — PKJ DESIGN GROUP



G TRENCHING DETAIL

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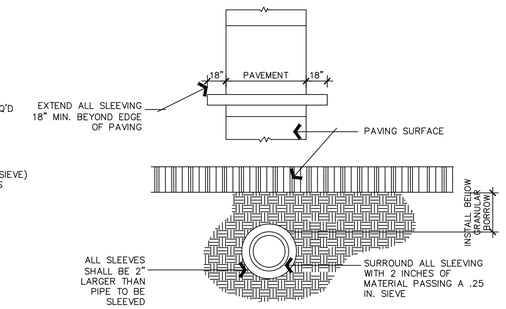
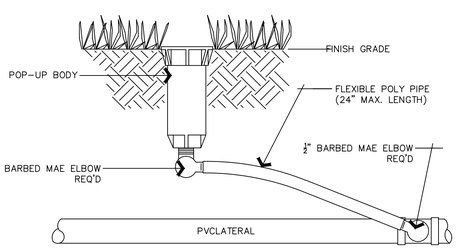


H TYPICAL SLEEVING

NOT TO SCALE — PKJ DESIGN GROUP

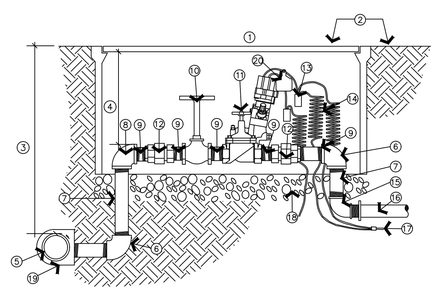


NOTES:

1. INSTALL SPRAY AND ROTARY HEADS PER THIS DETAIL.
2. INSTALL 2" AWAY FROM HARDSCAPES.

I SPRAY HEAD DETAIL

NOT TO SCALE — PKJ DESIGN GROUP



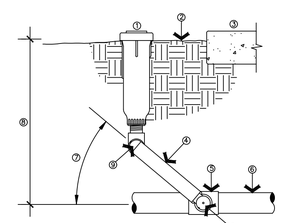
NOTES:

1. ONE REMOTE CONTROL VALVE PER BOX .
2. ALL FITTINGS AND PIPE IN MANIFOLD SHALL BE THREADED SCH. 80 PVC USING TEFLON TAPE AND #5 RECTOR SEAL.

1. CARSON–BROOKS 1419–12 STANDARD OR 1220–12 JUMBO VALVE BOX WITH STAINLESS STEEL BOLTS (BOLT DOWN LID).
2. INSTALL AT GRADE
3. 30" MAX. DEPTH
4. 10"–14"
5. MAIN WATER SUPPLY LINE
6. PVC SCH. 80 ELBOW
7. PVC SCH. 80 NIPPLE; LENGTH AS REQUIRED (TYP.)
8. PVC SCH. 80 ELL SAME SIZE AS VALVE
9. SCH. 80 NIPPLE. SIZE AS NECESSARY
10. MILWAUKEE BRAND OR APPROVED AMERICAN–MADE BRASS GATE VALVE W/ NON RISING STEM (LINE SIZE)
11. ELECTRIC CONTROL VALVE – SEE EQUIPMENT SCHEDULE
12. PVC SCH. 80 UNION
13. WATER TIGHT CONNECTORS (3M DBY ONLY)
14. PROVIDE 36" EXPANSION LOOP AT EACH WIRE CONNECTOR IN BOX
15. SCH. 80 ELBOW WITH SCH. 80 NIPPLE INTO SxT BUSHING TO LATERAL
16. LATERAL LINE
17. CONTROL WIRES
18. 6" MINIMUM DEPTH OF WASHED 3/4" GRAVEL
19. PVC SCH. 80 TEE SxSxS WITH SCH. 80 SxT BUSHING OR DOUBLE STRAP SADDLE.
20. ID TAG: RAINBIRD VID SERIES OR APPROVED EQUAL

J CONTROL VALVE ASSEMBLY

NOT TO SCALE — PKJ DESIGN GROUP



1. POP–UP ROTOR SPRINKLER – SEE LEGEND
2. FINISH GRADE
3. NOTE: ALL ROTOR HEADS TO BE PLACED 2" CLEAR OF ALL HARDSCAPE SURFACES
4. SCH. 80 THREADED NIPPLE
5. PVC SCH. 40 SxSxT TEE (OR ELL)
6. PVC LATERAL LINE, SIZE AS NOTED ON PLAN
7. SWING JOINT ARM INSTALLED AT ANGLE BETWEEN 30 AND 45 DRG. OF LATERAL PIPE. USE MALE THREAD MODEL
8. DEPTH – SEE NOTES & TRENCH DETAIL
9. MARLEX STREET ELL'S (3)

I POP UP ROTOR DETAIL

NOT TO SCALE — PKJ DESIGN GROUP

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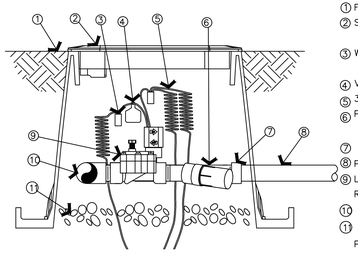
LICENSE STAMP

LICENSED LANDSCAPE ARCHITECT — JEREMY ANDERTH — 8126321-5301 — 06/30/2020 — REGISTERED — STATE OF UTAH

PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	7/1/2020

IRRIGATION DETAILS

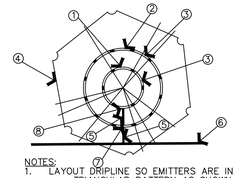
IR-2.5



① FINISH GRADE
② STANDARD VALVE BOX WITH COVER:
RAIN BIRD VB-STD
③ WATERPROOF CONNECTION:
RAIN BIRD DB SERIES
④ VALVE ID TAG
⑤ 30-INCH LINEAR LENGTH OF WIRE, COILED
⑥ PRESSURE REGULATING FILTER:
RAIN BIRD PRF-100-RBY (INCLUDED IN
⑦ XCZ-100-PRF KIT)
⑧ PVC SCH 40 FEMALE ADAPTOR
⑨ LATERAL PIPE
REMOTE CONTROL VALVE:
⑩ RAIN BIRD 100-DV (INCLUDED IN
⑪ XCZ-100-PRF KIT)
PVC SCH 40 TEE OR ELL TO MANIFOLD
3-INCH MINIMUM DEPTH OF 3/4-INCH WASHED GRAVEL

L DRIP CONTROL VALVE ASSEMBLY

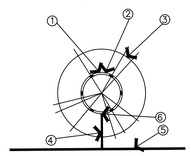
NOT TO SCALE — PKJ DESIGN GROUP



NOTES:
1. LAYOUT DRIPLINE SO EMITTERS ARE IN TRIANGULAR PATTERN AS SHOWN
2. APPROXIMATELY 16.2 GPH PER TREE

TREE

① 8' RADIUS
② 16' RADIUS
③ RAIN BIRD XFS-09-18-100 OR EQUIVALENT
④ TREE (DECIDUOUS OR EVERGREEN)
⑤ RAIN BIRD XT-700 TUBING OR EQUIVALENT AS APPROVED BY ARCHITECT
⑥ LATERAL LINE
⑦ 4-WAY BARBED TEE
⑧ BARBED TEE



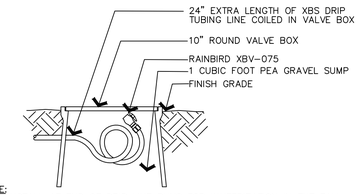
SHRUB

① 12" RADIUS
② RAIN BIRD XFS-09-18-100 OR EQUIVALENT
③ SHRUB
④ RAIN BIRD XT-700 TUBING OR EQUIVALENT AS APPROVED BY ARCHITECT
⑤ LATERAL LINE
⑥ BARBED TEE

NOTE:
1. APPROXIMATELY 5.4 GPH PER SHRUB

M DRIP IRRIGATION - IN LINE EMITTERS

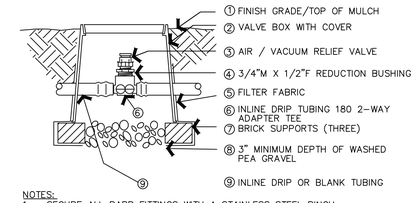
NOT TO SCALE — PKJ DESIGN GROUP



NOTE:
1. INSTALL AT END OF DRIP LINE RUNS FOR WINTERIZATION IN THE FALL.

N FLUSH CAP BOX

NOT TO SCALE — PKJ DESIGN GROUP



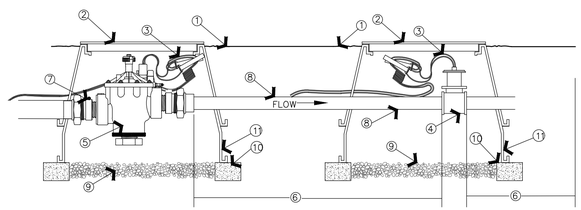
① FINISH GRADE/TOP OF MULCH
② VALVE BOX WITH COVER
③ AIR / VACUUM RELIEF VALVE
④ 3/4"M X 1/2"F REDUCTION BUSHING
⑤ FILTER FABRIC
⑥ INLINE DRIP TUBING 180 2-WAY ADAPTER TEE
⑦ BRICK SUPPORTS (THREE)
⑧ 3" MINIMUM DEPTH OF WASHED PEA GRAVEL
⑨ INLINE DRIP OR BLANK TUBING

NOTES:
1. SECURE ALL BARB FITTINGS WITH A STAINLESS STEEL PINCH CLAMP.
2. INSTALL A AIR/VACUUM RELIEF VALVE AT HIGH POINTS WITHIN DRIP ZONE.
3. INSTALL FILTER FABRIC AROUND EXTERIOR OF VALVE BOX. USE DUCT TAPE TO SECURE FABRIC TO PIPE AND VALVE BOX.

O DRIP AIR/VACUUM RELIEF VALVE ASSEMBLY

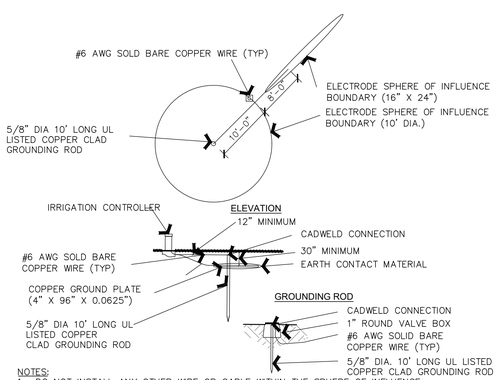
NOT TO SCALE — PKJ DESIGN GROUP

① FINISH GRADE
② GREEN VALVE BOX AND COVER
③ CONTROL WIRES WITH 12" MIN. SERVICE COIL AND WATERPROOF WIRE SPLICE CONNECTORS –
④ FLOW SENSOR PER IRRIGATION LEGEND
⑤ RAIN BIRD PESB SERIES MASTER VALVE
⑥ STRAIGHT PIPE REQUIRED: MINIMUM 10x PIPE DIAMETER UPSTREAM & MINIMUM 5x PIPE DIAMETER DOWNSTREAM
⑦ UNIONS
⑧ PVC MAINLINE – LENGTH AS REQUIRED
⑨ 6" DEPTH OF WASHED ¾" GRAVEL
⑩ CONTINUOUS BRICK SUPPORTS
⑪ VALVE BOX EXTENSIONS REQUIRED



P MASTER VALVE & FLOW SENSOR

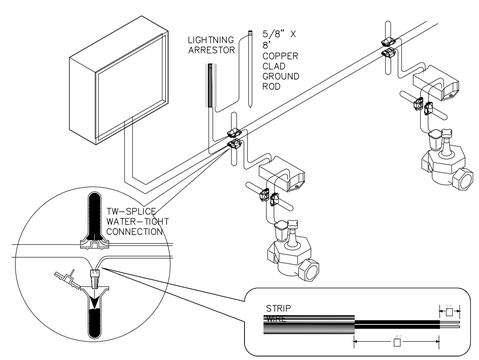
NOT TO SCALE — PKJ DESIGN GROUP



NOTES:
1. DO NOT INSTALL ANY OTHER WIRE OR CABLE WITHIN THE SPHERE OF INFLUENCE.
2. PLACE 100 LB POWER SET SOIL AMENDMENT TO EACH PLATE AS PER MANUFACTURER'S RECOMMENDATIONS.

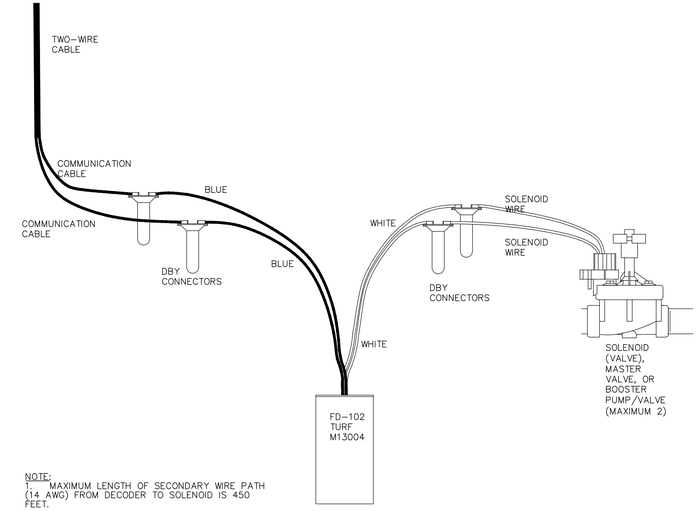
Q GROUNDING DETAIL

NOT TO SCALE — PKJ DESIGN GROUP



R 2-WIRE CONNECTION

NOT TO SCALE — PKJ DESIGN GROUP



NOTE:
1. MAXIMUM LENGTH OF SECONDARY WIRE PATH (14 AWG) FROM DECODER TO SOLENOID IS 450 FEET.

S DECODER WIRING

NOT TO SCALE — PKJ DESIGN GROUP

ISSUE DATE	PROJECT NUMBER
06-30-2020	UT19010

NO.	REVISION	DATE
1	XXXX	XX-XX-XX
2		
3		
4		
5		
6		
7		

PLAN INFORMATION

811 BLUE STAKES OF UTAH
UTILITY NOTIFICATION CENTER, INC
1-800-662-4111
www.bluestakes.org

PROJECT INFORMATION

DI STOREHOUSE

SARATOGA SPRINGS, UTAH

DEVELOPER / PROPERTY OWNER / CLIENT

Developer / Property Owner:
JRW & ASSOCIATES
ATTN: JOHNNY WATSON
1152 BOND AVENUE, STE. A
REXBURG, ID 83440
(208)359-2309

Client / Engineer:
LEI-ENGINEERING
3302 N. Main Street
Spanish Fork, Ut. 84660
801-798-0555 ext. 226
www.lei-eng.com

LANDSCAPE ARCHITECT / PLANNER

PKJ DESIGN GROUP
PKJ DESIGN GROUP L.L.C.
3450 N. TRIUMPH BLVD. SUITE 102
LEHI, UTAH 84043 (801) 960-2698
www.pkjdesigngroup.com

LICENSE STAMP

RECORDED LANDSCAPE ARCHITECT
JEREMY ANDRUSETH
812812-5301
06/30/2020
STATE OF UTAH

PM:	JTA
DRAWN:	KBA
CHECKED:	TM
PLOT DATE:	7/1/2020

IRRIGATION DETAILS

IR-2.6

APPENDIX C – PRELIMINARY STORM DRAIN ANALYSIS

Deseret Industries and Bishop Storehouse

PRELIMINARY
DRAINAGE REPORT

November 25, 2019

Prepared By:

ENGINEERS
SURVEYORS
PLANNERS

3302 N Main Street
Spanish Fork, UT 84660
(801) 798-0555

Description of Development

The Deseret Industries and Bishop Storehouse site is located within the city of Saratoga Springs, on the west side of Redwood Road and north of Medical Drive. The development area will be divided into two lots. Lot 1 will remain vacant until future development. Lot 2 will consist of the Deseret Industries and Bishop Storehouse site. There is approximately 10.15 acres in the development associated with Lot 2. It currently consists of a vacant field with natural vegetation.

Off-Site Drainage Features

There are no offsite drainage features discharging to the site.

Existing Storm Drainage Features

The site is currently vacant and is covered with native vegetation. There will be storm drain pipes installed in Medical Drive on the south side of the site with improvements to the Costco site to the south. These downstream pipes will be installed prior to the construction of the Deseret Industries and Bishops Storehouse Site. See the construction drawings for details on the location and sizing of these structures.

Proposed Storm Drainage Facilities

The proposed storm drain system within the site will consist of inlets and pipes that will be used to route runoff to a series of underground storm chambers before discharging the storm water into the existing downstream system. All pipe sizing and underground detention will be designed according standards set by Saratoga Springs City. The actual storm drain layout and design will be finalized as the site plan design progresses.

Drainage Calculations

See Appendix A for a complete summary of the calculations including the storage requirements for the underground detention chambers. Due to the size of the site, the rational method was used for the storm drain calculations. The runoff coefficient (c-value) was calculated taking a weighted average of the c-value of all types of proposed ground cover. The rainfall intensities used were taken from data provided in the City Standards. The storm chambers were sized to accommodate the runoff from a 100-year 24-hour storm. The release rate of 0.12 cfs/acre is based on the latest Market Street Storm Drain Capacity Analysis. Refer to Appendix A for the chamber sizing and c-value calculations.

Storm Drain Drawings

The exact layout and design of the on-site storm drain inlets, pipes, and underground detention system will be provided with final site plan drawings.

Conclusion

Storm water runoff will be collected and detained before being discharged to the downstream system. See the storm drain report submitted for the Costco improvements as well as the Market Street Storm Drain Capacity Analysis for details on the downstream storm drain infrastructure.

Appendix A: Storm Drain Calculations

Consulting Engineers and Surveyors, Inc.
3302 N. Main, Spanish Fork, UT 84660 (801)798-0555

Storm Drainage Calculations

Deseret Industries and Bishop's Storehouse
Saratoga Springs, UT

Date: September 3, 2019
Project #: 2019-0012
Prepared By: EKB
Revisions:

Design Criteria

Intensity Table:	Saratoga Springs City Standards	
Return Period:	100	year
Allowable Discharge:	0.12	cfs/Ac

Allowable Discharges

Orifice Discharge:	1.22	cfs
Total Discharge:	*1.22*	*cfs*

Weighted "C" Value

Surface Type	*Area (ac)*	*C-Value*	*C*A*
Roof	1.60	0.84	1.34
Pavement	6.51	0.89	5.79
Landscape/Open Space	2.04	0.44	0.90
Totals	10.15		8.0
Weighted "C" Value		***0.79***	

Drainage Calculations

Duration	Intensity		Area	Rainfall	Accumulated Flow		Discharge	Required Storage
min	*in/hr*		*Ac*	*cfs*	*cf*		*cf*	*cf*
5.0	6.12	0.79	10.15	49.18	14,753	1.22	365	14,388
10.0	4.68	0.79	10.15	37.61	22,564	1.22	731	21,833
15.0	3.84	0.79	10.15	30.86	27,771	1.22	1,096	26,674
30.0	2.58	0.79	10.15	20.73	37,317	1.22	2,192	35,124
60.0	1.60	0.79	10.15	12.86	46,284	1.22	4,385	41,900
120.0	0.87	0.79	10.15	6.95	50,045	1.22	8,770	41,275
180.0	0.58	0.79	10.15	4.66	50,334	1.22	13,154	37,180
360.0	0.31	0.79	10.15	2.46	53,227	1.22	26,309	26,918
720.0	0.17	0.79	10.15	1.38	59,591	1.22	52,618	6,974
1440.0	0.09	0.79	10.15	0.71	61,038	1.22	105,235	-44,198

Maximum Storage Requirement: *41,900*

Detention Pond

Required Detention Volume:	*41,900*	*cf*
Provided Detention Volume:	*42,824*	*cf*

Notes / Details

Storm Tech MC-4500 Chamber and End Cap		
Number of Rows	10	
Number of End Caps	20	
Storage per End Cap	108.70	ft^3
Number of Chamber	250	
Storage per Chamber	*162.60*	ft^3

Actual underground detention system to be designed with final site plan drawings.

APPENDIX D – GEOTECHNICAL INVESTIGATION REPORT

Intermountain GeoEnvironmental Services, Inc.
12429 South 300 East, Suite 100, Draper, Utah, 84020
Phone (801) 748-4044 | Fax (801) 748-4045
www.igesinc.com

Geotechnical Investigation
JRW & Associates
1200 North Redwood Road
Saratoga Springs, Utah
IGES Project No. 03019-001

June 7, 2019

Prepared for

JRW & Associates
1152 Bond Avenue, Suite A
Rexburg, Idaho 83440
Attn: Johnny Watson

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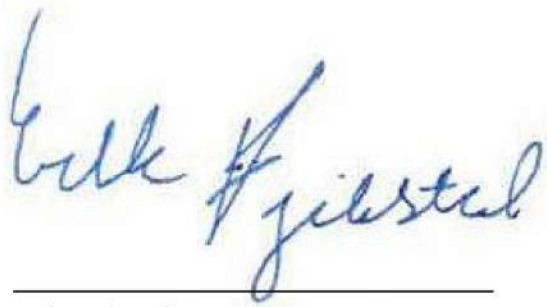
Geotechnical Investigation
JRW & Associates
1200 North Redwood Road
Saratoga Springs, Utah

IGES Job No. 03019-001

June 7, 2019

Prepared by:



Erik Fjelsted, P.E.
Staff Engineer

David A. Petersen, P.E.
Project Engineer

Reviewed by

Kent A. Hartley, P.E.
Principal

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C		Laboratory Test Results
D		MCE-PGA Design Response Spectra
E		Liquefaction Analysis Results

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1.0 EXECUTIVE SUMMARY

This report presents the results of a geotechnical investigation conducted for the proposed Welfare Complex which includes a Deseret Industries Retail Store and Bishop's Storehouse, located at approximately 1200 North and Redwood Road in Saratoga Springs, Utah. Based on the subsurface conditions encountered, the subject site is suitable for development provided that the recommendations presented in this report are incorporated into the design and construction of the project. A summary of the critical observations and recommendations are included below:

- Based on our observations, native soils consisted of Lean CLAY (CL), Silty SAND (SM), and Poorly Graded GRAVEL with silt (GP-GM).
- The site is covered by approximately 12 to 24 of inches of topsoil, which will need to be removed before constructing footings.
- Groundwater was not encountered in any of the Test Pits. The CPT explorations encountered groundwater at a depth of approximately 29 to 43 feet below existing grade.
- Based on our liquefaction analysis up to ¼ inch of liquefaction induced settlement could occur during a seismic event. This estimate is a cumulative sum of numerous small layers, most of which are 4 to 6 inches or less in thickness. It is our judgment that liquefaction should not impact the proposed development at the site.
- Footings should be established entirely on competent native soils or on a zone of structural fill extending to competent native soils a minimum of 6 feet below existing grade. All footings or structural fill placed beneath footings should extend a minimum of 6 feet below existing grade to get below the collapsible soils. Footings established in this manner may be designed using an allowable bearing capacity of **1,500 psf** or if placed on a zone of structural fill having a minimum thickness of 24 inches the bearing capacity may be increased to **2,000 psf** (see section 6.3). Due to the variable nature of the subsurface soil conditions, IGES should observe all foundation excavations prior to placing concrete. To reduce the potential for excessive differential settlement, transition zones between fill and native soil are not recommended.
- Flexible (asphalt) and rigid (concrete) pavement sections have been prepared for parking lot, drives and heavy traffic areas. These pavement section designs have been completed for a 40-yr life expectancy and are summarized in Section 6.7 of this report.
- Active, at-rest and passive lateral earth pressure coefficients of 0.30, 0.50 and 3.0 respectively and seismic active lateral earth pressure coefficient of 0.75.
- Concrete slabs-on-grade should be constructed over at least 4 inches of compacted gravel overlying native soils or a zone of structural fill that is at least

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12 inches thick. The slab may be designed with a modulus of subgrade reaction of **120 psi/inch**.

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during the construction. IGES staff should be on site to verify compliance with these recommendations.

This executive summary is not intended to replace the complete report and should not be used separately from the report. The executive summary omits a number of details, any one of which could be crucial to the proper application of this report.

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2.0 INTRODUCTION

2.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical investigation conducted for the proposed Welfare Complex which includes a Deseret Industries Retail Store and Bishop's Storehouse, located at approximately 1200 North Redwood Road in Saratoga Springs, Utah as shown on the *Site Vicinity Map* (Figure A-1). The purposes of this investigation were to assess the nature and engineering properties of the subsurface soils at the site and to provide recommendations for general site grading and design and construction of foundations, pavements, slabs-on-grade and exterior concrete flatwork.

The scope of work completed for this study included a site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses and preparation of this report.

The recommendations contained in this report are subject to the limitations presented in Section 7.0 of this report.

2.2 PROJECT DESCRIPTION

It is our understanding that the development at the site will include two buildings, roadways, parking lots, landscaping and a detention pond on a 10.5-acre site. The bishop's storehouse is currently planned as a single-story, at-grade structure with a foot print of approximately 23,000 square feet. The Deseret Industries Retail store is currently planned as a single-story, at-grade structure with a foot print of approximately 60,000 square feet. It is anticipated that the parking lots, roadways and loading areas will be paved with either asphalt or concrete. It is anticipated that the proposed structures will lightly loaded and will be constructed on conventional strip and spread footings.

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3.0 METHOD OF STUDY

3.1 FIELD INVESTIGATION

As part of this investigation, near-surface soil conditions were explored by completing 8 test pits to a maximum of 14 feet below existing grade and advancing two Cone Penetration Test (CPT) soundings to 50 feet below existing grade. A member of our technical staff visually logged soils at the time of exploration in general accordance with the *Unified Soil Classification System* (USCS). The approximate locations of the test pits, CPTs, and infiltration test are shown on the *Site Map* (Figure A-2). The geologic conditions are discussed in greater detail in Section 5 of this report. The *Test Pit Logs* are included at the end of this report (Figures A-3 through A-11); a *Key to Soil Symbols and Terminology* is provided as Figure A-12. The CPT Logs are included as part of Appendix B. A discussion of the subsurface conditions encountered is provided in Section 4.0 of this report.

The test pits were completed using a JCB-4CX rubber-tired backhoe. Soil sampling was completed to collect representative samples of the various layers observed at the site. Disturbed samples were placed in plastic baggies and relatively undisturbed soil samples were collected with the use of a 6-inch long brass tube attached to a hand sampler driven with a 2-lb sledge hammer. All samples were transported to our laboratory to evaluate the engineering properties of the various earth materials observed. The soils were classified in accordance with the *Unified Soil Classification System* (USCS) by our field personnel. Classifications for the individual soil units are shown on the attached test pit logs (Figures A-3 through A-11).

The CPT was completed using a 25-ton box-truck. Additional calculations and analysis included as part of the CPT exploration completed at the site are included in Appendix B. These calculations include pore pressure dissipation (PPD) tests to assess groundwater levels and artesian conditions along with seismic tests to assess the representative shear wave velocity of site soils.

3.1.1 Infiltration Testing

Infiltration tests were completed for the project in TP-1 at approximately 4 feet below existing site grade.

The test was performed as follows: a hole approximately 6 inches in diameter and 13 inches in depth was hand-excavated at the bottom of the test pit, and then filled with water. The soil was presoaked for approximately 30 minutes, after which periodic readings were made and recorded to measure the water level at time increments of approximately 10 minutes.

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The test was continued until a steady-state infiltration rate could be identified in the records – testing continued for about 90 minutes after pre-soak.

Our test results indicated that the native Lean CLAY (CL) soils were moderately permeable, with measured infiltration measurements given in tables 3.3.1.

Table 3.3.1 - Infiltration Test Summary – TP-1

Diameter ~ 6 inches				
Time Elapsed (minutes)	**Change in Depth (inch)**	**Infiltration Rate (min/in)**	**Infiltration Rate (in/hr)**	**Comments**
0	0	0	0	Intermediate Reading
11	2.0	5.5	10.9	Intermediate Reading
20	1.0	9.0	6.7	Intermediate Reading
30	1.0	10.0	6.0	Intermediate Reading
41	0.88	12.6	4.8	Intermediate Reading
50	0.50	18.0	3.3	Intermediate Reading
60	0.63	16.0	3.8	Intermediate Reading
70	0.50	20.0	3.0	Intermediate Reading
81	0.50	22.0	2.7	Intermediate Reading
90	0.50	**18.0**	**3.3**	**Final Reading**

3.2 LABORATORY INVESTIGATION

Geotechnical laboratory tests were conducted on representative relatively undisturbed and bulk soil samples obtained during our field investigation. The laboratory testing program was designed to evaluate the engineering characteristics of onsite earth materials. Laboratory tests conducted during this investigation include:

- Laboratory Compaction Characteristics of Soil (Standard Proctor - ASTM D698/D1557)
- California Bearing Ratio (CBR) (ASTM D1883)
- Collapse/Swell Potential (ASTM D4546)

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The results of laboratory tests are presented on the Boring Logs in Appendix A (Figures A-3 through A-11) and in Appendix C.

3.3 ENGINEERING ANALYSIS

Engineering analyses were performed using soil data obtained from the laboratory test results and empirical correlations from material density, depositional characteristics and classification. Analyses were performed using formulas, calculations and software that represent current methods accepted by the geotechnical industry. These methods include settlement, bearing capacity, lateral earth pressures, trench stability and pavement design. Appropriate factors of safety were applied to the results consistent with industry standards and the accepted standard of care. The results of our engineering analysis are presented in the recommendations section of this report.

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4.0 GENERALIZED SITE CONDITIONS

4.1 SURFACE CONDITIONS

At the time of our subsurface investigation, the site was vacant and appeared to be used for farming. The surficial soils appeared to be comprised of topsoil consisting of lean clay. The site is relatively flat sloping very gradually down to the east between an elevation of approximately 4,540 feet above mean sea level.

4.2 SUBSURFACE CONDITIONS

4.2.1 Soils

Based on our observations the site is overlain by 12 to 24 inches of topsoil comprised of Lean CLAY (CL). Based on our observations, native soils consisted primarily of Lean CLAY (CL) with some isolated layers of Silty SAND (SM) and Poorly Graded GRAVEL with silt (GP-GM).

Lean CLAY (CL)

The Lean CLAY (CL) was observed below the topsoil in each test pit. The clay extended to a depth of 10.5 to 14 feet below existing grade. It was generally medium stiff, slightly moist to moist, and moderate brown. Pinholes were observed primarily within the upper 6 feet.

Silty SAND (SM)

The Silty SAND was observed in TP-3, TP-5, TP-6 and TP-7. The silty sand was generally medium dense, moist and tan.

Poorly Graded GRAVEL with silt (GP-GM)

The Poorly Graded GRAVEL with silt (GP-GM) was observed in TP-5. The gravel was generally medium dense to dense and slightly moist to dry. These gravels have 5 to 12 percent fines. The typical gravel size is 1 inch with 3 inches being the maximum size.

Refer to the boring logs for a more detailed description of the soils encountered (Appendix A).

4.2.2 Groundwater

Groundwater was not encountered in any test pits, however based on the CPT data groundwater was encountered at 29 and 43 feet below grade in CPT-01 and CPT-02, respectively. Seasonal fluctuations in precipitation, snowmelt, surface runoff from

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adjacent properties, or other on or offsite sources including irrigation or other sources may increase moisture conditions; groundwater conditions can be expected to fluctuate several feet seasonally depending on the time of year. Groundwater is not anticipated to impact the planned construction.

4.2.3 Collapsible Soils

Collapse is a phenomenon where undisturbed native soils under increased loading can exhibit volumetric strain and consolidation upon wetting. Collapsible soils can cause differential settling of structures and roadways. Collapsible soils do not necessarily preclude development and can be mitigated by over-excavating porous, potentially collapsible soils and replacing with engineered fill and by controlling surface drainage and runoff. Collapsible soils are typically characterized by a pinhole structure and relatively light in-situ density. Pinholes were observed in the native clay soil mainly in the upper 6 feet. IGES completed four collapse tests on representative soil samples; test results are summarized below in Table 4.2.3 . The complete results of the one-dimensional collapse tests can be seen in Appendix C.

Table 4.2.3 - Summary Collapse Test Results

Location	Depth	Collapse Load	Percent Collapse
TP-2	4.5	2000	5.1%
TP-3	6.0	2000	0.5%
TP-5	4.5	2000	2.6%
TP-7	3.5	2000	3.5%

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5.0 GEOLOGIC CONDITIONS

5.1 GEOLOGIC SETTING

The site is located at an elevation between approximately 4,540 feet in the northwestern portion of Utah Valley. Utah Valley represents a deep, sediment-filled structural basin of Cenozoic-age flanked by uplifted blocks; the Wasatch Range on the east, and the Lake and East Tintic Mountains to the west (Hintze, 1980). The Wasatch Range is the easternmost expression of pronounced Basin and Range extension in north-central Utah.

The near-surface geology of the Utah Valley is dominated by sediments, which were deposited within the last 30,000 years by Lake Bonneville (Scott et al., 1983; Hintze, 1993; Machette, 1992). The lacustrine sediments near the mountain front consist mostly of gravel and sand. As the lake receded, streams began to incise large deltas that had formed at the mouths of major canyons along the Wasatch Range, and the eroded material was deposited in shallow lakes and marshes in the basin and in a series of recessional deltas and alluvial fans. Sediments toward the center of the valley are predominately deep-water deposits of clay, silt and fine sand. However, these deep-water deposits are in places covered by a thin post-Bonneville alluvial cover.

Surface sediments at the subject site are mapped as Upper Pleistocene lacustrine silt and clay (Qlmp) (Biek, 2004). Qlmp is described as calcareous silt with minor clay and laminated fine-grained sand that was deposited below the Provo shoreline of Lake Bonneville.

5.2 FAULTING AND SEISMICITY

The site lies within the north-south trending belt of seismicity known as the Intermountain Seismic Belt (ISB) (Hecker, 1993). The ISB extends from northwestern Montana through southwestern Utah. An active fault is generally defined as a fault that has had activity within the Holocene (<11ka). No active faults are mapped through or immediately adjacent to the site (Black et al., 2003). The site is located approximately 9.2 miles west of the main trace of the Provo segment of the Wasatch Fault Zone, the closest mapped active fault. Smaller detached splays of the Provo segment are located approximately 3.8 miles northeast and 7.8 miles east-northeast of the project site respectively. The Provo segment is one of the longest sections of the Wasatch Fault Zone (Hecker, 1993) and is estimated to be approximately 43 miles long with a reported rupture length of 37 miles and a maximum potential to produce earthquakes up to magnitude (M_s) 7.5 to 7.7 (Black et al., 2003). The site is also located approximately 2.1 miles northwest of the Utah Lake Faults and Folds (ULFF). The ULFF consists of several northeast to northwest trending faults and folds located beneath Utah Lake and are reported to

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have been active in the past 15 ka (Black et al., 2003). However, since the ULFF is at the bottom of a large lake these faults are poorly understood – as such, the USGS does not include ULFF in their fault database for seismic hazard analysis. Analysis of the ground shaking hazard along the Wasatch Front suggests that the Wasatch Fault Zone is the single greatest contributor to the seismic hazard in the Salt Lake City region.

Following the criteria outlined in the 2015 International Building Code (IBC, 2015), spectral response at the site was evaluated for the Maximum Considered Earthquake (MCE) which equates to a probabilistic seismic event having a two percent probability of exceedance in 50 years (2PE50). Spectral accelerations were determined based on the location of the site using the *U.S. Seismic Design Maps* USGS website. This tool incorporates seismic hazard maps depicting probabilistic ground motions and spectral response data developed for the United States by the U. S. Geological Survey as part of NEHRP/NSHMP (Frankel et al., 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and *the International Building Code* (IBC) (International Code Council, 2015).

Based on our understanding of the proposed project, it is recommended the building be designed with a structural *Building Risk Category* of *II*. To account for site effects, site coefficients that vary with the magnitude of spectral acceleration and *Site Class* are used. Site classification is based on the upper 100 feet of the site soil profile; based on our field exploration and understanding of the geology in this area, the subject site is best classified as Site Class D (S*tiff Soil*). Based on IBC criteria, the short-period (F_a) and long-period (F_v) site coefficients are 1.109 and 1.740, respectively. The Risk-Targeted Maximum Considered Earthquake (MCE_R) *Spectral Response Accelerations* are presented in Table 3.3.1; a summary of the *Design Maps* data is presented in Appendix C. The *peak ground acceleration* (PGA) may be taken as 0.395g (see Appendix C). It should be noted that to more accurately determine the site classification and site-specific seismic design parameters a geotechnical investigation to a minimum depth of 100 feet is needed. The seismic design category for this site is D.

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Table 5.2.1 - Short- and Long-Period Spectral Accelerations for MCE

Parameter	Short Period (0.2 sec)	Long Period (1.0 sec)
MCE Spectral Response Acceleration (g)	$S_S = 0.977$	$S_1 = 0.330$
MCE Spectral Response Acceleration Modified for Site Class D (g)	$S_{MS} = S_sF_a = 1.083$	$S_{M1} = S_1F_v = 0.574$
Design Spectral Response Acceleration (g)	$S_{DS} = S_{MS}*^2/_3 = 0.722$	$S_{D1} = S_{M1}*^2/_3 = 0.383$

5.3 OTHER GEOLOGIC HAZARDS AND CONDITIONS

Geologic hazards and conditions can be defined as naturally occurring geologic conditions or processes that could present a danger to human life and property or result in impacts to conventional construction procedures. These hazards and conditions must be considered before development of the site. There are several hazards and conditions in addition to seismicity and faulting which, if present at a site, should be considered in the design of the site facilities. Liquefaction is the only other geologic hazard considered for this site.

5.3.1 Liquefaction

Certain areas within the Intermountain region possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

Referring to the *Liquefaction-Potential Map for Utah County, Utah* published by the Utah Geological Survey, the site is located within an area currently designated as "moderate" for liquefaction potential. Therefore, IGES completed two CPT explorations to depths of approximately 50 feet to evaluate the liquefaction potential at this site.

We have evaluated the liquefaction potential of the soil profile encountered in the CPT completed for this site in accordance with procedures detailed by Youd et al. (2001), and

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Recommended Procedures for Implementation of CDMG Special Publication 117 (Martin and Lew, 1999). Our analysis considered groundwater levels directly observed with the CPT explorations and PPD tests; however, the groundwater level modeled for our liquefaction analysis was conservatively assumed to be about 4 feet higher than the groundwater level observed in the subsurface explorations to account for possible future groundwater level increases.

Our liquefaction model incorporates the PGA corresponding to the 2PE50 ground motion (see Section 5.2). The PGA is estimated to be 0.4g.

Liquefaction analysis also considers the *deaggregated* moment magnitude for a site (the moment magnitude that has the highest contribution to the hazard for the ground motion under consideration). Based on our experience in this area, IGES has used a deaggregated moment magnitude of 7.4 Mw.

For the purpose of our analysis, we have used a factor-of-safety against liquefaction of 1.4 to differentiate between potentially liquefiable and non-liquefiable soils (a factor-of-safety below 1.1 is considered liquefiable, between 1.1 and 1.4 *may* liquefy, and greater than 1.4 is considered to not liquefy). Potential dynamic settlement was evaluated using the methods developed by Tokimatsu and Seed (1987). A summary of the calculations is presented in Appendix E. No liquefaction induced settlement was calculated in CPT-02 and ¼-inch of settlement was calculated for CPT-01. This value is the cumulative sum of multiple small layers, most of which are isolated to 4 to 6 inches or less. These layers are also observed at depths of approximately 30 feet or greater. Based on a boundary curve chart used to predict liquefaction-induced ground damage (Ishihara, 1985), the potential for these discrete layers to manifest liquefaction-induced phenomena at the surface is low (e.g., settlement, sand boils, loss of bearing capacity, etc.).

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6.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

6.1 GENERAL CONCLUSIONS

Based on the subsurface conditions encountered at the site, it is our opinion that the subject site is suitable for development provided that the recommendations included in this report are incorporated into the design and construction of the project. If development at the site does take place, IGES should be notified and allowed to review the proposed development in order to assess the suitability of this report in regard to the planned improvements and to recommend additional explorations, analysis and recommendations.

In general, 12 to 18 inches of topsoil was identified on site. Footings should be established entirely on competent native soils or on a zone of structural fill extending to competent native soils a minimum of 6 feet below existing grade. All footings or structural fill placed beneath footings should extend a minimum of 6 feet below existing grade to get below the collapsible soils. The following sub-sections present our recommendations for general site grading, design of foundations, slabs-on-grade, pavements, moisture protection and soil corrosivity that should be considered prior to developing this site.

6.2 EARTHWORK

Prior to the placement of foundations, general site grading is recommended to provide proper support for foundations, exterior concrete flatwork, concrete slabs-on-grade, and pavement sections. Site grading is also recommended to provide proper drainage and moisture control on the subject property and to aid in preventing differential movement in foundation soils as a result of variations in moisture conditions.

6.2.1 General Site Preparation and Grading

Within the areas to be graded (below proposed structures, fill sections, concrete flatwork, and pavement sections) any existing surface vegetation, debris, undocumented fill, asphalt, concrete or other miscellaneous debris should be removed. All topsoil should be removed from below footings. Over-excavated soils can be used as structural fill if relatively free of deleterious material and organics and compacted in accordance with the recommendations presented in this report (Section 6.2.4). Topsoil shall be segregated from other soil and not be permitted to be used as structural fill.

An IGES representative should be on site at key points in construction to observe the site preparation and grading operations to assess whether the recommendations presented in this report have been complied with.

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6.2.2 Trench Excavations

Based on our soil observations, fine-grained soils are prevalent at the site and are considered to be Type A soils (OSHA). Based on OSHA guidelines for excavation safety, trenches with vertical walls up to 5 feet in depth may be occupied. When the trench is deeper than 5 feet we recommend a trench-shield or shoring be used as a protective system to workers in the trench. Alternatively, excavations deeper than 5 feet (up to 20 feet) may be constructed with side slopes no steeper than one and three quarters horizontal to one vertical (1¾H:1V). When undocumented fill soils, saturated soils or wet conditions are encountered, side slopes may need to be further flattened to maintain stability. If excavations greater than 20 feet in depth are anticipated a registered professional engineer must design the protective system.

The contractor is ultimately responsible for trench and site safety. Pertinent OSHA requirements should be met to provide a safe work environment. If site specific conditions arise that require engineering analysis in accordance with OSHA regulations, IGES can respond and provide recommendations as needed.

We recommend that IGES observe all excavations to assess the exposed foundation soils. We also recommend that the geotechnical engineer be allowed to review the grading plans when they are prepared in order to evaluate their compatibility with these recommendations.

6.2.3 Excavations

Excavations should extend laterally at least two feet beyond slabs-on-grade, footings and pavements. Structural fill should be placed and compacted in accordance with and meet the recommendations included in this report.

Prior to placing structural fill, utilities or constructing footings any loose soils observed in excavation bottoms should be removed or moisture conditioned to within 2 percent of the optimum moisture content (OMC) and compacted to at least 95 percent of the maximum dry density (MDD) as determined by ASTM D-1557 (modified Proctor). If over-excavation is required, it should extend a minimum of 1 foot laterally for every foot of depth of over-excavation.

6.2.4 Structural Fill and Compaction

All fill placed for the support of structures, flatwork or pavements should consist of structural fill. Structural fill may consist of excavated onsite native fine-grained soils or an

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approved imported granular soil. The native fine-grained soils may be challenging to work with to obtain the desired level of compaction. If native fine-grained soils are used as structural fill, they should be pulverized and moisture conditioned beyond the optimum moisture content (OMC) before being placed as structural fill. If import structural fill is used, it should be relatively well graded and have a minimum fines (material passing the No. 200 sieve) of 30 percent. A less permeable fill is desired due to the collapsible soils, hence the reason for requiring a "minimum" of 30% fines. In all cases, structural fill should be free of vegetation and debris, and contain no rock larger than 4 inches in nominal size (6 inches in greatest dimension).

Soil not meeting the aforementioned criteria may be suitable for use as structural fill; alternate borrow sources may be considered but should be reviewed and approved by IGES prior to use. All structural fill soils should be approved by the Geotechnical Engineer prior to placement.

All structural fill should be placed in maximum 6-inch loose lifts if compacted by small hand-operated compaction equipment, maximum 8-inch loose lifts if compacted by light-duty rollers, and maximum 12-inch loose lifts if compacted by heavy duty compaction equipment that is capable of efficiently compacting the entire thickness of the lift. These lift thicknesses are *maximums*; the contractor should understand that thinner lifts may be necessary to achieve the required compaction. We recommend that all structural fill be compacted on a horizontal plane, unless otherwise approved by IGES. The moisture content should be at or above the OMC based on the modified proctor (ASTM D1557) for all structural fill. Prior to placing any fill, the excavations should be observed by IGES to assess compliance with our recommendations. In addition, proper grading should precede placement of fill, as described in the General Site Preparation and Grading subsection of this report. All structural fill below footings, pavement, sidewalks and curb and gutter and other concrete slab on grade construction should be compacted to a minimum of 95 percent of the maximum dry density (MDD) based on the modified proctor (ASTMD 1557).

Specifications from governing authorities such as cities and special service districts having their own precedence for backfill and compaction should be followed where applicable.
Structural fill as defined above or native soils may be used to backfill around the foundation walls and that it be placed in lifts not exceeding 12 inches prior to compaction, compacted to approximately 90 percent of the MDD and moisture conditioned to within 2 percent of the OMC.

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6.2.5 Utility Trench Fill and Compaction

All utility trenches backfilled below footings, pavement sections, concrete flatwork, curb and gutter and/or sidewalks should be backfilled with structural fill that is at or slightly above the OMC when placed and compacted to at least 95 percent of the MDD as determined by ASTM D-1557. All other trenches in landscape areas should be backfilled and compacted to a minimum of 90 percent of the MDD and within 2 percent of the OMC as determined by ASTM D-1557.

Utility trenches should be backfilled with structural fill as discussed in Section 6.2.5 of this report. Pipe bedding should *not* be water-densified in-place (jetting). Alternatively, pipe bedding and shading may consist of clean ¾-inch gravel which generally does not require compaction. More stringent specifications from utility companies, cities or other governing authorities having their own precedence for backfill and compaction should be followed where applicable.

6.2.6 Soft Soil Stabilization

Due to the presence of fine-grained clayey soils, soft soils may be encountered at the site due to the presence of water following precipitation events; this condition may be exacerbated in cold weather. These soils may cause equipment mobility problems and may make it difficult to place and properly compact structural fill overlying the soft soils. If encountered, we recommend stabilizing these soils prior to placing structural fill, constructing pavement sections or foundation elements such as footings.

Stabilization can be accomplished by placing a woven geotextile over the soft subgrade; seams should be overlapped a minimum of 24 inches or as recommended by the manufacturer. The geotextile should be covered with a minimum of 18 inches of crushed, angular ¾- to 3-inch diameter drain rock. Structural fill (Section 6.2.4) may then be placed and compacted as recommended in this report. The woven geotextile should consist of TenCate Mirafi HP370 or an approved equivalent. The geotextile should be placed to cover the entire excavation bottom.

Alternatively, stabilization of soft or pumping subgrade can be accomplished using a clean, coarse angular material worked into the soft subgrade. We recommend the material be greater than 3 inches in nominal diameter, but less than 6 inches. The stabilization material should be worked (pushed) into the soft subgrade soils until a relatively firm and unyielding surface is established. Once a relatively firm and unyielding surface is achieved, the area may be brought to final design grade using structural fill. Other earth materials not meeting aforementioned criteria may also be suitable but will likely require a thicker section of aggregate; however, such material should be evaluated on a case-by-case basis and should be approved by IGES prior to use. The area should be

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wheel-rolled with heavy equipment to evaluate whether a firm working surface has been achieved and that soft/pumping soils have been "bridged" to the greatest extent reasonably possible based on existing subsurface conditions. An IGES representative should be present during this evaluation.

The area of stabilization should extend a minimum of 3 feet beyond the footings and/or footprint of the structure, whichever is greater.

6.3 FOUNDATIONS

Prior to constructing footings, all topsoil and any undocumented fill soils should be removed before constructing footings. Footings should be established entirely on competent native soils or on a zone of structural fill that extends to competent native soils located at a minimum depth of 6 feet below existing side grade. Loose soils remaining in the excavation following excavation should either be removed or compacted in place. To reduce the potential for differential settlement, transition zones between fill and native soil are generally not recommended but can be evaluated on a case by case basis. If structural fill is used it should meet the criteria described in Section 6.2.5 and have a minimum thickness of 12 inches. The structural fill should also extend a minimum of 24 inches beyond the edge of the footings. Strip footings should be a minimum of 24 inches wide and no greater than 48 inches wide; spread footings should be a minimum of 30 inches wide and no greater than 9 feet wide. Exterior footings should be embedded at least 30 inches below final grade for frost protection and confinement. Interior footings not exposed to the full effects of frost (i.e., a continuously headed structure) should be embedded at least 18 inches for confinement.

Conventional strip footings founded as described above may be proportioned for a maximum net allowable bearing capacity **of 1,500 pounds per square foot (psf)**. The bearing capacity may be increased to 2,000 if placed on a zone of structural fill having a minimum thickness of 24 inches. these values are for dead load plus live load conditions.

Static settlements of properly designed and constructed conventional footings, founded as described above, are anticipated to be less than 1 inch. Differential settlements should be on the order of half the total settlement over 30 feet.

6.4 CONCRETE SLAB-ON-GRADE CONSTRUCTION

Concrete slabs-on-grade should be constructed over at least 4 inches of gravel overlying a zone of structural fill (reworked native soils) with a minimum thickness of 18 inches due to the collapse potential of native soils. Native soils should be removed to a depth of at least 12 inches, the exposed soils may then be scarified to a minimum depth of 6 inches

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and compacted in place and then the removed native soils can be replaced as structural fill in 6 inch lifts). The slab may be designed with a Modulus of Subgrade Reaction of **120 psi/inch**. The gravel should consist of clean drain rock with a ¾-inch maximum particle size and no more than 5 percent fines passing the No. 200 mesh sieve. The gravel layer should be vibrated in place until tight and relatively unyielding.

The maximum load on the floor slab should not exceed 300 psf; greater loads may be allowed but must be evaluated by IGES or a structural engineer on a case-by-case basis. All concrete slabs should be designed to minimize cracking as a result of shrinkage. Consideration should be given to reinforcing the slab with a welded wire fabric, re-bar, or fiber mesh. Slab reinforcement should be designed by the structural engineer; however, as a minimum, slab reinforcement should consist of W4.0 x W4.0 welded wire mesh within the middle third of the slab.

Our experience indicates that use of reinforcement in slabs and foundations can generally reduce the potential for drying and shrinkage cracking. However, some cracking can be expected as the concrete cures. Minor cracking is considered normal; however, it is often increased by a high water/cement ratio, high concrete temperature at the time of placement, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low slump concrete can reduce the potential for shrinkage cracking; saw cuts in the concrete at strategic locations can help to control and reduce undesirable shrinkage cracks.

We recommend a **minimum slab thickness of 4 inches**; a thicker slab section may be required if the slab-on-grade is designed to bear a significant structural load (i.e., a structural slab or mat foundation, which is different than slab-on-grade flooring). We recommend that concrete be tested to assess that the slump and/or air content is in compliance with the plans and specifications. We recommend that concrete be placed in general accordance with the requirements of the American Concrete Institute (ACI).

6.5 EARTH PRESSURE AND LATERAL RESISTANCE

Lateral forces imposed upon conventional foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footing and the supporting soils. In determining the frictional resistance, a coefficient of friction of 0.43 should be used for concrete in contact with native granular (sandy and gravelly) soils or granular structural fill.

Ultimate lateral earth pressures from backfill acting against retaining walls and buried structures may be computed from lateral pressure coefficients or equivalent fluid

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densities. In general, foundation and other walls that are fixed at the top should be designed using at-rest lateral earth pressures. Retaining walls allowed to rotate at the top (unfixed) can be designed for active pressures based on the International Building Code (IBC, 2015). Foundation walls for buried or partially buried structures may also be designed for active pressures if no more than 8 feet of the wall extends below grade and is laterally supported by flexible diaphragms.

Based on an internal angle of friction of 28°, the ultimate lateral earth pressures for native fine-grained soils acting against buried structures may be computed from the lateral pressure coefficients or equivalent fluid densities presented in Table 6.5.1:

Table 6.5.1 - Lateral Pressure Coefficients and Equivalent Fluid Densities

Earth Pressure Condition	Lateral Pressure Coefficient (symbol)	Equivalent Fluid Density (pounds per cubic foot)
Active*	0.36 (k_A)	42
At-rest**	0.53 (k_O)	60
Passive*	2.77 (k_p)	310

* Based on Coulomb's equation
** Based on Jaky

Walls and structures allowed to rotate slightly should use the active condition. If the element is constrained against rotation the at-rest condition should be used unless the wall has 8 feet or less of depth below grade according to the IBC, as mentioned previously. These values should be used with an appropriate factor of safety against overturning and sliding. A value of 1.5 is typically used. Additionally, if passive resistance is calculated in conjunction with frictional resistance, the passive resistance should be reduced by ½.

Lateral pressures can increase during a seismic event and should be accounted for in the design of retaining walls. The interaction of dynamic loads from earthquakes and retaining walls is complex; assessing this interaction can require sophisticated analysis. The Mononobe-Okabe (M-O) pseudo-static approach simplifies this analysis and provides reasonable design values. With the M-O approach for seismic analyses, the *active* and *passive* earth pressure coefficients provided in the following table account for the both the dynamic horizontal thrust produced by ground motion and the static lateral earth pressure; therefore, for seismic analysis the static and seismic values reported below do not need to be added together, the seismic value alone can be used.

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Table 6.5.2 – Recommended Lateral Earth Pressure Coefficients for Dynamic Conditions

Condition	Lateral Pressure Coefficient	Equivalent Fluid Density (pcf)
Active (Kae)	0.75	90
Passive (Kpe)	2.10	240

The pressure distribution of the dynamic horizontal thrust may be closely approximated as an inverted triangle with stress decreasing with depth and the resultant acting at a distance approximately 0.6 times the loaded height of the structure, measured upward from the bottom of the structure.

The coefficients and densities presented in the tables above for static and dynamic conditions assume no buildup of hydrostatic pressures, a vertical wall face and flat back slope. The force of the water should be added to the presented values if hydrostatic pressures are anticipated. Proper grading and other drainage recommendations provided previously in this report will help to reduce the potential for buildup of hydrostatic pressures if implemented.

Clayey soils drain poorly and may swell upon wetting, thereby greatly increasing lateral pressures acting on earth retaining structures; therefore, clayey soils with a potential for swelling should not be used as retaining wall backfill. Backfill should consist of soil with an Expansion Index (EI) less than 20.

6.6 MOISTURE PROTECTION AND SURFACE DRAINAGE

Moisture should not be allowed to infiltrate the soils near, or upslope from, the structures. Precautions should be taken during and after construction to minimize the potential for saturation of foundation soils beneath footings, exterior slab on grade construction, sidewalks and roadways. We recommend the following be implemented during and/or after construction is complete:

- We recommend rain gutters be installed around the entire perimeter of the buildings to collect and direct all roof runoff a minimum of 10 feet away from structures.
- The grade within 10 feet of the structures should be sloped a minimum of 5% away from the structure (6-inches). Alternatively, if the surface within 10 feet of the structure consists of a hard surface such as concrete or asphalt, the minimum recommended slope would be 2% away from the structure.

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- No pressurized irrigation lines should be placed within 5 feet of the structures and we recommend the area within 5 feet of the structure be hardscaped, xeriscaped or planted with drought tolerant plants that do not require irrigation.
- Compact backfill against the foundation walls in maximum 12-inch loose lifts to approximately 90 to 95 percent of the MDD (ASTM D1557); native soils may be used as backfill.

6.7 ASPHALT & CONCRETE PAVEMENT DESIGN

IGES completed one CBR lab test (See Appendix C) to assess the suitability of native soils to support a pavement section. The laboratory test indicated a CBR value of 4.1 for near surface soils. For the pavement section designs presented below, IGES has used a CBR of 4.1. IGES has prepared pavement section designs for three different traffic scenarios: parking, drives and a trash enclosure approach slab (high traffic area). The pavement section designs presented below have been prepared for a 40-year design life assuming an annual growth rate of 0%.

IGES has estimated an equivalent single axle load (ESAL) of approximately 200,000 over a 40-year design life for the Parking Lot. IGES recommends that one of the following pavement thicknesses be used for the parking lot:

Table 6.7.1 - Flexible (Asphalt) Pavement Section – Parking Lot

	Asphalt Concrete (in.)	Untreated Road Base (in.)	Granular Borrow (in.)	Reworked Native Soils (in)
Parking Lot 1	**4**	**7**	**8**	**18**
Parking Lot 2	**5**	**9**	**-**	**18**

Table 6.7.2 - Rigid (Concrete) Pavement Section – Parking Lot

	Portland Cement Concrete (in.)	Untreated Road Base (in.)	Reworked Native Soils (in)
Parking Lot 3	**6**	**8**	**18**

IGES has estimated an equivalent single axle load (ESAL) of approximately 500,000 over a 40-year design life for the Drive areas. IGES recommends that one of the following pavement thicknesses be used for the Drive areas at the site:

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Table 6.7.3 - Flexible (Asphalt) Pavement Section – Drives

	Asphalt Concrete (in.)	Untreated Road Base (in.)	Granular Borrow (in.)	Reworked Native Soils (in)
Main Drive 1	**4**	**9**	**10**	**18**
Main Drive 2	**5**	**7**	**8**	**18**

Table 6.7.4 - Rigid (Concrete) Pavement Section – Drives

	Portland Cement Concrete (in.)	Untreated Road Base (in.)	Reworked Native Soils (in)
Main Drive 3	**7**	**10**	**18**

It is our experience that pavement in areas where trucks frequently turn around, backup, or load and unload, including round-a-bouts, docks, trash enclosures, exit and entrances from the main roadways, etc., experience more distress. If the owner wishes to prolong the life of the pavement in these areas consideration should be given to using a Portland cement concrete (rigid) pavement in these areas. The following rigid pavement section is recommended:

Table 6.7.5 - Rigid Pavement Section – High Traffic Areas

Portland Cement Concrete (in.)	Untreated Road Base (in.)	Reworked Native Soils (in)
7	**12**	**18**

All undocumented fill soils should have been removed or compacted in place as structural fill in accordance with Section 6.2.5 of this report prior to starting construction on the pavement section. IGES recommends that the upper 18 inches be removed and replaced with structure fill (Section 6.2.4) prior to constructing the pavement sections. This can be accomplished by removing the upper 12 inches and scarifying the exposed subgrade soils to a minimum depth of 6 inches; the scarified soils should moisture conditioned and compacted as structural fill as recommended in Section 6.2.4. Additionally, if the subgrade soils are soft or pumping, they should be stabilized as recommended in section 6.2.6 prior to placing granular borrow or road base.

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Asphalt has been assumed to be a high stability plant mix; base coarse material should be composed of crushed stone with a minimum CBR of 70. Granular borrow has been assumed to be a pit-run type material with a minimum CBR of 30. Asphalt should be compacted to a minimum density of 96% of the Marshall value; base coarse and granular borrow should be compacted to at least 95% of the MDD as determined by ASTM D-1557.

Concrete should consist of a low slump, low water cement ratio mix with a minimum 28-day compressive strength of 4,000 psi. Base course should be compacted to at least 95% of the MDD as determined by ASTM D-1557.

If traffic conditions vary significantly from our stated assumptions, IGES should be contacted so we can modify our pavement design parameters accordingly. Specifically, if the traffic counts are significantly higher or lower, we should be contacted to revise the pavement section design as necessary. The pavement section thicknesses above assume that most construction traffic including cement trucks, cranes, loaded haulers, etc. has ceased. If a significant volume of construction traffic occurs after the pavement section has been constructed the owner should anticipate maintenance or a decrease in the design life of the pavement.

The owner should also consider the benefits of maintenance in extending the life of the pavement. Some heavy traffic areas may need to be repaired or replaced. Crack seal should be applied every 2-3 years to new cracks that have developed to help reduce the effects infiltrated water can have on deteriorating the pavement support materials.

The pavement section thicknesses above have been designed with the assumption that there is no mixing over time between the road base and the softer native layers below. In order to prevent mixing or fines migration, and thereby prolong the life of the pavement section, we recommend placing a non-woven filter fabric such as Mirafi TenCate 160N between the native soils and the road base.

6.8 SOIL CORROSIVITY

Chemical testing was not completed as a part of this investigation however the soils were predominantly fine-grained. It would be expected to get test results indicating that the corrosion potential of native soils on site can be characterized as ***moderate to severe*** with respect to steel that is in direct contact with native soils. Consideration should be given to consulting with a corrosion engineer to design appropriate cathodic protection or sacrificial thicknesses for metal that will be in contact with native site soils.

The soluble sulfate content is likely to be in a range that indicates a low to moderate risk of sulfate attack on concrete. Type I/II cement should be used for all concrete at this

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project site. The provisions in American Concrete Institute (ACI) 318 Section 4.3 should be reviewed for further clarification.

No chemical testing was completed, however chemical testing can be completed upon request.

6.9 OTHER CONSIDERATIONS

Moderate to highly collapsible soils were prevalent in the top 4.5 feet with minor pinholes observed up to 6 feet below existing grade. To reduce the risk associated with collapsible soils, we recommend removing all collapsible soils to a depth of 6 feet below existing grade where footings are planned. For parking lots, roadways or sidewalks, it is recommended to scarify and moisture condition the top 18 inches. Before placing structural fill, an IGES representative should be on site to observe that the exposed soils have been prepared as recommended in this report.

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7.0 CLOSURE & LIMITATIONS

The concept of risk is a significant consideration of geotechnical analyses. The analytical means and methods used in performing geotechnical analyses and development of resulting recommendations do not constitute an exact science. Analytical tools used by geotechnical engineers are based on limited data, empirical correlations, engineering judgment and experience. As such the solutions and resulting recommendations presented in this report cannot be considered risk-free and constitute IGES's best professional opinions and recommendations based on the available data and other design information available at the time they were developed. IGES has developed the preceding analyses, recommendations and designs, at a minimum, in accordance with generally accepted professional geotechnical engineering practices and care being exercised in the project area at the time our services were performed. No warrantees, guarantees or other representations are made.

The information contained in this report is based on limited field testing and understanding of the project. The subsurface data used in the preparation of this report were obtained largely from the explorations made for this project. It is very likely that variations in the soil, rock, and groundwater conditions exist between and beyond the points explored. The nature and extent of the variations may not be evident until construction occurs and additional explorations are completed. If any conditions are encountered at this site that are different from those described in this report, IGES must be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction or grading changes from those described in this report, our firm must also be notified.

This report was prepared for the Welfare Complex. Use of the data, recommendations or design information contained herein for any other project or development of the site not as specifically described in this report is at the user's sole risk and without the approval of IGES, Inc. It is the client's responsibility to see that all parties to the project including the designer, contractor, subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

We recommend that IGES be retained to review the final design plans, grading plans and specifications to determine if our engineering recommendations have been properly incorporated in the project development documents. We also recommend that IGES be retained to evaluate, construction performance and other geotechnical aspects of the projects as construction initiates and progresses through its completion.

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8.0 REFERENCES CITED

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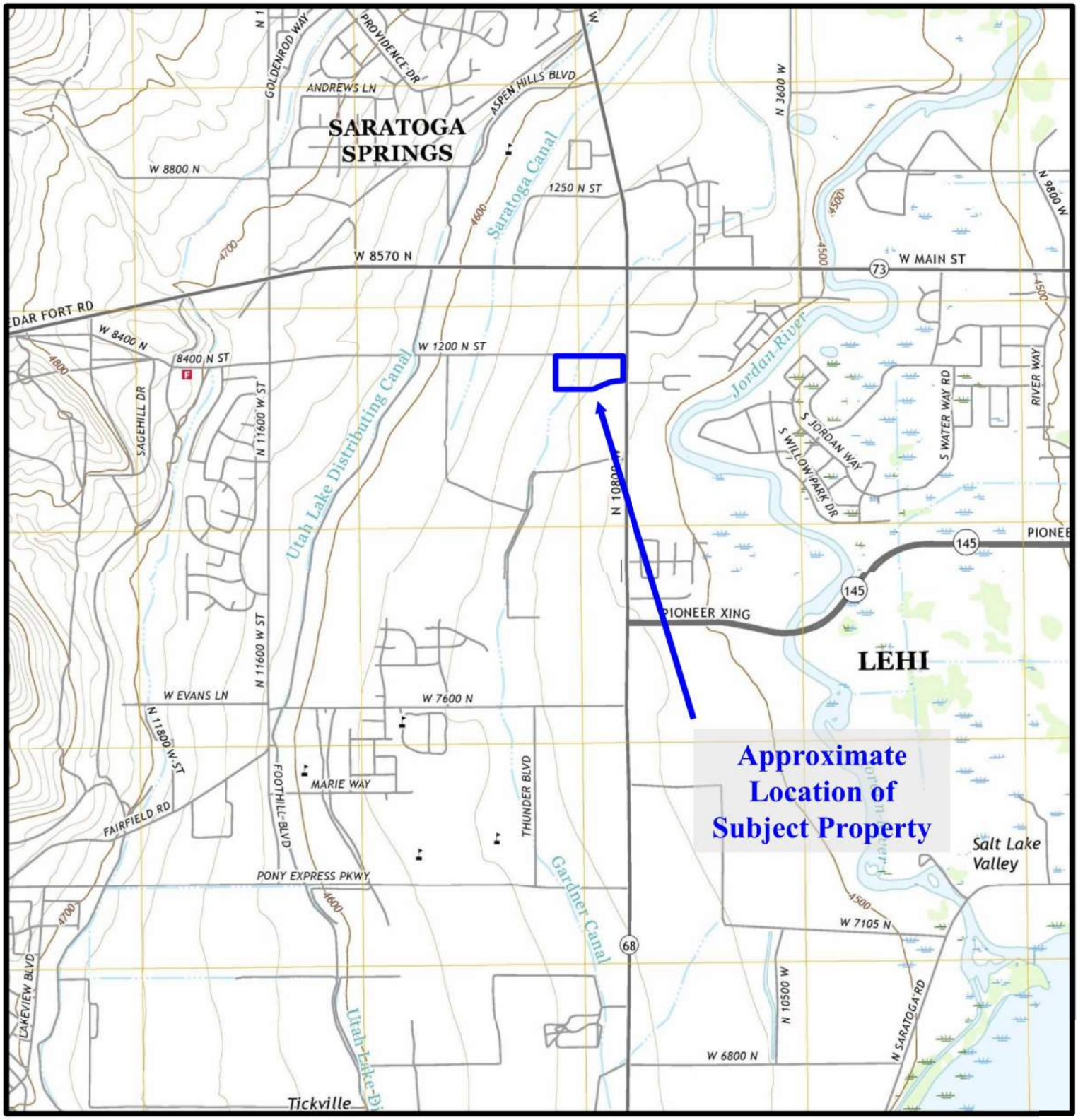
APPENDIX A

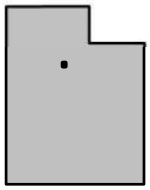


Base Map:
USGS Jordan Narrows
USGS Saratoga Springs
7.5-Minute Quadrangle Topographic Maps (2017)

0' 1000' 2000'

SCALE 1:24,000
Contour Interval – 20 feet

N



MAP LOCATION

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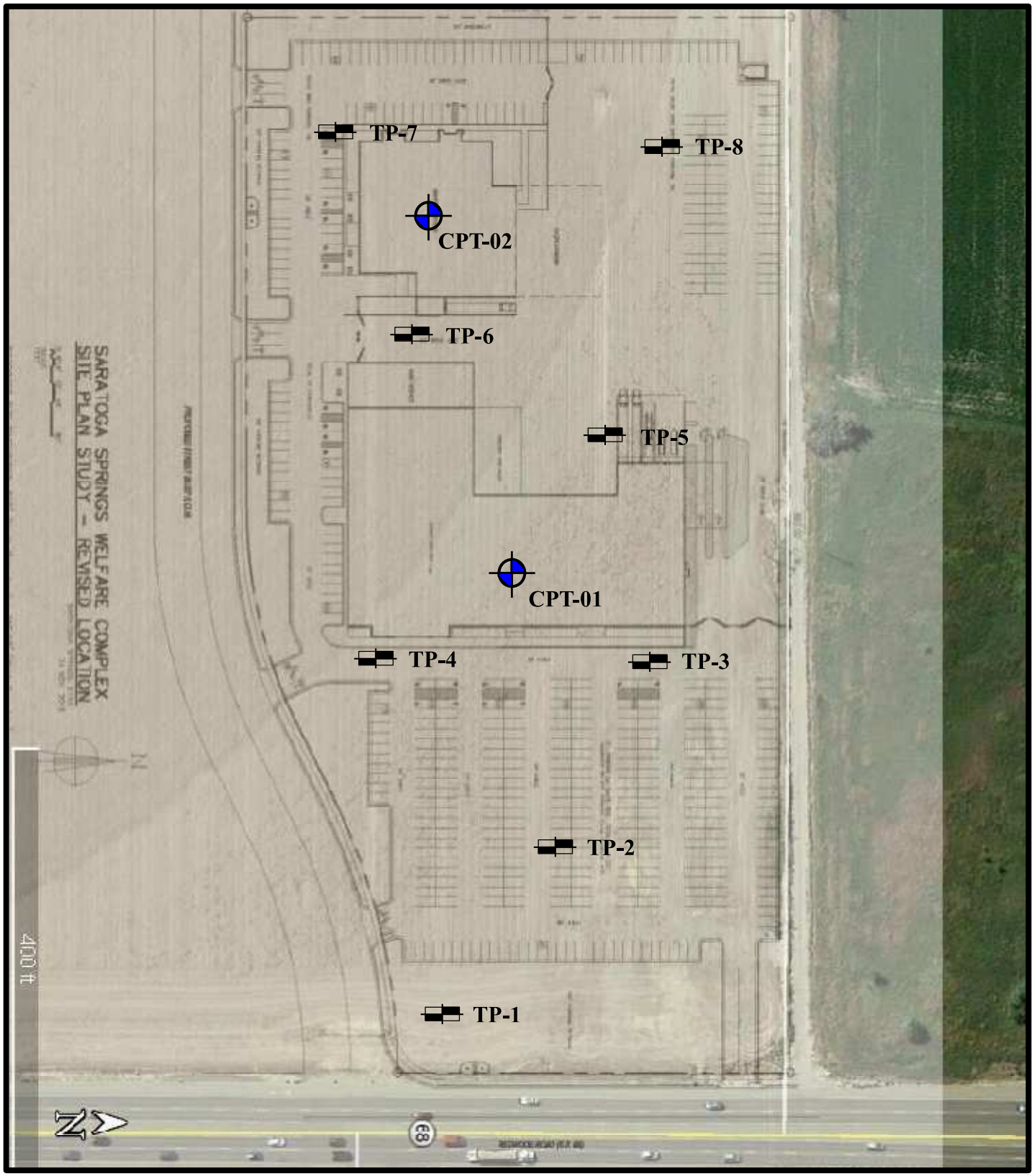
Project Number 03019-001

Geotechnical Investigation
JRW & Associates
1200 North Redwood Road
Saratoga Springs, Utah

SITE VICINITY MAP

Figure

A-1



Approximate Test Pit Location

Approximate CPT Location

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Saratoga Springs, Utah

SITE MAP

Figure

A-2

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
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1200 North Redwood Road
Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO:
TP-1
Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - medium stiff to stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown frequent pinholes						
1												
	5					- light brown						
						- occasional pinholes						
2						- few to no pinholes						
3	10											
4												
						No groundwater was encountered						
	15					Bottom of test pit @ 14 Feet						

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 3

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
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Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO:
TP-2
Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown frequent pinholes						
1						- light brown						
	5						80.1	15.5				●
2						- occasional to few pinholes						
						- no pinholes						
3	10											
						No groundwater was encountered						
4						Bottom of test pit @ 12.5 Feet						
	15											

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 4

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
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Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO:
TP-3
Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown to light brown frequent pinholes						
1												
	5											
2							91.4	17.5				●
						- occasional pinholes						
						- few to no pinholes						
3	10											
4												
					SM	Silty SAND - medium dense, moist, tan						
						No groundwater was encountered						
	15					Bottom of test pit @ 14.5 Feet						

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 5

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

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Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO:
TP-4
Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown pinholes present						
1		X										
	5											
2						- occasional pinholes						
						- no pinholes, white mottling and stringers						
3	10											
						- brown to gray, no more white mottling						
						No groundwater was encountered						
4						Bottom of test pit @ 12.5 Feet						
	15											

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 6

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
JRW & Associates
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Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO: **TP-5**

Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown pinholes present						
1												
	5						89.7	19.5				●
						- few to no pinholes						
2						- gray to brown						
3	10											
					SM	Silty SAND with gravel - medium dense, moist, tan with cobbles						
					GP-GM	Poorly Graded GRAVEL with silt and sand - dense, moist, tan with cobbles						
						No groundwater was encountered						
4						Bottom of test pit @ 12.5 Feet						
	15											

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 7

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
JRW & Associates
1200 North Redwood Road
Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO: **TP-6**

Sheet 1 of 1

LOCATION

LATITUDE | LONGITUDE | ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown frequent pinholes						
1						- slightly moist, light brown						
	5											
2						- moist, brown to light brown						
						- no pinholes						
3	10					- gray to brown						
					SM	Silty SAND - medium dense, slightly moist to moist, tan						
						No groundwater was encountered						
4						Bottom of test pit @ 12.5 Feet						
	15											

LOG OF TEST PITS (A) - (4 LINE HEADER) 03019-001.GPJ IGES.GDT 5/24/19

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 8

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
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Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO:
TP-7
Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - Lean CLAY - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown to light brown pinholes present						
1		X					79.1	17.2				●
	5											
						- few to no pinholes						
2						- brown						
3	10											
					SM	Silty SAND - medium dense, moist, tan						
						No groundwater was encountered						
4						Bottom of test pit @ 12.5 Feet						
	15											

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SAMPLE TYPE
[ ] - GRAB SAMPLE
[X] - 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
▼ - MEASURED
▽ - ESTIMATED

NOTES:

Figure A - 9

DATE	
STARTED:	3/11/19
COMPLETED:	3/11/19
BACKFILLED:	3/11/19

Geotechnical Investigation
JRW & Associates
1200 North Redwood Road
Saratoga Springs, Utah

Project Number 03019-001

IGES Rep: JGS
Rig Type: JCB-4CX

TEST PIT NO:
TP-8
Sheet 1 of 1

LOCATION
LATITUDE LONGITUDE ELEVATION (ft)

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					Topsoil - stiff, moist, dark brown						
					CL	Lean CLAY - stiff, moist, brown trace pinholes						
1						- no pinholes						
	5											
2												
3	10					- brown to gray						
						No groundwater was encountered						
4						Bottom of test pit @ 12.5 Feet						
	15											

LOG OF TEST PITS (A) - (4 LINE HEADER) 03019-001.GPJ IGES.GDT 5/24/19

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SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Figure A - 10

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			USCS SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
			SC	CLAYEY SANDS SAND-GRAVEL-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)		ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

LOG KEY SYMBOLS

- BORING SAMPLE LOCATION
- TEST-PIT SAMPLE LOCATION
- WATER LEVEL (level after completion)
- WATER LEVEL (level where first encountered)

CEMENTATION

DESCRIPTION	DESCRIPTION
WEAKELY	CRUMBLES OR BREAKS WITH HANDLING OR SLIGHT FINGER PRESSURE
MODERATELY	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE
STRONGLY	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE

OTHER TESTS KEY

C	CONSOLIDATION	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	DS	DIRECT SHEAR
UC	UNCONFINED COMPRESSION	T	TRIAXIAL
S	SOLUBILITY	R	RESISTIVITY
O	ORGANIC CONTENT	RV	R-VALUE
CBR	CALIFORNIA BEARING RATIO	SU	SOLUBLE SULFATES
COMP	MOISTURE/DENSITY RELATIONSHIP	PM	PERMEABILITY
CI	CALIFORNIA IMPACT	-200	% FINER THAN #200
COL	COLLAPSE POTENTIAL	Gs	SPECIFIC GRAVITY
SS	SHRINK SWELL	SL	SWELL LOAD

MODIFIERS

DESCRIPTION	%
TRACE	<5
SOME	5 - 12
WITH	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL BELOW WATER TABLE

STRATIFICATION

DESCRIPTION	THICKNESS	DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2"	OCCASIONAL	ONE OR LESS PER FOOT OF THICKNESS
LAYER	1/2 - 12"	FREQUENT	MORE THAN ONE PER FOOT OF THICKNESS

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil conditions between individual sample locations.
3. Logs represent general soil conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary.

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT (blows/ft)	MODIFIED CA. SAMPLER (blows/ft)	CALIFORNIA SAMPLER (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
VERY LOOSE	<4	<4	<5	0 - 15	EASILY PENETRATED WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
LOOSE	4 - 10	5 - 12	5 - 15	15 - 35	DIFFICULT TO PENETRATE WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
MEDIUM DENSE	10 - 30	12 - 35	15 - 40	35 - 65	EASILY PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
DENSE	30 - 50	35 - 60	40 - 70	65 - 85	DIFFICULT TO PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
VERY DENSE	>50	>60	>70	85 - 100	PENETRATED ONLY A FEW INCHES WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE: UNTRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER: UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
VERY SOFT	<2	<0.125	<0.25	EASILY PENETRATED SEVERAL INCHES BY THUMB. EXUDES BETWEEN THUMB AND FINGERS WHEN SQUEEZED BY HAND.
SOFT	2 - 4	0.125 - 0.25	0.25 - 0.5	EASILY PENETRATED ONE INCH BY THUMB. MOLDED BY LIGHT FINGER PRESSURE.
MEDIUM STIFF	4 - 8	0.25 - 0.5	0.5 - 1.0	PENETRATED OVER 1/2 INCH BY THUMB WITH MODERATE EFFORT. MOLDED BY STRONG FINGER PRESSURE.
STIFF	8 - 15	0.5 - 1.0	1.0 - 2.0	INDENTED ABOUT 1/2 INCH BY THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.
VERY STIFF	15 - 30	1.0 - 2.0	2.0 - 4.0	READILY INDENTED BY THUMBNAIL.
HARD	>30	>2.0	>4.0	INDENTED WITH DIFFICULTY BY THUMBNAIL.

IGES®

Figure A-11

Key to Soil Symbols and Terminology

APPENDIX B

PRESENTATION OF SITE INVESTIGATION RESULTS

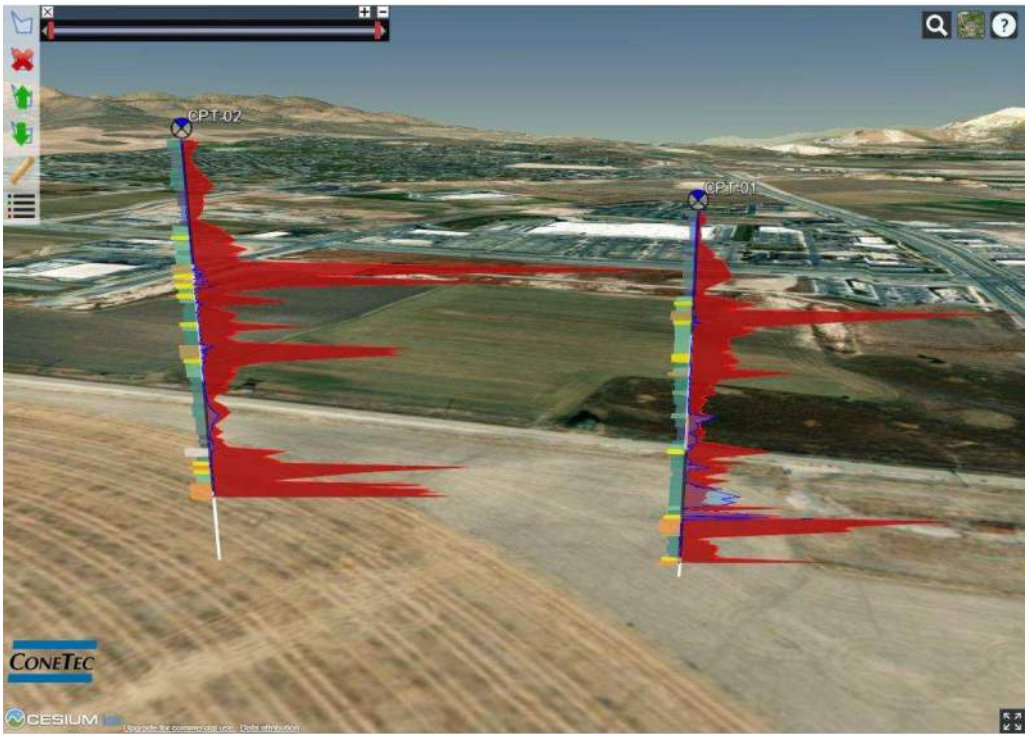
JRW

Prepared for:

IGES, Inc.

ConeTec Job No: 19-52023

Project Start Date: 16-May-2019
Project End Date: 16-May-2019
Report Date: 24-May-2019



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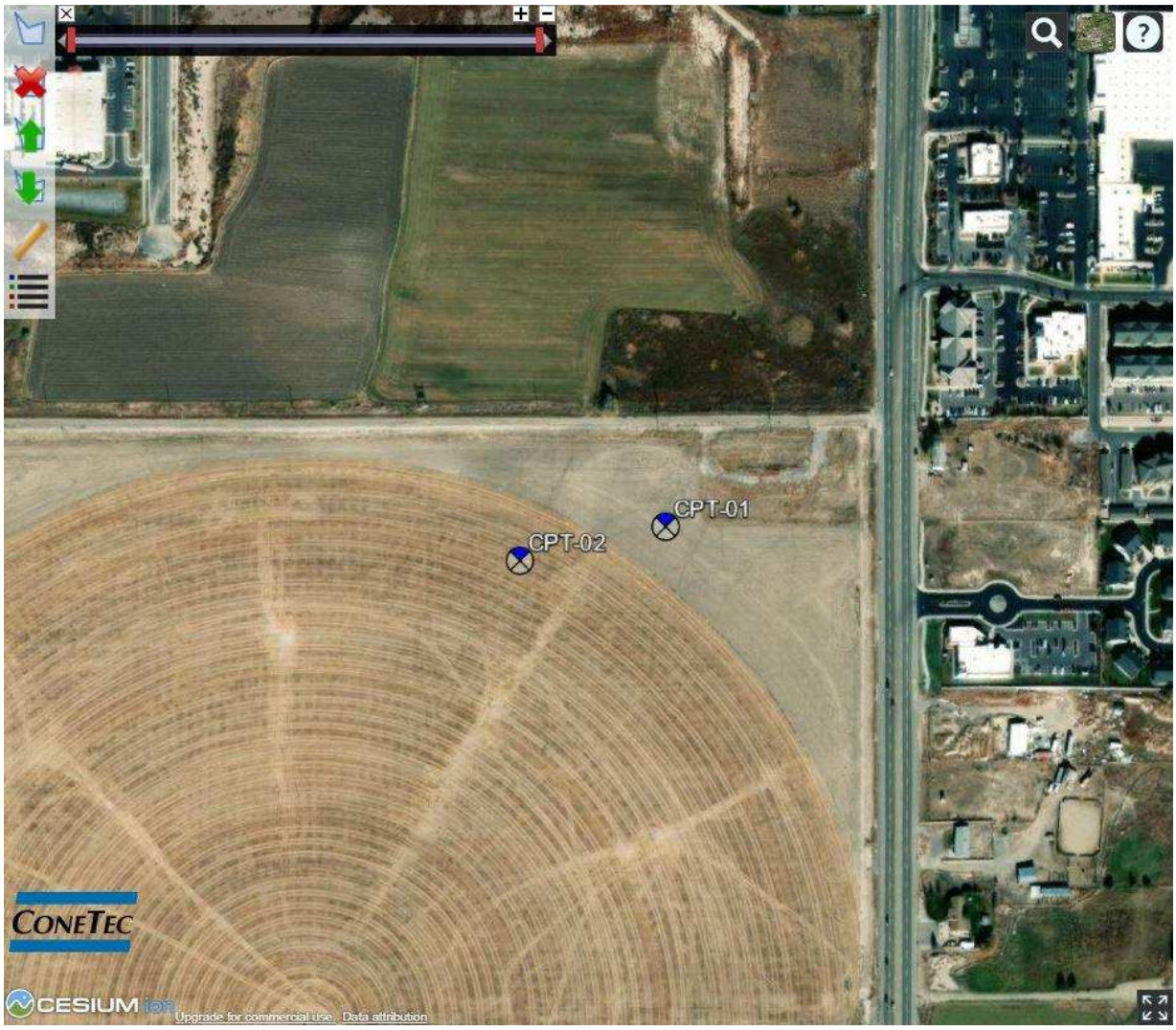
Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec, Inc. for IGES, Inc. of Draper, Utah. The program consisted of cone penetration testing (CPT) at two (2) locations. Shear wave velocities were recorded in one (1) of the soundings. Pore pressure dissipation testing was performed as directed by IGES, Inc. field personnel. The water table used in the CPT interpretations is based on the results of the pore pressure dissipation tests performed within each sounding.

Project Information

Project	
Client	IGES, Inc.
Project	JRW
ConeTec Project #	19-52023

A map from Bing maps including the CPT test locations is presented below.



Rig Description	Deployment System	Test Type
CPT truck rig	25-ton truck mounted cylinder	SCPT

Coordinates		
Test Type	Collection Method	EPSG Number
SCPT	USB/Serial GPS	4326 (WGS 84 / LatLong)

Cone Penetration Test (CPT)	
Depth reference	Existing ground surface at the time of the investigation
Tip and sleeve data offset	0.1 Meter This has been accounted for in the CPT data files
Additional Comments	None

Cone Penetrometers Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
418:T1500F15U500	418	15	225	1500	15	500
Cone 418 was used in all soundings						

Calculated Geotechnical Parameter Tables	
Additional information	The Normalized Soil Behavior Type Chart based on Qtn (SBT Qtn) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPT parameters have been generated and are provided in Excel format files in the release folder. The CPT parameter calculations are based on values of corrected tip resistance (qt) sleeve friction (fs), and pore pressure (u2). Effective stresses are calculated based on unit weights that have been assigned to the individual soil behavior type zones and the assumed equilibrium pore pressure profile.

Limitations

This report has been prepared for the exclusive use of IGES, Inc. (Client) for the project titled “JRW”. The report’s contents may not be relied upon by any other party without the express written permission of ConeTec, Inc. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table presented in the first Appendix. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

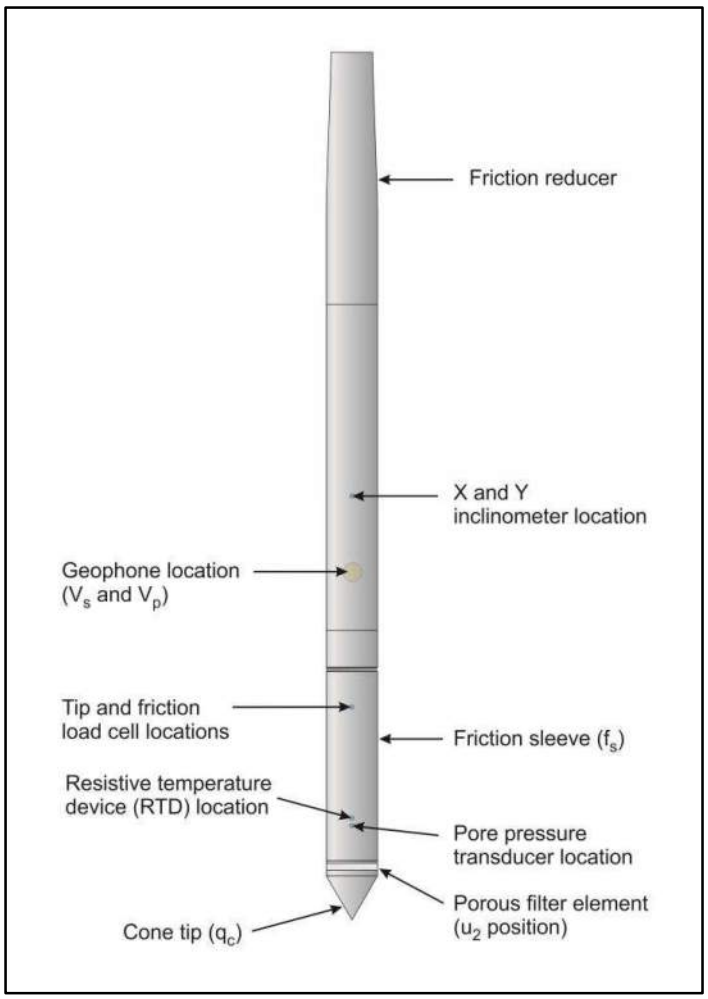


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1-a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high

friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of interpretation files were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the interpretation methods used is also included in the data release folder.

For additional information on CPTu interpretations, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

Shear wave velocity testing is performed in conjunction with the piezocone penetration test (SCPTu) in order to collect interval velocities. For some projects seismic compression wave (Vp) velocity is also determined.

ConeTec's piezocone penetrometers are manufactured with a horizontally active geophone (28 hertz) that is rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip.

Shear waves are typically generated by using an impact hammer horizontally striking a beam that is held in place by a normal load. In some instances an auger source or an imbedded impulsive source maybe used for both shear waves and compression waves. The hammer and beam act as a contact trigger that triggers the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded using an up-hole integrated digital oscilloscope which is part of the SCPTu data acquisition system. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

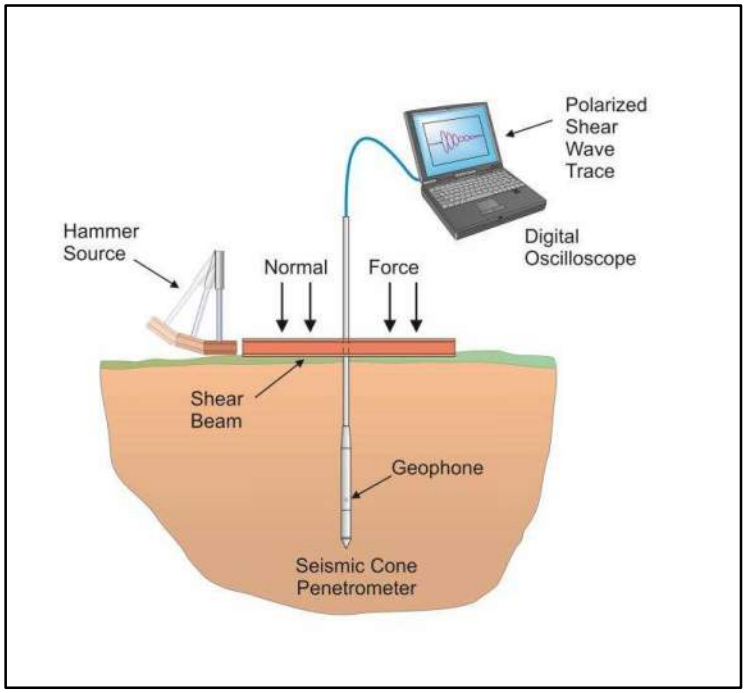


Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures.

Prior to the start of a SCPTu sounding, the procedures described in the Cone Penetration Test section are followed. In addition, the active axis of the geophone is aligned parallel to the beam (or source) and the horizontal offset between the cone and the source is measured and recorded.

Prior to recording seismic waves at each test depth, cone penetration is stopped and the rods are decoupled from the rig to avoid transmission of rig energy down the rods. Multiple wave traces are recorded for quality control purposes. After reviewing wave traces for consistency the cone is pushed to the next test depth (typically one meter intervals or as requested by the client). Figure SCPTu-2 presents an illustration of a SCPTu test.

For additional information on seismic cone penetration testing refer to Robertson et.al. (1986).

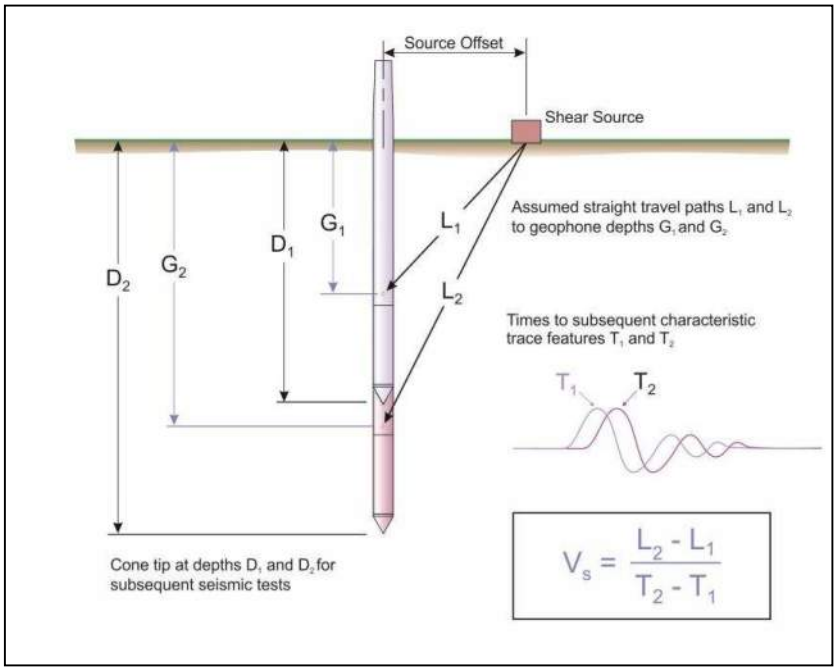


Figure SCPTu-2. Illustration of a seismic cone penetration test

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.

The average shear wave velocity to a depth of 100 feet (30 meters) ($\bar{v}_s$) has been calculated and provided for all applicable soundings using the following equation presented in ASCE, 2010.

$$\bar{v}_s = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{v_{si}}}$$

where: $\bar{v}_s$ = average shear wave velocity ft/s (m/s)
d_i = the thickness of any layer between 0 and 100 ft (30 m)
v_{si} = the shear wave velocity in ft/s (m/s)
$\sum_{i=1}^{n} d_i$ = 100 ft (30 m)

Average shear wave velocity, $\bar{v}_s$ is also referenced to V_{s100} or V_{s30}.

The layer travel times refers to the travel times propagating in the vertical direction, not the measured travel times from an offset source.

Tabular results and SCPTu plots are presented in the relevant appendix.

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

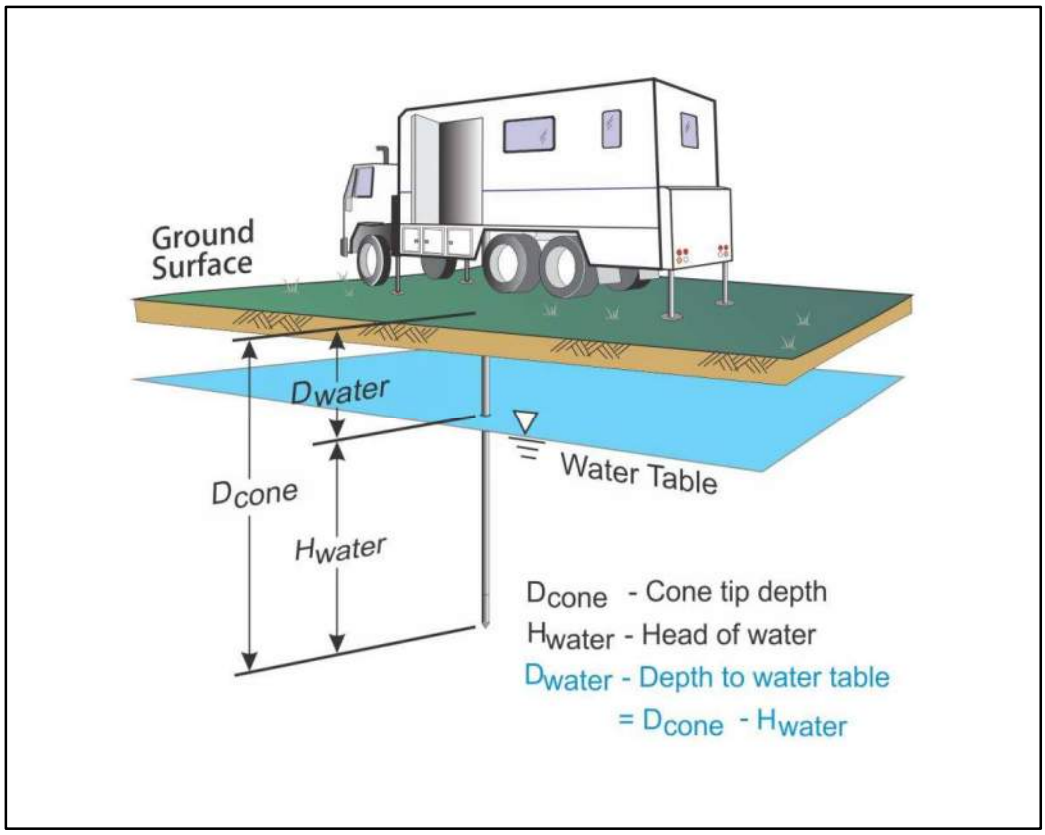


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

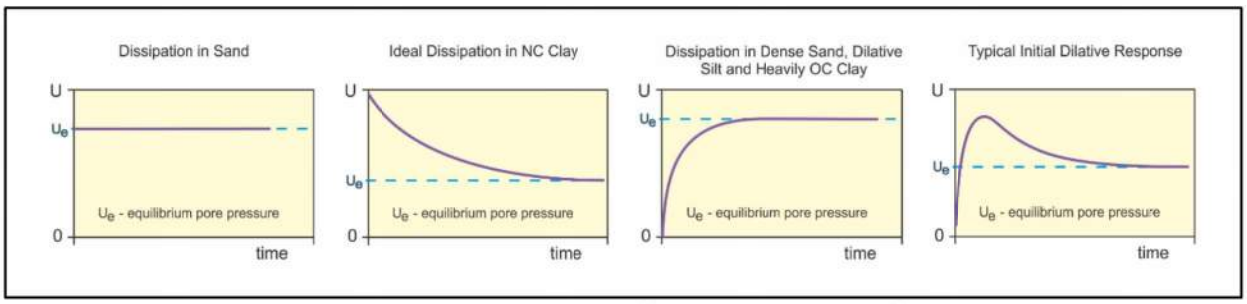


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T* is the dimensionless time factor (Table Time Factor)
a is the radius of the cone
I_r is the rigidity index
t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM, West Conshohocken, US.

Burns, S.E. and Mayne, P.W., 1998, “Monotonic and dilatory pore pressure decay during piezocone tests”, Canadian Geotechnical Journal 26 (4): 1063-1073.

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Crow, H.L., Hunter, J.A., Bobrowsky, P.T., 2012, “National shear wave measurement guidelines for Canadian seismic site assessment”, GeoManitoba 2012, Sept 30 to Oct 2, Winnipeg, Manitoba.

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Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, “Cone Penetration Testing in Geotechnical Practice”, Blackie Academic and Professional.

Mayne, P.W., 2013, “Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests”, Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420.

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Mayne, P.W. and Peuchen, J., 2012, “Unit weight trends with cone resistance in soft to firm clays”, Geotechnical and Geophysical Site Characterization *4,* Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Robertson, P.K., 1990, “Soil Classification Using the Cone Penetration Test”, Canadian Geotechnical Journal, Volume 27: 151-158.

Robertson, P.K., 2009, “Interpretation of cone penetration tests – a unified approach”, Canadian Geotechnical Journal, Volume 46: 1337-1355.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, “Use of Piezometer Cone Data”, Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., Campanella, R.G., Gillespie D and Rice, A., 1986, “Seismic CPT to Measure In-Situ Shear Wave Velocity”, Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8: 791-803.

Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, “Estimating coefficient of consolidation from piezocone tests”, Canadian Geotechnical Journal, 29(4): 551-557.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, “An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils”, Canadian Geotechnical Journal, 36(2): 369-381.

Teh, C.I., and Houlsby, G.T., 1991, “An analytical study of the cone penetration test in clay”, Geotechnique, 41(1): 17-34.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Normalized Cone Penetration Test Plots
- SBT Zone Scatter Plots
- Seismic Cone Penetration Test Plots
- Seismic Cone Penetration Test Tabular Results
- Seismic Cone Penetration Wave Traces
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and

Standard Cone Penetration Test Plots

CONETEC

Job No:	19-52023
Client:	IGES
Project:	JRW
Start Date:	16-May-2019
End Date:	16-May-2019

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft.)	Final Depth (ft.)	Latitude[2]	Longitude	Elevation[3] (ft.)	Refer to Notation Number
CPT-01	19-52023_SP01	16-May-2019	418:T1500F15U500	29.5	50.03	40.383219	-111.918333	4540	
CPT-02	19-52023_SP02	16-May-2019	418:T1500F15U500	43.4	50.03	40.383012	-111.919514	4549	

1. The assumed phreatic surface used in the CPT interpretations are based on the pore pressure dissipation tests performed within each sounding.

2. The coordinates are based on the WGS84 Datum and have an accuracy of ±30 feet.

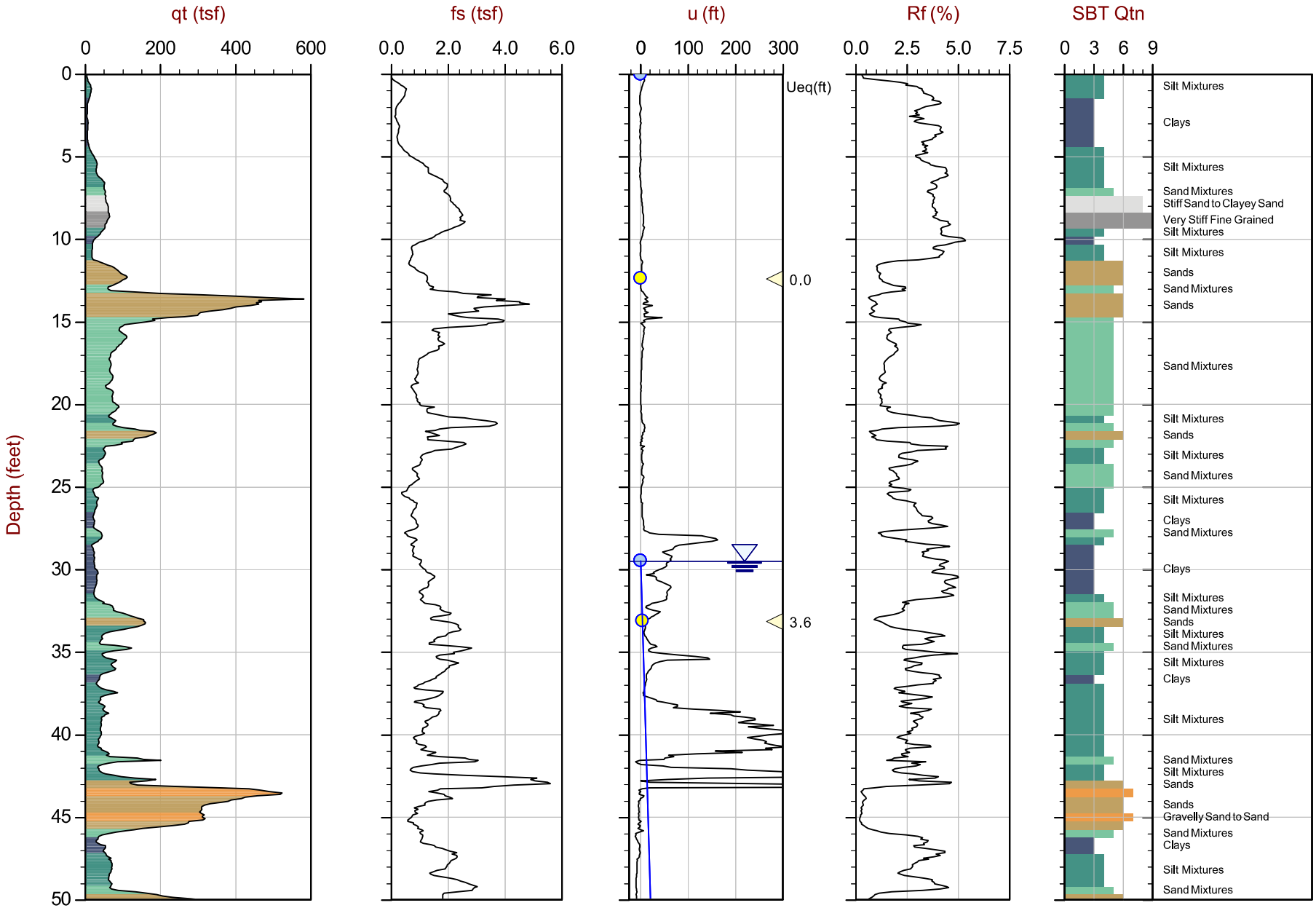
3. Elevations are referenced to the ground surface and are derived from the Google Earth Elevation for the recorded coordinates.

CONETEC

IGES

Job No: 19-52023
Date: 2019-05-16 09:01
Site: JRW

Sounding: CPT-01
Cone: 418:T1500F15U500



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: 0.150 m

File: 19-52023_CP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 40.383220 Long: -111.918330

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Hydrostatic Line, Phreatic Surface

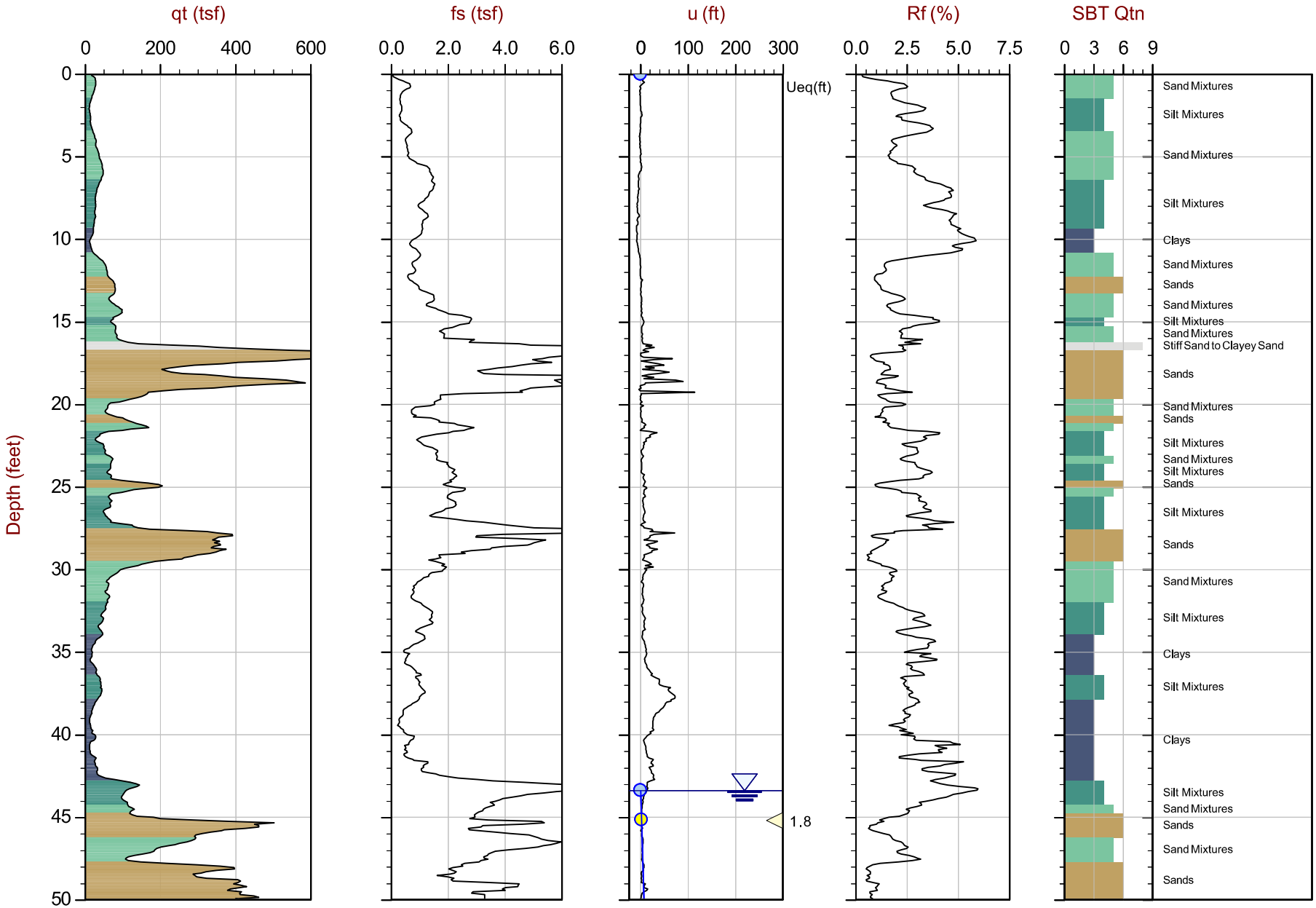
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

IGES

Job No: 19-52023
Date: 2019-05-16 10:19
Site: JRW

Sounding: CPT-02
Cone: 418:T1500F15U500



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: 0.150 m

File: 19-52023_SP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 40.383010 Long: -111.919510

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Hydrostatic Line, Phreatic Surface

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Normalized Cone Penetration Test Plots

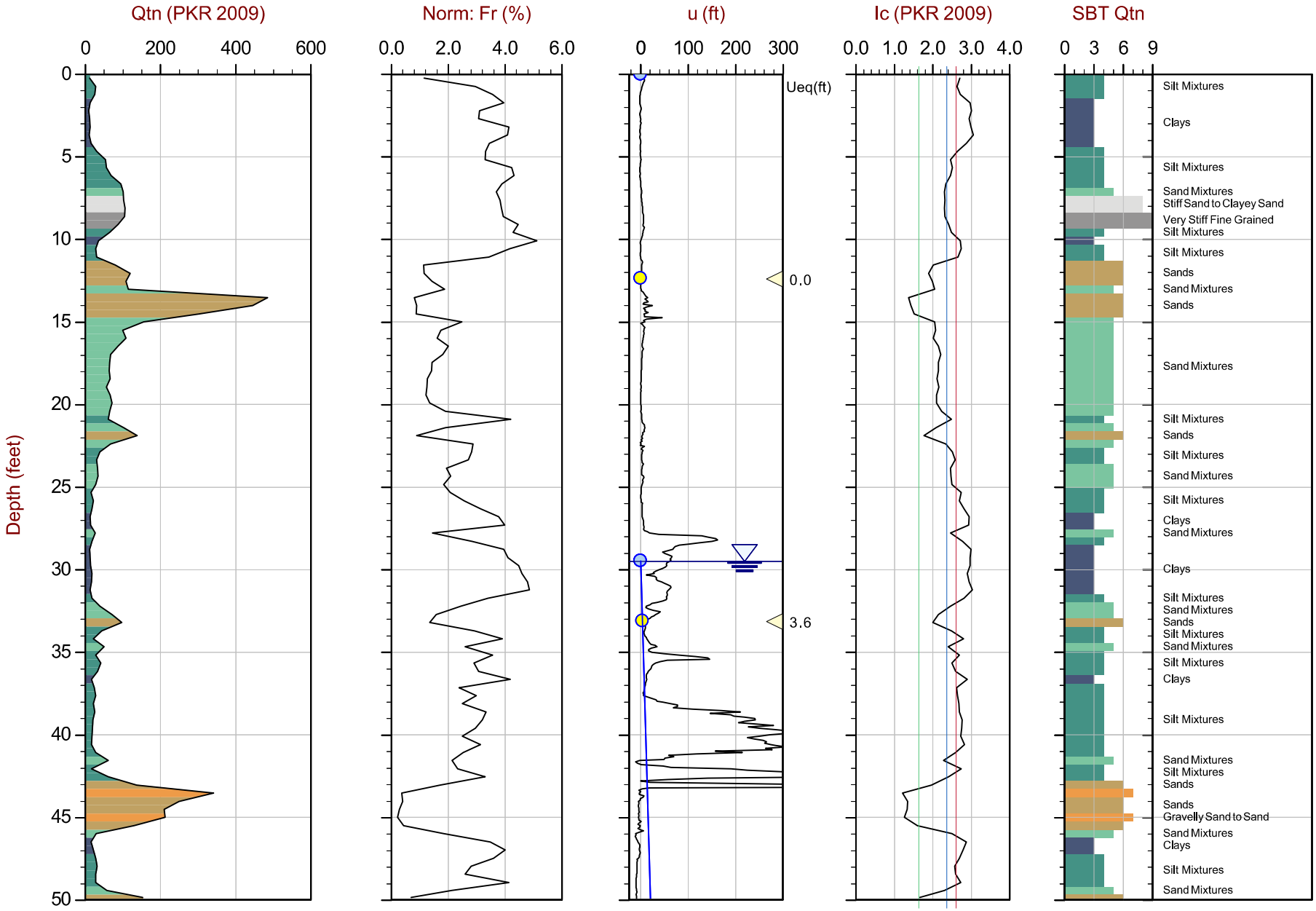
CONETEC

CONETEC

IGES

Job No: 19-52023
Date: 2019-05-16 09:01
Site: JRW

Sounding: CPT-01
Cone: 418:T1500F15U500



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: 0.150 m

File: 19-52023_CP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 40.383220 Long: -111.918330

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Hydrostatic Line, Phreatic Surface

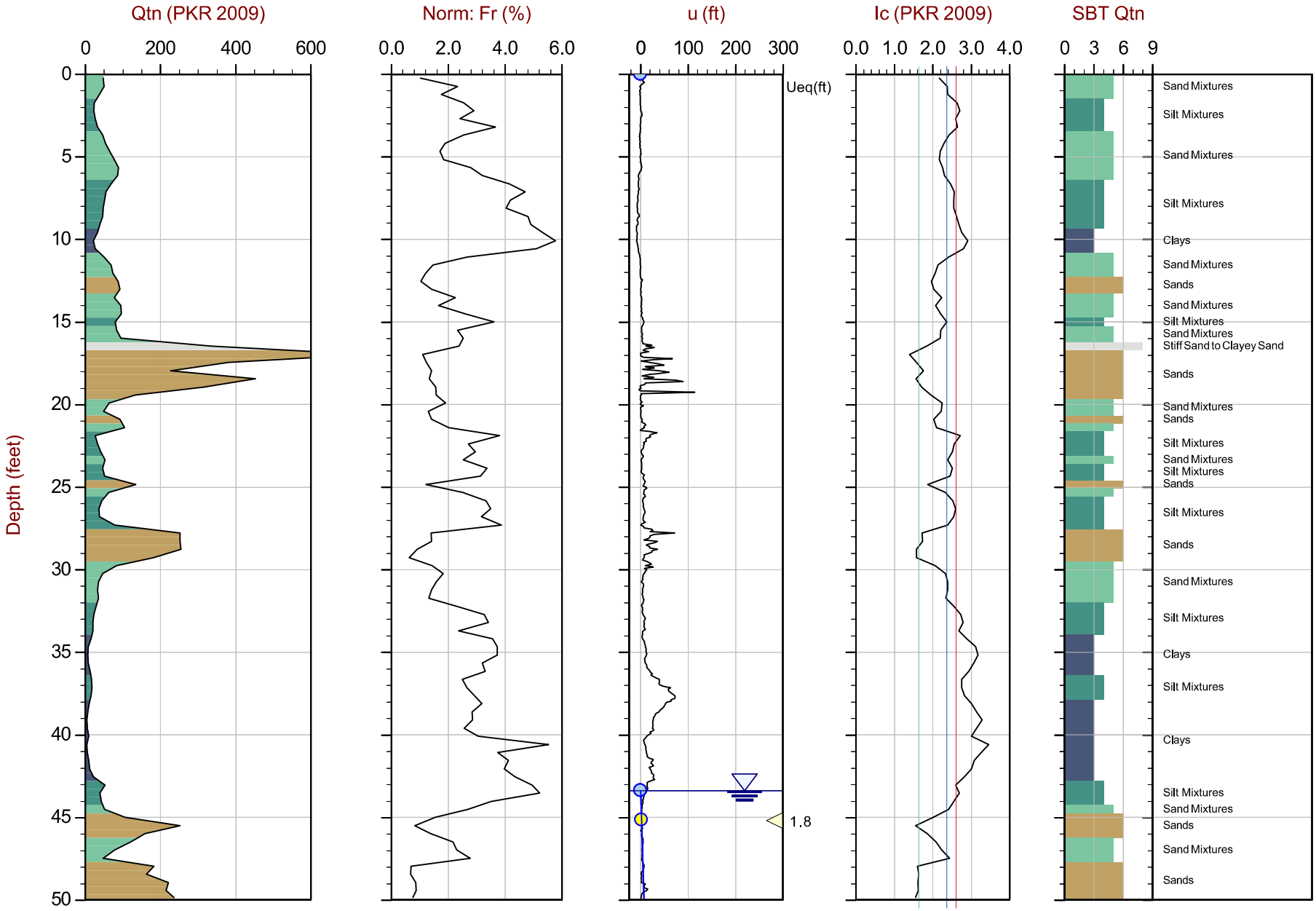
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

IGES

Job No: 19-52023
Date: 2019-05-16 10:19
Site: JRW

Sounding: CPT-02
Cone: 418:T1500F15U500



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: 0.150 m

File: 19-52023_SP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 40.383010 Long: -111.919510

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Hydrostatic Line, Phreatic Surface

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

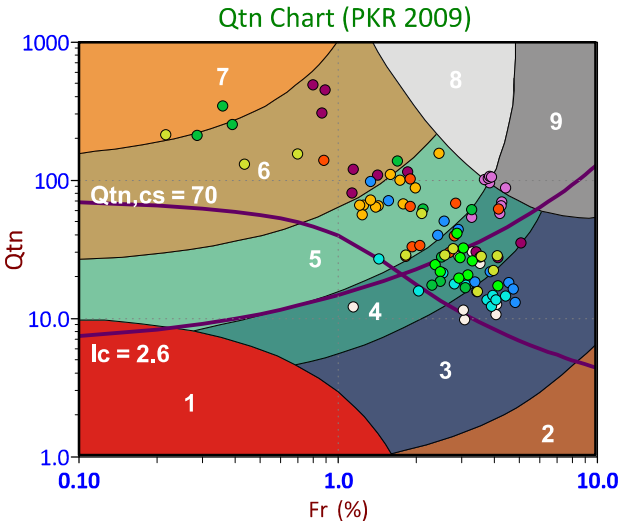
SBT Zone Scatter Plots

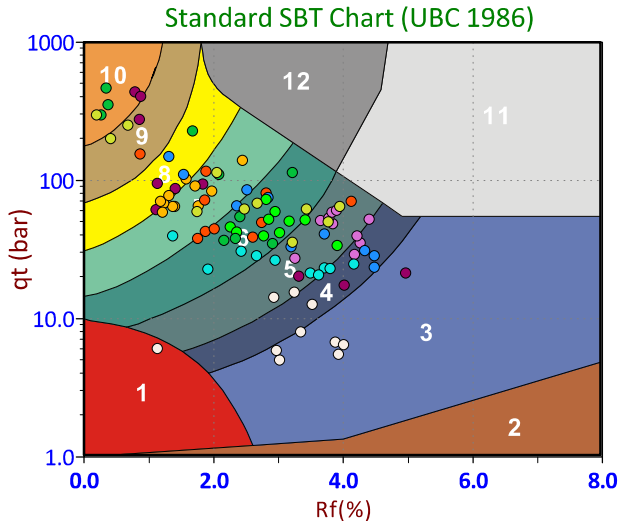
CONETEC

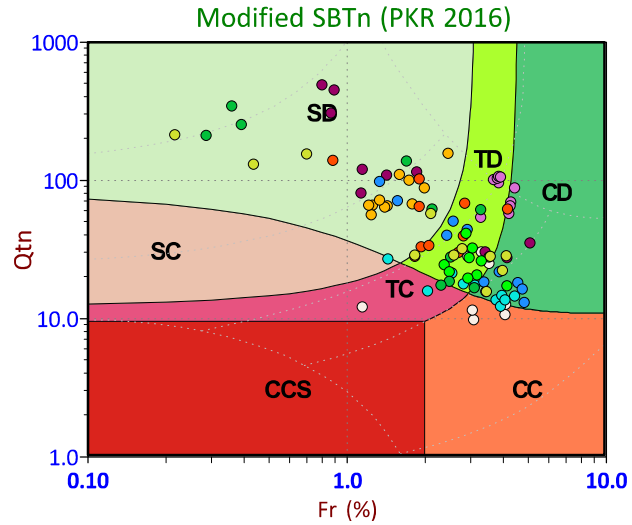
IGES

Job No: 19-52023
Date: 2019-05-16 09:01
Site: JRW

Sounding: CPT-01
Cone: 418:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

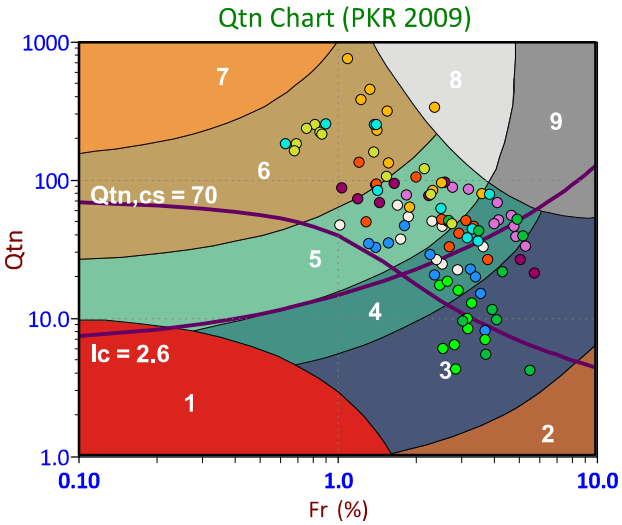
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

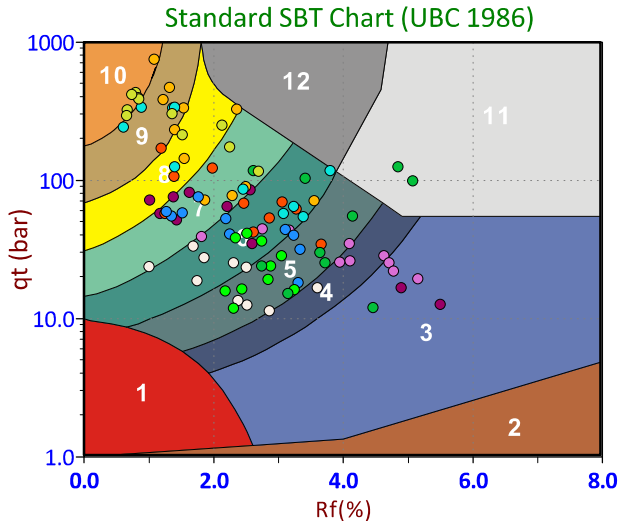
CONETEC

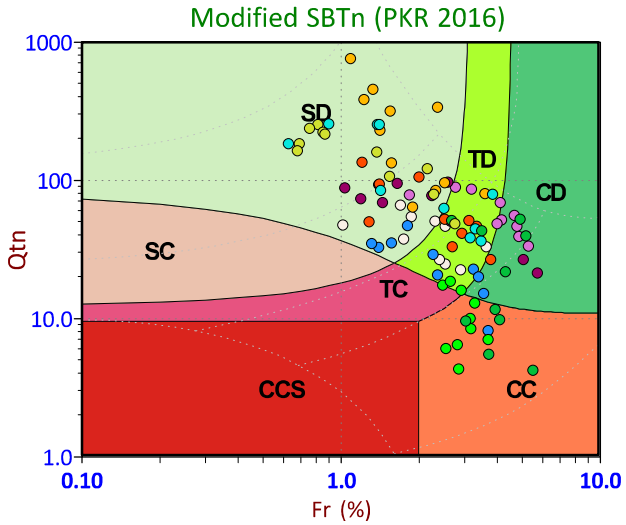
IGES

Job No: 19-52023
Date: 2019-05-16 10:19
Site: JRW

Sounding: CPT-02
Cone: 418:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Seismic Cone Penetration Test Plots

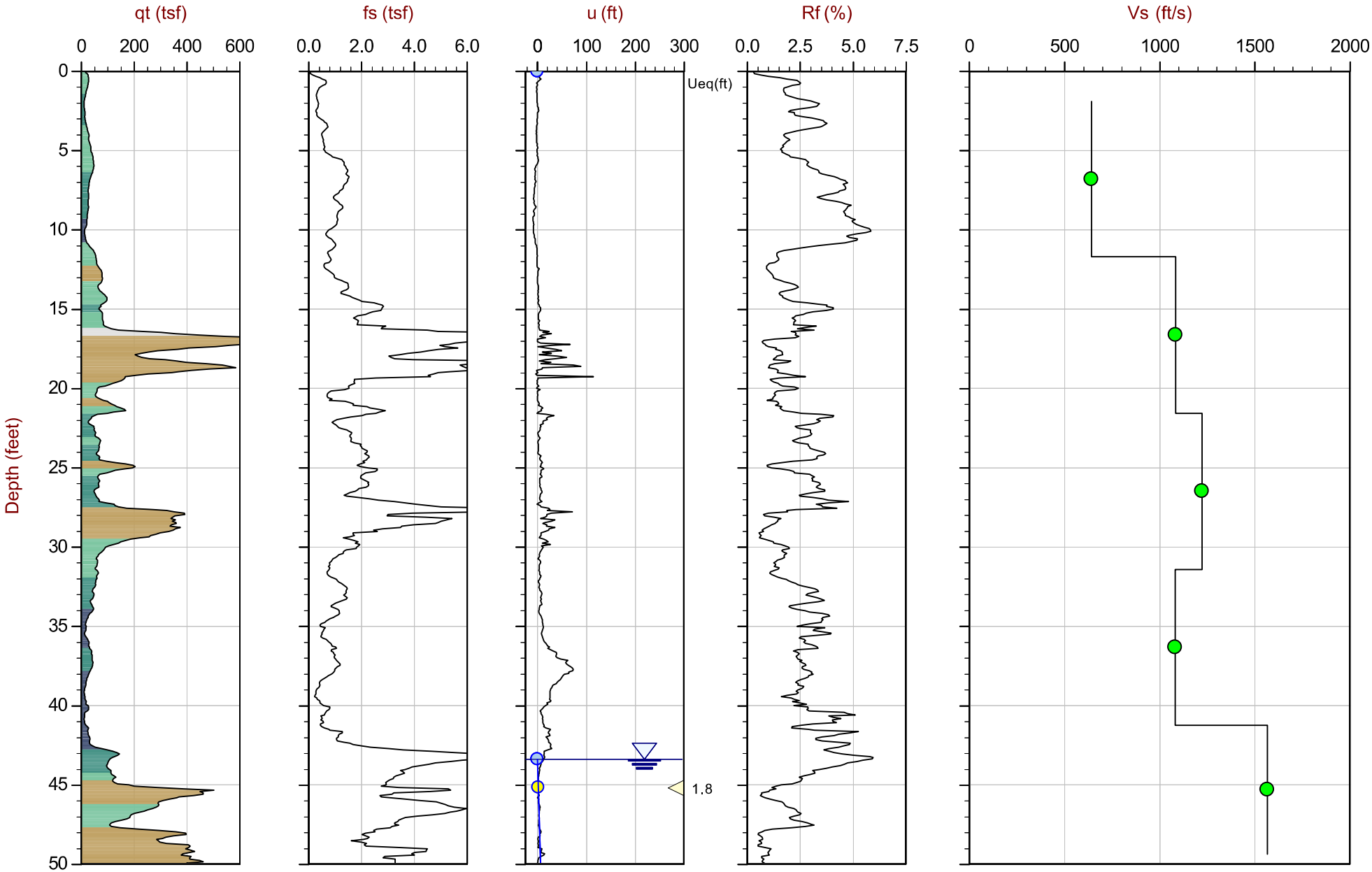
CONETEC

CONETEC

IGES

Job No: 19-52023
Date: 2019-05-16 10:19
Site: JRW

Sounding: CPT-02
Cone: 418:T1500F15U500



Max Depth: 15.250 m / 50.03 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: 0.150 m

File: 19-52023_SP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 40.383010 Long: -111.919510

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Hydrostatic Line, Phreatic Surface

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Test Tabular Results

CONETEC

Job No:	19-52023
Client:	IGES
Project:	JRW
Sounding ID:	SCPT-02
Date:	16-May-2019

Seismic Source:	Beam
Source Offset (ft):	1.50
Source Depth (ft):	0.00
Geophone Offset (ft):	0.66

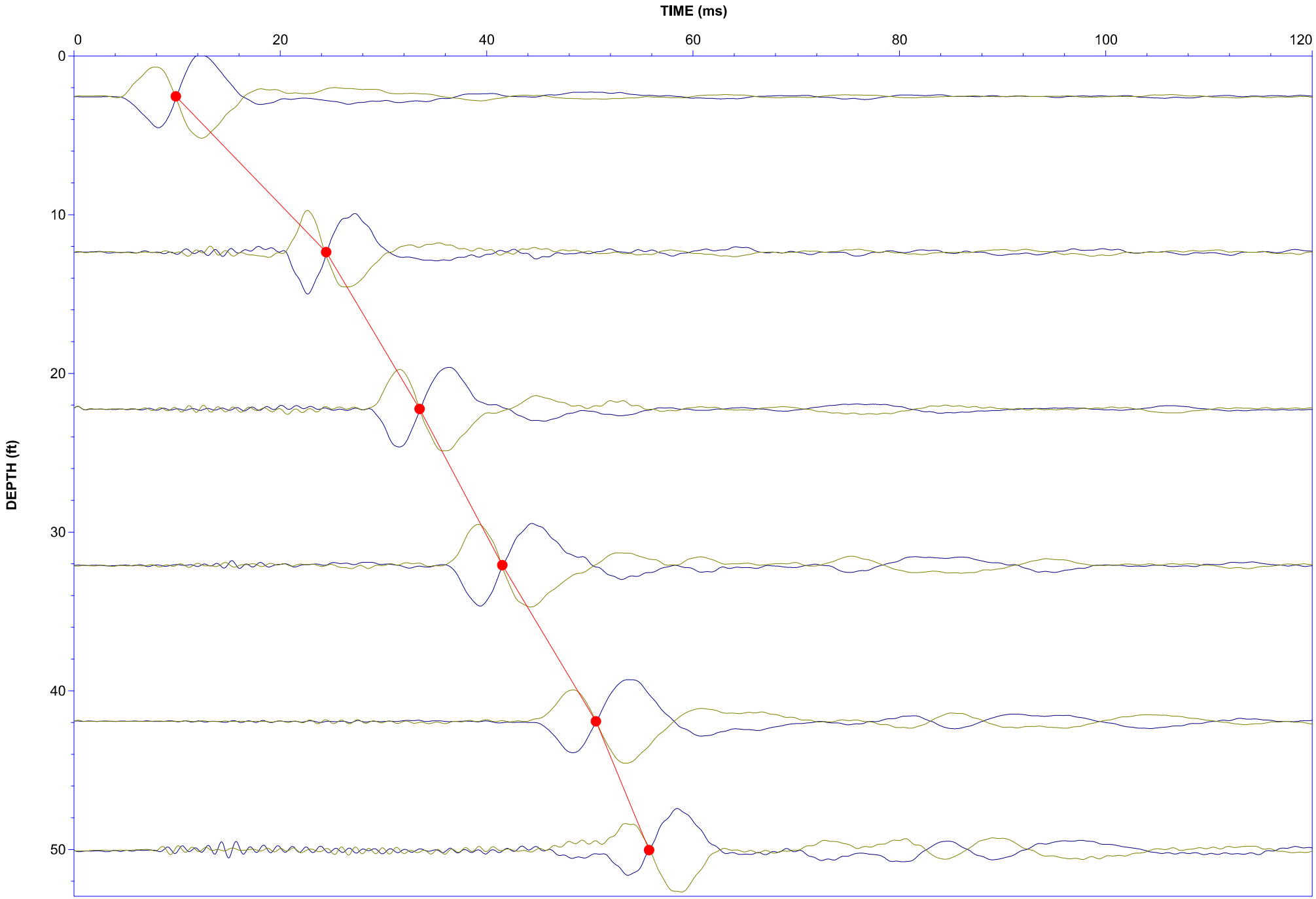
SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
2.56	1.90	2.42			
12.37	11.71	11.81	9.39	14.56	644
22.24	21.59	21.64	9.83	9.05	1087
32.09	31.43	31.47	9.83	8.02	1225
41.93	41.27	41.30	9.83	9.07	1084
50.03	49.38	49.40	8.10	5.16	1569

Seismic Cone Penetration Wave Traces

CONETEC

Job No: 19-52023 Client: IGES Project: JRW Filter: 0-1000 Hz Sounding ID: CPT-02 Date: 05:16:19 10:19
Cone: 418:T1500F15U500



Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

CONETEC

Job No:	19-52023
Client:	IGES
Project:	JRW
Start Date:	16-May-2019
End Date:	16-May-2019

CPTu PORE PRESSURE DISSIPATION SUMMARY

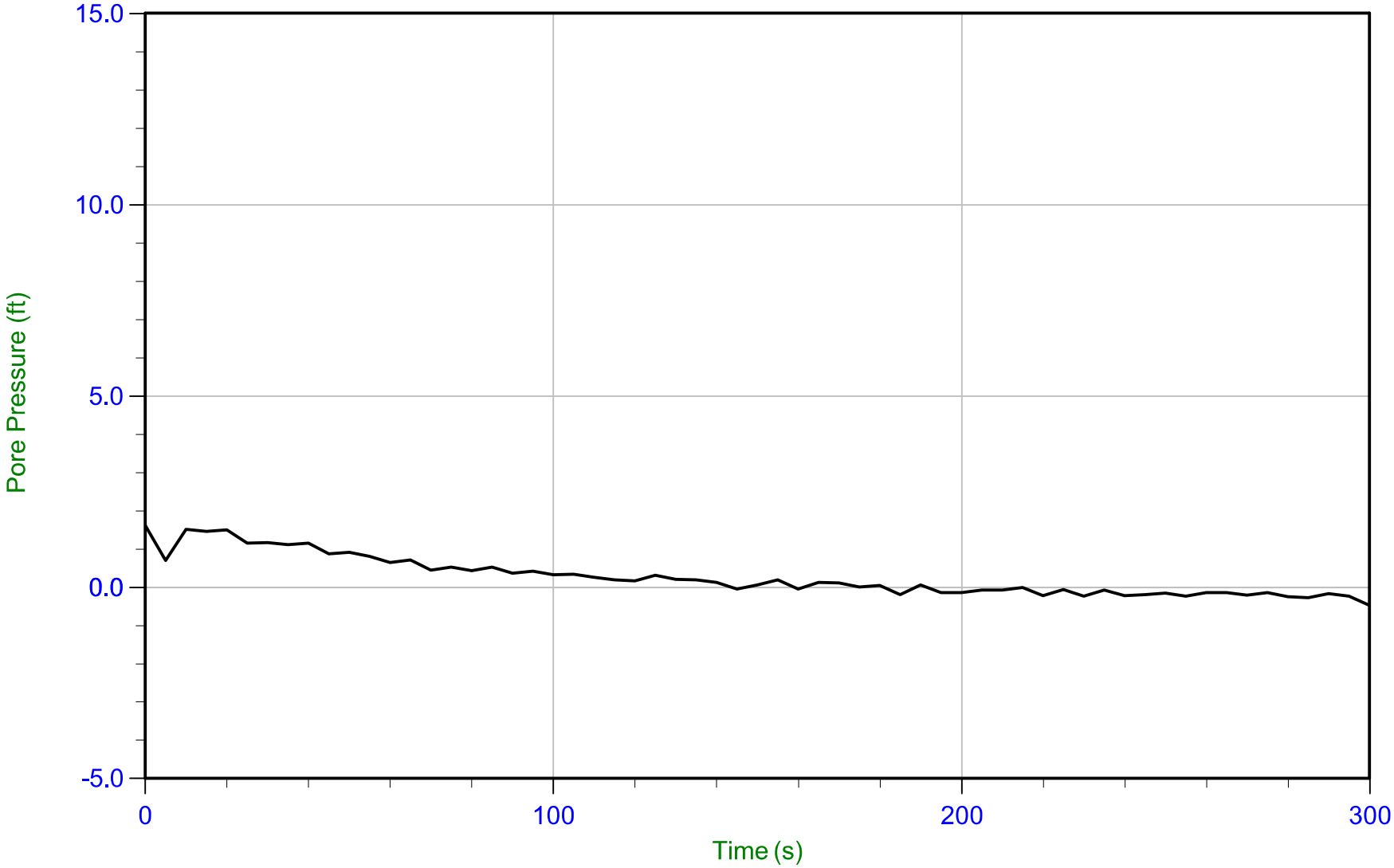
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft.)	Estimated Equilibrium Pore Pressure U_{eq} (ft.)	Calculated Phreatic Surface (ft.)	Refer to Notation Number
CPT-01	19-52023_CP01	15	300	12.39	0.0	12.4	
CPT-01	19-52023_CP01	15	1000	33.14	3.6	29.5	
CPT-02	19-52023_SP02	15	500	45.19	1.8	43.4	

CONETEC

IGES

Job No: 19-52023
Date: 16-May-2019 09:01:27
Site: JRW

Sounding: CPT-01
Cone: 418 Area=15 cm²



Trace Summary:

Filename: 19-52023_CP01.PPD
Depth: 3.775 m / 12.385 ft
Duration: 300.0 s

u Min: -0.5 ft
u Max: 1.6 ft
u Final: -0.5 ft

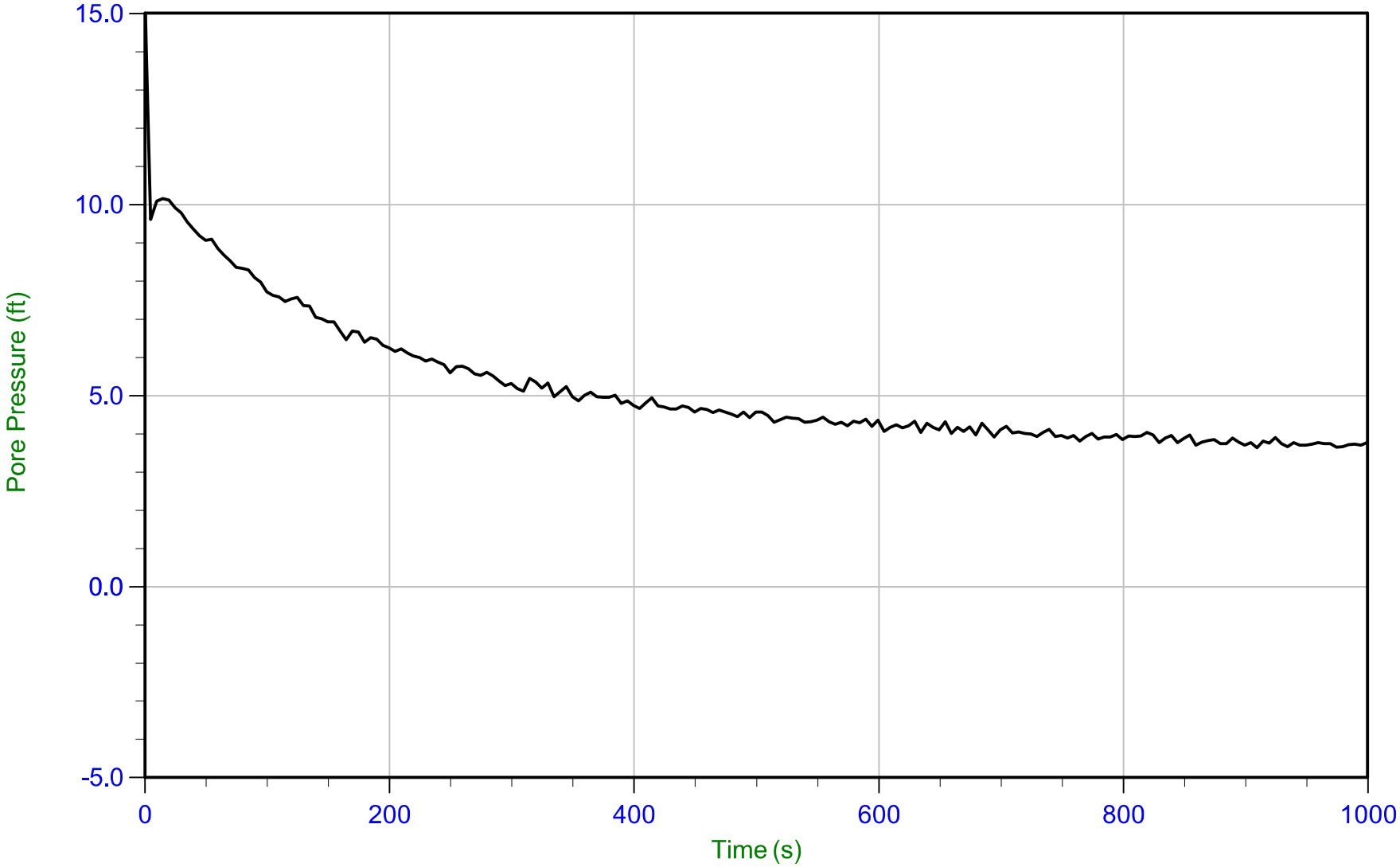
WT: 3.772 m / 12.374 ft
Ueq: 0.0 ft

CONETEC

IGES

Job No: 19-52023
Date: 16-May-2019 09:01:27
Site: JRW

Sounding: CPT-01
Cone: 418 Area=15 cm²



Trace Summary:

Filename: 19-52023_CP01.PPD
Depth: 10.100 m / 33.136 ft
Duration: 1000.0 s

u Min: 3.6 ft
u Max: 15.5 ft
u Final: 3.8 ft

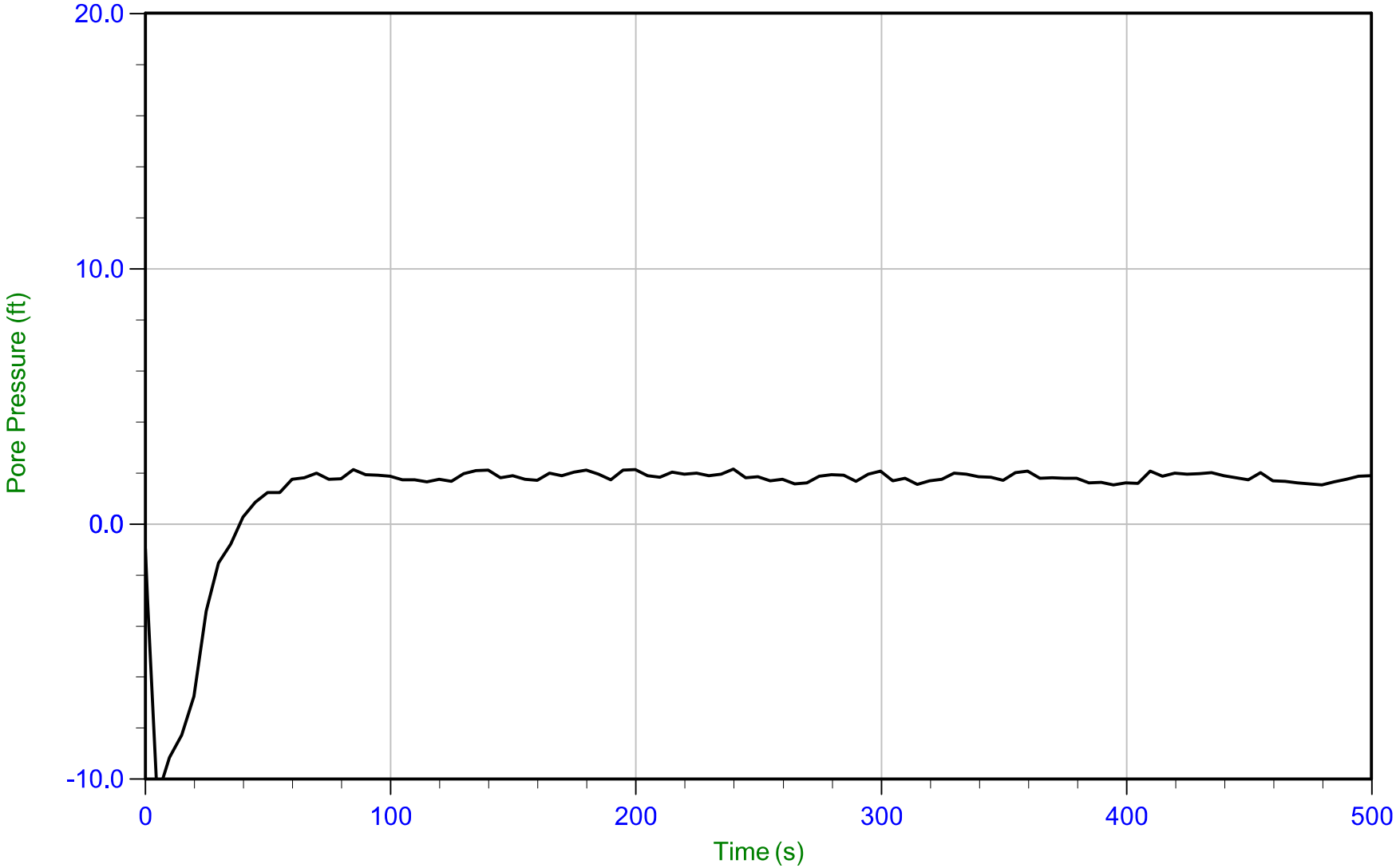
WT: 8.989 m / 29.491 ft
Ueq: 3.6 ft

CONETEC

IGES

Job No: 19-52023
Date: 16-May-2019 10:19:35
Site: JRW

Sounding: CPT-02
Cone: 418 Area=15 cm²



Trace Summary:

Filename: 19-52023_SP02.PPD
Depth: 13.775 m / 45.193 ft
Duration: 500.0 s

u Min: -10.7 ft
u Max: 2.2 ft
u Final: 1.9 ft

WT: 13.233 m / 43.415 ft
Ueq: 1.8 ft

APPENDIX C

Laboratory Compaction Characteristics of Soil

(ASTM D698 / D1557)

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Project: GTI Wellfare Complex
No: 03019-001
Location: Saratoga Springs
Date: 3/18/2019
By: JAB

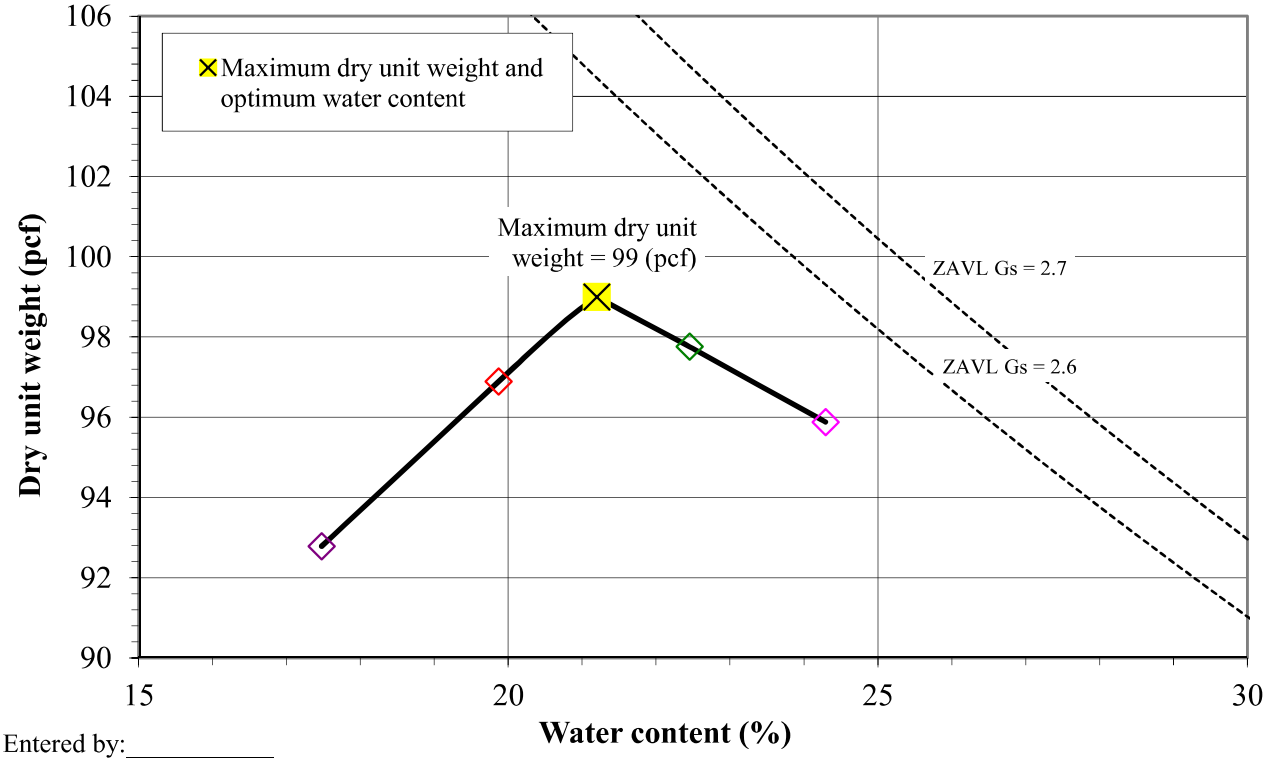
Boring No.: TP-2
Sample:
Depth: 2.0-4.0'
Sample Description: Brown clay
Engineering Classification: Not requested
As-received water content (%): Not requested

Method: ASTM D698 B
Mold Id. Inc 1
Mold volume (ft^3): 0.0333

Preparation method: Moist
Rammer: Mechanical-circular face
Rock Correction: No

Optimum water content (%): 21.2
Maximum dry unit weight (pcf): 99

Point Number	As-Is	+2%	+4%	+6%				
Wt. Sample + Mold (g)	5876.9	5984.7	6038.6	6030.5				
Wt. of Mold (g)	4231.4	4231.4	4231.4	4231.4				
Wet Unit Wt., γ_m (pcf)	109.0	116.1	119.7	119.2				
Wet Soil + Tare (g)	1297.47	1411.96	1563.23	1561.59				
Dry Soil + Tare (g)	1153.89	1232.32	1351.73	1317.51				
Tare (g)	332.26	328.19	409.82	312.77				
Water Content, w (%)	**17.5**	**19.9**	**22.5**	**24.3**				
Dry Unit Wt., γ_d (pcf)	**92.8**	**96.9**	**97.8**	**95.9**				



Entered by:_____

Reviewed:_____

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California Bearing Ratio
(ASTM D 1883)

© IGES 2004, 2019

Project: GTI Welfare Complex
Number: 03019-001
Location: Saratoga Springs
Date: 3/26/2019
By: JWB

Boring No.: TP-2
Sample:
Depth: 2.0-4.0'
Original Method: ASTM D698 B
Engineering Classification: Not requested
Condition of Sample: Soaked
Scalp and Replace: No

Maximum Dry Unit Weight (pcf):	99
Optimum Water Content (%):	21.2
Relative Compaction (%):	101.3
0.1 in. Corrected CBR (%):	**4.1**
0.2 in. Corrected CBR (%):	**5.3**

As Compacted Data			Before	After
Mold Id.	E	Wet Soil + Tare (g)	1661.81	1919.54
Wt. of Mold + Sample (g)	11346.6	Dry Soil + Tare (g)	1430.37	1639.72
Wt. of Mold (g)	7224.9	Tare (g)	327.89	315.02
Dry Unit Weight (pcf)	100.3	Water Content (%)	21.0	21.1
After Soaking Data			**Average**	**Top 1 in.**
Wt. of Mold + Sample (g)	11454.3	Wet Soil + Tare (g)	1730.68	483.43
Dry Unit Weight (pcf)	98.9	Dry Soil + Tare (g)	1439.57	411.33
		Tare (g)	222.26	122.4
		Water Content (%)	23.9	25.0

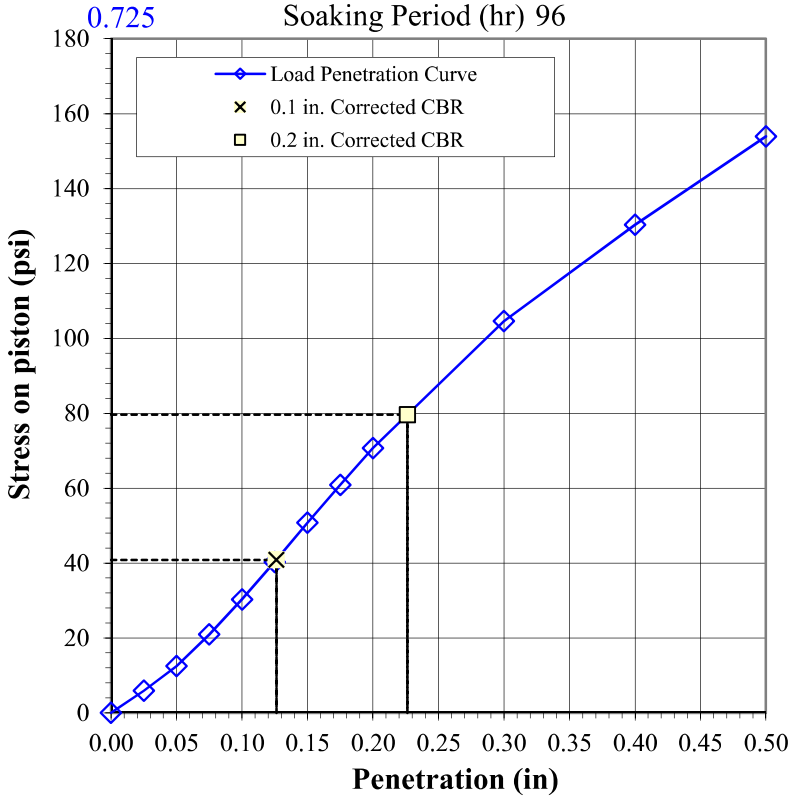
Swell Data

Date	Time	Dial		
3/21/2019	11:15	0.661	Surcharge (psf)	50
3/25/2019	11:00	0.725	Swell (%)	1.40
			Soaking Period (hr)	96

Penetration Data	Piston ID	CBR T1

Zero load (lb) = 0
Area of Piston (in^2) = 3.0

Penetration (in.)	Raw Load (lb)	Piston Stress (psi)	Std. Stress (psi)
0.000	0	0	
0.025	18	6	
0.050	37	12	
0.075	63	21	
0.100	91	30	1000
0.125	121	40	1125
0.150	152	51	1250
0.175	182	61	1375
0.200	212	71	1500
0.300	314	105	1900
0.400	391	130	2300
0.500	462	154	2600



Entered By:_____
Reviewed:_____

Collapse/Swell Potential of Soils

(ASTM D4546 Method B)

IGES
© IGES 2014, 2019

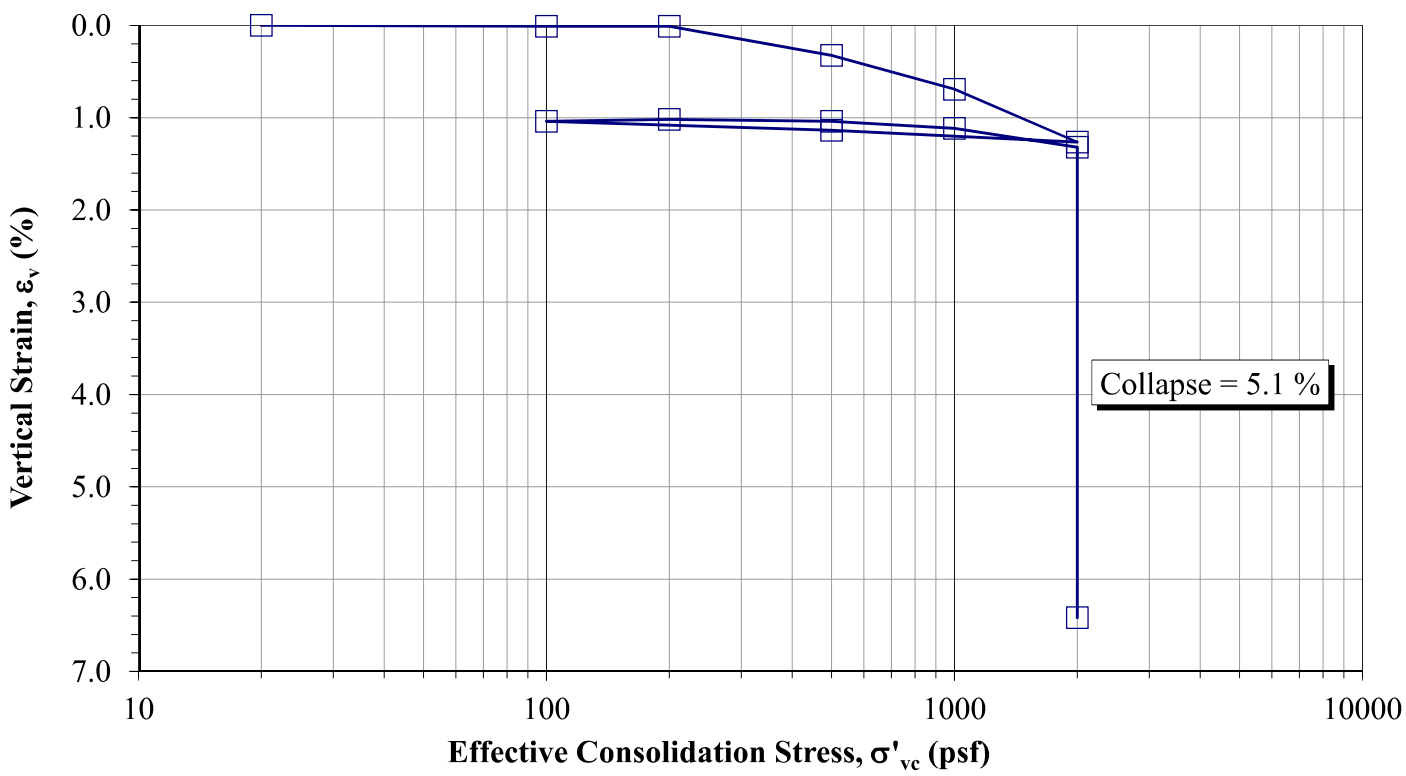
Project: GTI Welfare Complex
No: 03019-001
Location: Saratoga Springs
Date: 3/19/2019
By: EH

Boring No.: TP-2
Sample:
Depth: 4.5'
Sample Description: Brown silt
Engineering Classification: Not requested
Sample type: Undisturbed-trimmed from thin-wall

Consolidometer No.:	4	
Specific gravity, G_s	2.70	Assumed
Collapse (%)	5.1	
Collapse stress (psf)	2000	
Water type used for inundation	Tap	

	Initial (o)	Final (f)
Sample height, H (in.)	0.924	0.865
Sample diameter, D (in.)	2.419	2.419
Mass rings + wet soil (g)	149.22	161.41
Mass rings/tare (g)	46.11	46.11
Moist unit wt., γ_m (pcf)	92.50	110.53
Wet soil + tare (g)	231.92	236.70
Dry soil + tare (g)	217.75	211.02
Tare (g)	126.53	123.05
Water content, w (%)	15.5	29.2
Dry unit wt., γ_d (pcf)	80.06	85.55
Saturation	37.95	81.24

Stress (psf)	Dial (in.)	1-D ε_v (%)	H_c (in.)	e
Seating	0.0732	0.00	0.9240	1.105
20	0.0732	0.00	0.9240	1.105
100	0.0733	0.01	0.9239	1.105
200	0.0733	0.01	0.9239	1.105
500	0.0762	0.32	0.9210	1.098
1000	0.0796	0.69	0.9176	1.091
2000	0.0849	1.27	0.9123	1.079
500	0.0837	1.14	0.9135	1.081
100	0.0828	1.04	0.9144	1.083
200	0.0826	1.02	0.9146	1.084
500	0.0828	1.04	0.9144	1.083
1000	0.0835	1.11	0.9137	1.082
2000	0.0854	1.32	0.9118	1.077
2000	0.1325	6.42	0.8647	0.970



Comments: Test specimen contains pinholes.

Entered: _____
Reviewed: _____

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Collapse/Swell Potential of Soils

(ASTM D4546 Method B)

© IGES 2014, 2019

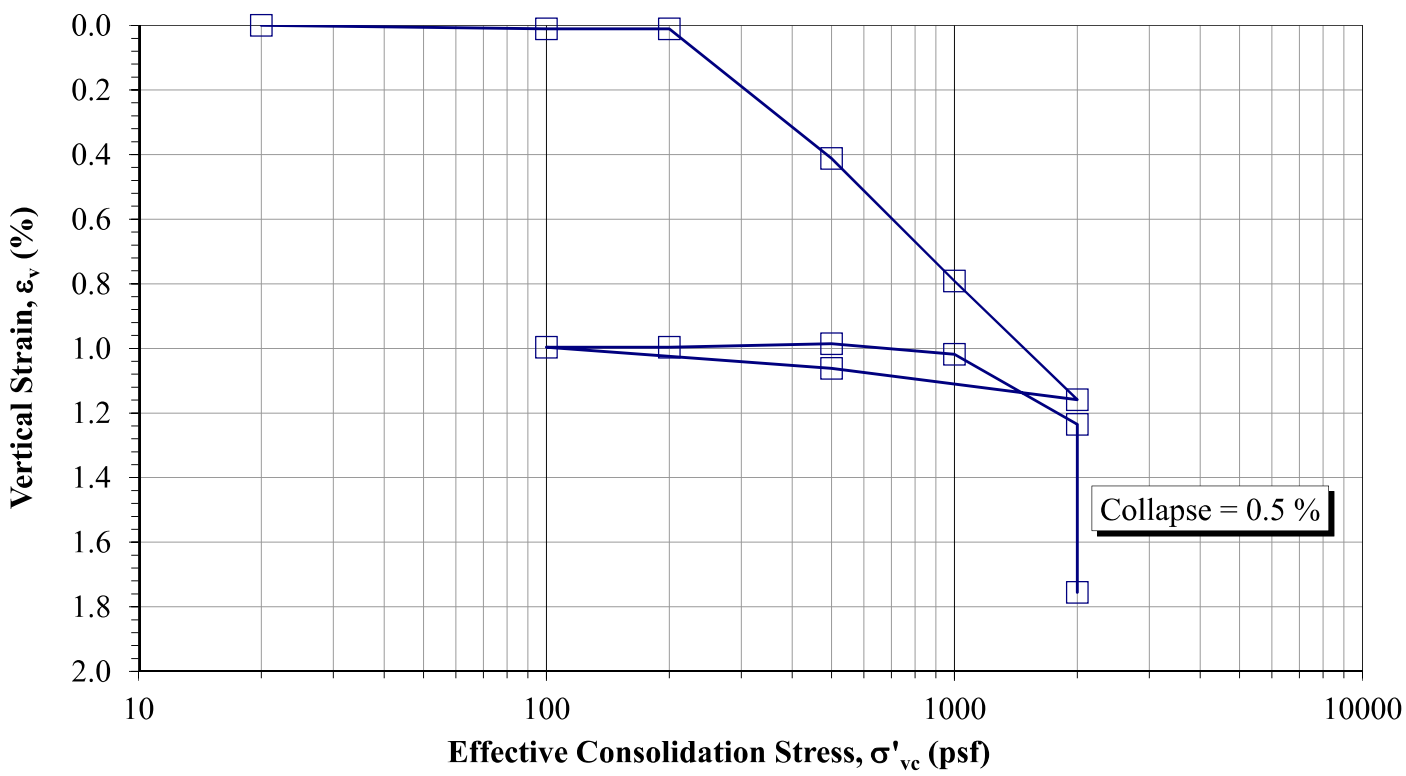
Project: GTI Welfare Complex
No: 03019-001
Location: Saratoga Springs
Date: 3/19/2019
By: EH

Boring No.: TP-3
Sample:
Depth: 6.0'
Sample Description: Brown clay
Engineering Classification: Not requested
Sample type: Undisturbed-trimmed from thin-wall

Consolidometer No.:	7	
Specific gravity, G_s	2.70	Assumed
Collapse (%)	0.5	
Collapse stress (psf)	2000	
Water type used for inundation	Tap	

	Initial (o)	Final (f)
Sample height, H (in.)	0.923	0.907
Sample diameter, D (in.)	2.414	2.414
Mass rings + wet soil (g)	163.95	172.94
Mass rings/tare (g)	44.87	44.87
Moist unit wt., γ_m (pcf)	107.38	117.56
Wet soil + tare (g)	242.53	247.71
Dry soil + tare (g)	224.50	221.21
Tare (g)	121.61	120.83
Water content, w (%)	17.5	26.4
Dry unit wt., γ_d (pcf)	91.37	93.01
Saturation	56.01	87.75

Stress (psf)	Dial (in.)	1-D ε_v (%)	H_c (in.)	e
Seating	0.1466	0.00	0.9230	0.845
20	0.1466	0.00	0.9230	0.845
100	0.1467	0.01	0.9229	0.844
200	0.1467	0.01	0.9229	0.844
500	0.1504	0.41	0.9192	0.837
1000	0.1539	0.79	0.9157	0.830
2000	0.1573	1.16	0.9123	0.823
500	0.1564	1.06	0.9132	0.825
100	0.1558	1.00	0.9138	0.826
200	0.1558	1.00	0.9138	0.826
500	0.1557	0.99	0.9139	0.826
1000	0.1560	1.02	0.9136	0.826
2000	0.1580	1.24	0.9116	0.822
2000	0.1628	1.76	0.9068	0.812



Entered: _____
Reviewed: _____

Collapse/Swell Potential of Soils

(ASTM D4546 Method B)

© IGES 2014, 2019

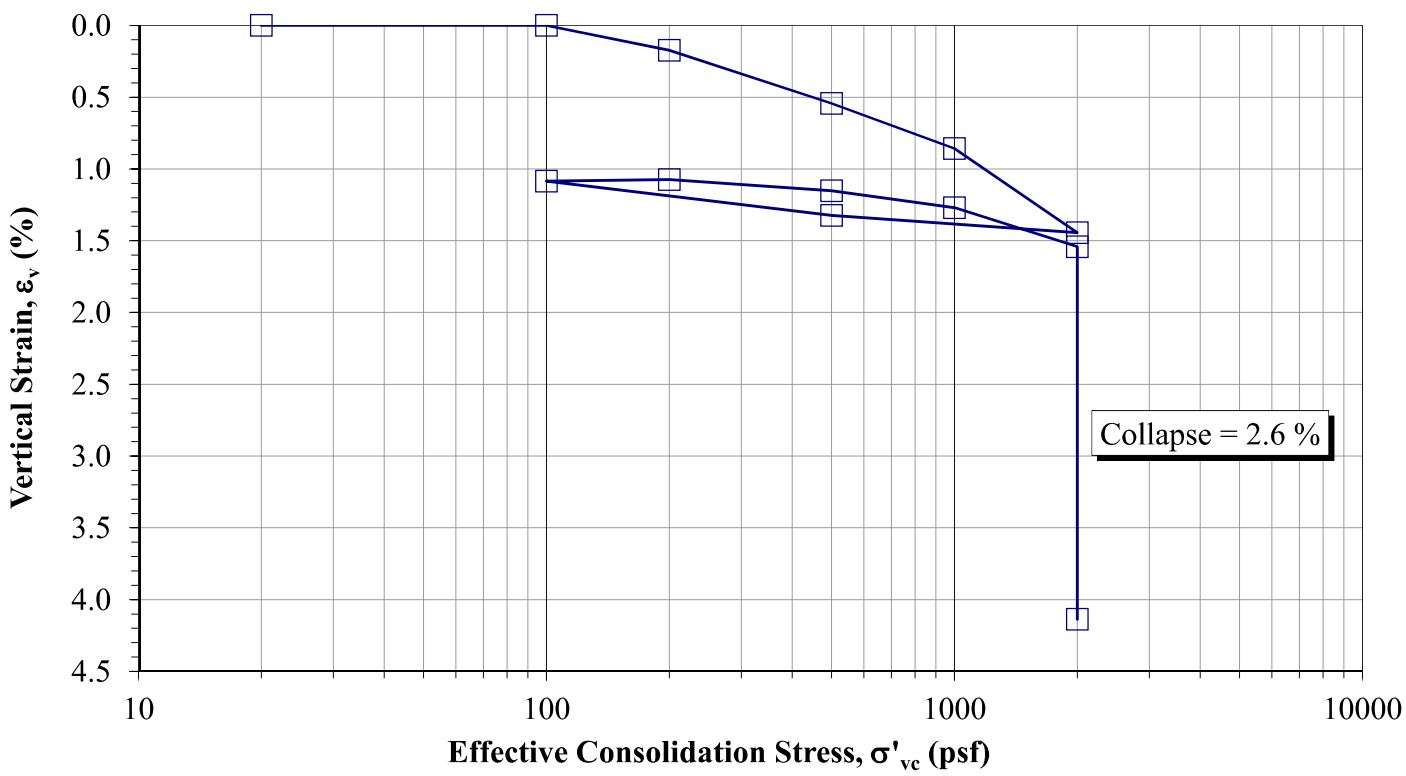
Project: GTI Welfare Complex
No: 03019-001
Location: Saratoga Springs
Date: 3/19/2019
By: EH

Boring No.: TP-5
Sample:
Depth: 4.5'
Sample Description: Brown clay with sand
Engineering Classification: Not requested
Sample type: Undisturbed-trimmed from thin-wall

Consolidometer No.:	8	
Specific gravity, G_s	2.70	Assumed
Collapse (%)	2.6	
Collapse stress (psf)	2000	
Water type used for inundation	Tap	

	Initial (o)	Final (f)
Sample height, H (in.)	0.921	0.883
Sample diameter, D (in.)	2.415	2.415
Mass rings + wet soil (g)	164.24	171.73
Mass rings/tare (g)	45.55	45.55
Moist unit wt., γ_m (pcf)	107.18	118.86
Wet soil + tare (g)	281.26	253.68
Dry soil + tare (g)	256.11	226.92
Tare (g)	127.36	128.09
Water content, w (%)	19.5	27.1
Dry unit wt., γ_d (pcf)	89.66	93.53
Saturation	59.94	91.15

Stress (psf)	Dial (in.)	1-D ε_v (%)	H_c (in.)	e
Seating	0.1597	0.00	0.9210	0.880
20	0.1597	0.00	0.9210	0.880
100	0.1597	0.00	0.9210	0.880
200	0.1613	0.17	0.9194	0.877
500	0.1647	0.54	0.9160	0.870
1000	0.1676	0.86	0.9131	0.864
2000	0.1730	1.44	0.9077	0.853
500	0.1719	1.32	0.9088	0.855
100	0.1697	1.09	0.9110	0.859
200	0.1696	1.07	0.9111	0.860
500	0.1703	1.15	0.9104	0.858
1000	0.1714	1.27	0.9093	0.856
2000	0.1739	1.54	0.9068	0.851
2000	0.1978	4.14	0.8829	0.802



Entered: _____
Reviewed: _____

Collapse/Swell Potential of Soils

(ASTM D4546 Method B)

© IGES 2014, 2019

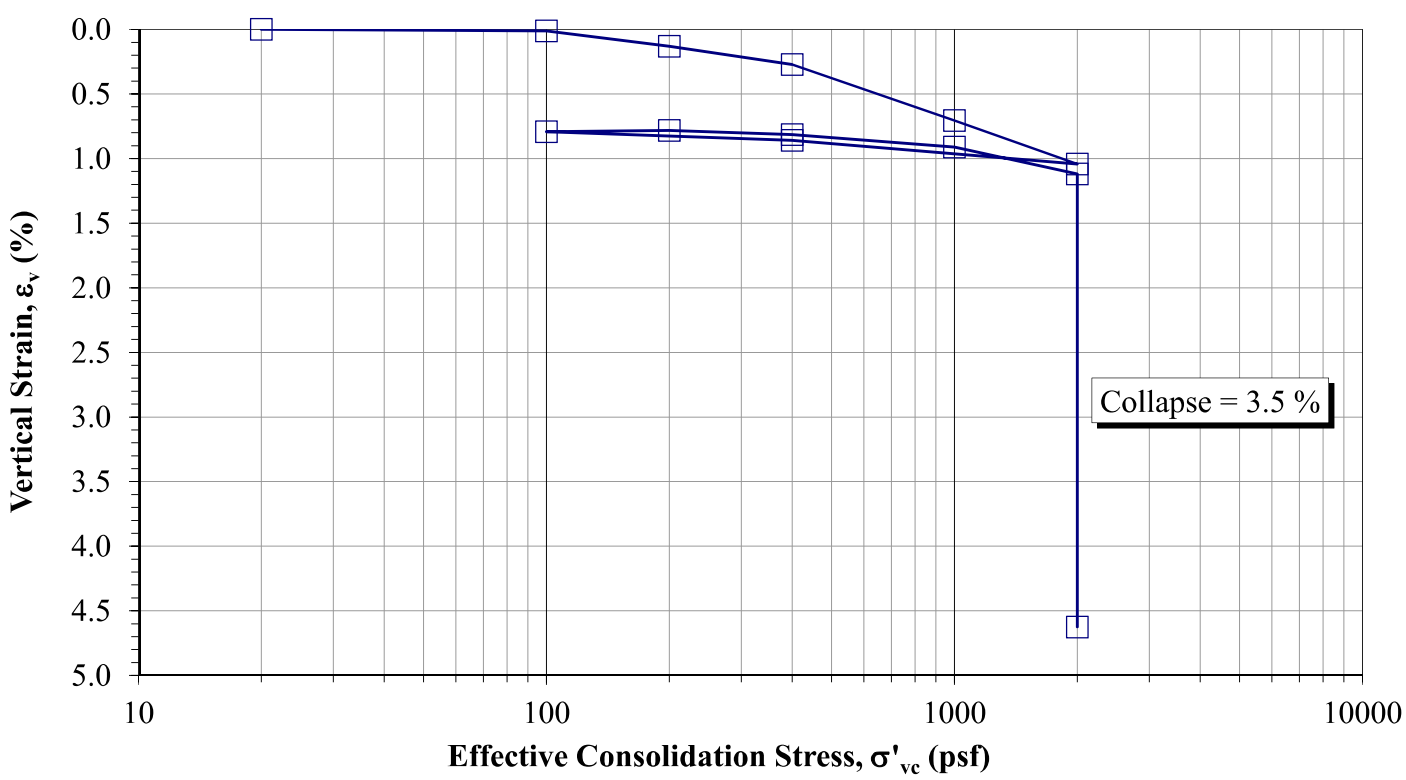
Project: GTI Welfare Complex
No: 03019-001
Location: Saratoga Springs
Date: 3/19/2019
By: EH

Boring No.: TP-7
Sample:
Depth: 3.5'
Sample Description: Brown clay
Engineering Classification: Not requested
Sample type: Undisturbed-trimmed from thin-wall

Consolidometer No.:	9	
Specific gravity, G_s	2.70	Assumed
Collapse (%)	3.5	
Collapse stress (psf)	2000	
Water type used for inundation	Tap	

	Initial (o)	Final (f)
Sample height, H (in.)	0.921	0.878
Sample diameter, D (in.)	2.414	2.414
Mass rings + wet soil (g)	148.00	161.60
Mass rings/tare (g)	45.46	45.46
Moist unit wt., γ_m (pcf)	92.67	110.05
Wet soil + tare (g)	248.57	237.33
Dry soil + tare (g)	229.70	208.72
Tare (g)	120.17	121.44
Water content, w (%)	17.2	32.8
Dry unit wt., γ_d (pcf)	79.05	82.88
Saturation	41.08	85.63

Stress (psf)	Dial (in.)	1-D ε_v (%)	H_c (in.)	e
Seating	0.1130	0.00	0.9210	1.132
20	0.1130	0.00	0.9210	1.132
100	0.1131	0.01	0.9209	1.132
200	0.1142	0.13	0.9198	1.129
400	0.1155	0.27	0.9185	1.126
1000	0.1195	0.71	0.9145	1.117
2000	0.1226	1.04	0.9114	1.110
400	0.1209	0.86	0.9131	1.114
100	0.1203	0.79	0.9137	1.115
200	0.1202	0.78	0.9138	1.116
400	0.1205	0.81	0.9135	1.115
1000	0.1214	0.91	0.9126	1.113
2000	0.1233	1.12	0.9107	1.108
2000	0.1556	4.63	0.8784	1.034



Entered: _____
Reviewed: _____

APPENDIX D

Date: 2019-05-24T19:18:40.163Z
Reference Document: IBC-2015
URL: https://earthquake.usgs.gov/ws/designmaps/ibc-2015.json?latitude=40.383064&longitude=-111.918064&riskCategory=II&siteClass=D&title=Welfare_Complex
Parameters: latitude: 40.383064, longitude: -111.918064
Risk Category: II
Site Class: D
Title: Welfare Complex
Response Data:
pgauh: 0.395
pgad: 0.612
pga: 0.395
fpga: 1.105
pgam: 0.437
ssrt: 0.974
crs: 0.855
ssuh: 1.139
ssd: 1.759
ss: 0.974
fa: 1.11
sms: 1.082
sds: 0.721
sdcs: D
s1rt: 0.329
cr1: 0.854
s1uh: 0.385
s1d: 0.658
s1: 0.329
fv: 1.741
sm1: 0.573
sd1: 0.382
sdc1: D
sdc: D

APPENDIX E

Project Name	Welfare Complex
Project No.	03019-001
Sounding No.	CPT-01
Date of Sounding	05/16/19
Depth to Groundwater During Sampling (ft)	29
Estimated Depth to Historic High Groundwater (ft)	25
PHGA (g)	0.4
Moment Magnitude (Mw)	7.4
Depth of Fill (ft)	2
Magnitude Weighting Factor CM	1.035

$CM = 10^{2.24}/M_w^{2.56}$

Dry Settlement	0.04	**Pradel**
Total Settlement	0.30	**I&Y**
Liquefaction-induced Settlement	0.26	
Total Settlement	0.19	**T&S**
Liquefaction-induced Settlement	0.15	

These formulas have been adjusted to add settlement in the top 60 feet only (not down to 100 feet plus)

0.59332

******* Ic > 2.6, layer is probably too clay-rich to liquefy

----- Layer is above groundwater level and is unlikely to liquefy

** During Sampling
* During Liquefaction

Ic adjustment: 0.16
add if CPT underestimates clay content (i.e., Bonneville clays)

Stress Reduction Coefficient
r_d=1.0 - 0.00765z for z <= 9.15m
r_d=1.174 - 0.0267z for 9.15m < z >= 23m

if FS < 1.1 layer will liquefy
if FS > 1.1 and < 1.4 layer may liquefy
if FS > 1.4 layer is safe from liquefaction

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	σ'_{vo} tsf *	σ'_{vo} tsf **	σ_{vo} kPa	σ'_{vo} kPa *	σ'_{vo} kPa **	qc kPa	fs kPa	F	Q	n	Ic 1st (Ic criteria by iteration)	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. correction q_{c1N}	Kc	clean sand correction $(q_{c1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
1	0.08	3.97	4.0	0.01	120	0.12	0.12	0.005	0.125	0.005	0.5	12.0	0.5	380	1	0.303	91.2	0.693	1.864	1.720	1.812	1.753	1.951	1.70	6.4	1.00	6.4	0.055	1.000	0.0102	----			
2	0.16	4.58	4.6	0.02	120	0.08	0.21	0.011	0.131	0.011	1.1	12.6	1.1	439	2	0.350	73.3	0.720	1.994	1.802	1.906	1.850	2.040	1.70	7.4	1.00	7.4	0.056	1.000	0.0220	----			
3	0.25	5.57	5.6	0.02	120	0.08	0.29	0.016	0.136	0.016	1.5	13.0	1.5	533	2	0.378	71.8	0.723	2.002	1.823	1.911	1.868	2.049	1.70	8.9	1.00	8.9	0.057	0.999	0.0306	----			
4	0.33	6.46	6.5	0.06	120	0.08	0.37	0.021	0.141	0.021	2.0	13.5	2.0	619	6	0.947	83.1	0.765	2.187	1.960	2.053	2.014	2.190	1.70	10.4	1.64	17.0	0.064	0.999	0.0386	----			
5	0.41	7.38	7.4	0.12	120	0.08	0.45	0.026	0.146	0.026	2.5	14.0	2.5	707	11	1.618	92.5	0.796	2.271	2.083	2.149	2.126	2.294	1.70	11.9	1.93	22.9	0.069	0.999	0.0460	----			
6	0.49	9.43	9.5	0.21	120	0.08	0.53	0.031	0.151	0.031	2.9	14.4	2.9	903	20	2.181	108.7	0.807	2.275	2.135	2.179	2.165	2.330	1.70	15.1	2.05	31.0	0.076	0.999	0.0530	----			
7	0.57	11.64	11.7	0.30	120	0.08	0.62	0.036	0.156	0.036	3.4	14.9	3.4	1,115	28	2.542	122.3	0.810	2.268	2.155	2.188	2.178	2.341	1.70	18.7	2.09	39.0	0.083	0.999	0.0595	----			
8	0.66	14.06	14.1	0.34	120	0.08	0.70	0.041	0.161	0.041	3.9	15.4	3.9	1,346	33	2.447	130.5	0.800	2.230	2.124	2.154	2.145	2.308	1.70	22.6	1.97	44.6	0.087	0.998	0.0656	----			0.003
9	0.74	14.51	14.5	0.43	120	0.08	0.78	0.046	0.166	0.046	4.4	15.9	4.4	1,389	42	3.000	131.8	0.819	2.278	2.192	2.215	2.209	2.370	1.70	23.3	2.20	51.2	0.092	0.998	0.0714	----			0.002
10	0.82	15.65	15.7	0.48	120	0.08	0.86	0.050	0.170	0.050	4.8	16.3	4.8	1,499	46	3.103	132.9	0.821	2.280	2.202	2.221	2.217	2.378	1.70	25.1	2.22	55.9	0.096	0.998	0.0768	----			0.001
11	0.90	16.23	16.2418	0.53	120	0.08	0.94	0.055	0.175	0.055	5.3	16.8	5.3	1,554	50	3.246	130.9	0.827	2.293	2.222	2.239	2.235	2.396	1.70	26.1	2.30	59.8	0.100	0.998	0.0819	----			0.001
12	0.98	15.98	15.9877	0.52	120	0.08	1.03	0.060	0.180	0.060	5.8	17.3	5.8	1,530	49	3.241	122.8	0.832	2.307	2.239	2.255	2.251	2.412	1.70	25.7	2.36	60.6	0.101	0.998	0.0867	----			0.001
13	1.07	15.31	15.3091	0.51	120	0.08	1.11	0.065	0.185	0.065	6.2	17.7	6.2	1,466	49	3.326	113.7	0.840	2.333	2.268	2.283	2.280	2.441	1.70	24.6	2.49	61.1	0.101	0.998	0.0913	----			0.001
14	1.15	14.78	14.7767	0.49	120	0.08	1.19	0.070	0.190	0.070	6.7	18.2	6.7	1,415	47	3.311	105.6	0.846	2.349	2.288	2.302	2.298	2.459	1.70	23.7	2.57	61.0	0.101	0.997	0.0956	----			0.001
15	1.23	13.58	13.5743	0.48	120	0.08	1.27	0.075	0.195	0.075	7.2	18.7	7.2	1,300	46	3.539	95.8	0.860	2.394	2.337	2.350	2.347	2.508	1.70	21.8	2.81	61.3	0.101	0.997	0.0998	----			0.001
16	1.31	12.60	12.5914	0.47	120	0.08	1.35	0.080	0.200	0.080	7.7	19.1	7.7	1,207	45	3.714	87.3	0.873	2.432	2.380	2.391	2.389	2.549	1.70	20.2	3.03	61.3	0.101	0.997	0.1037	----			0.001
17	1.39	11.69	11.6788	0.44	120	0.08	1.44	0.085	0.205	0.085	8.1	19.6	8.1	1,119	42	3.800	79.3	0.883	2.464	2.415	2.425	2.423	2.584	1.70	18.8	3.23	60.6	0.101	0.997	0.1074	----			0.001
18	1.48	10.69	10.678	0.41	120	0.08	1.52	0.090	0.210	0.090	8.6	20.1	8.6	1,024	39	3.840	71.1	0.893	2.496	2.450	2.460	2.458	2.618	1.70	17.2	3.44	59.1	0.099	0.997	0.1109	----			
19	1.56	9.68	9.67132	0.36	120	0.08	1.60	0.095	0.215	0.095	9.1	20.6	9.1	927	34	3.756	62.9	0.902	2.524	2.479	2.488	2.486	2.647	1.70	15.5	3.63	56.4	0.097	0.996	0.1143	----			
20	1.64	8.09	8.08045	0.33	120	0.08	1.68	0.100	0.220	0.100	9.5	21.0	9.5	775	32	4.130	53.3	0.926	2.599	2.559	2.567	2.566	2.726	1.70	13.0	4.19	54.4	0.095	0.996	0.1175	----			
21	1.72	6.88	6.86914	0.29	120	0.08	1.76	0.105	0.225	0.105	10.0	21.5	10.0	659	27	4.221	45.1	0.943	2.653	2.616	2.624	2.622	2.783	1.70	11.1	4.64	51.3	0.093	0.996	0.1206	----			
22	1.80	6.13	6.11957	0.25	120	0.08	1.85	0.109	0.229	0.109	10.5	22.0	10.5	587	24	4.202	39.6	0.954	2.690	2.655	2.663	2.661	2.821	1.70	9.8	4.97	48.9	0.091	0.996	0.1235	----			
23	1.89	5.71	5.70519	0.22	120	0.08	1.93	0.114	0.234	0.114	11.0	22.4	11.0	547	21	3.860	35.6	0.957	2.697	2.663	2.670	2.669	2.829	1.70	9.2	5.04	46.2	0.088	0.996	0.1263	----			
24	1.97	5.45	5.44981	0.19	120	0.08	2.01	0.119	0.239	0.119	11.4	22.9	11.4	522	18	3.508	32.7	0.956	2.696	2.662	2.669	2.668	2.828	1.70	8.8	5.03	44.0	0.087	0.995	0.1290	----			
25	2.05	5.33	5.33674	0.17	120	0.08	2.09	0.124	0.244	0.124	11.9	23.4	11.9	510	17	3.323	30.9	0.957	2.698	2.665	2.672	2.670	2.830	1.70	8.6	5.05	43.2	0.086	0.995	0.1316	----			
26	2.13	5.26	5.26406	0.16	120	0.08	2.17	0.129	0.249	0.129	12.4	23.9	12.4	504	16	3.177	29.5	0.958	2.700	2.667	2.674	2.672	2.833	1.70	8.4	5.07	42.8	0.086	0.995	0.1341	----			
27	2.21	5.47	5.46994	0.16	120	0.08	2.26	0.134	0.254	0.134	12.8	24.3	12.8	524	15	2.942	29.3	0.952	2.680	2.647	2.653	2.652	2.812	1.70	8.8	4.89	43.0	0.086	0.995	0.1365	----			
28	2.30	5.14	5.13432	0.16	120	0.08	2.34	0.139	0.259	0.139	13.3	24.8	13.3	492	15	3.099	27.3	0.963	2.715	2.685	2.691	2.690	2.850	1.70	8.3	5.23	43.2	0.086	0.995	0.1388	----			
29	2.38	5.26	5.25076	0.15	120	0.08	2.42	0.144	0.264	0.144	13.8	25.3	13.8	504	15	2.991	27.0	0.961	2.708	2.679	2.685	2.684	2.844	1.70	8.4	5.17	43.7	0.086	0.994	0.1410	----			
30	2.46	4.79	4.78045	0.15	120	0.08	2.50	0.149	0.269	0.149	14.3	25.7	14.3	459	14	3.189	24.5	0.976	2.756	2.729	2.734	2.733	2.894	1.70	7.7	5.64	43.4	0.086	0.994	0.1431	----			
31	2.54	4.80	4.79157	0.13	120	0.08	2.58	0.154	0.274	0.154	14.7	26.2	14.7	460	12	2.712	23.4	0.967	2.728	2.700	2.705	2.704	2.864	1.70	7.7	5.36	41.3	0.084	0.994	0.1452	----			
32	2.62	4.71	4.70326	0.14	120	0.08	2.67	0.159	0.279	0.159	15.2	26.7	15.2	451	14	3.164	22.9	0.982	2.772	2.748	2.753	2.752	2.912	1.70	7.6	5.82	44.0	0.087	0.994	0.1471	----			
33	2.71	5.24	5.238	0.17	120	0.08	2.75	0.164	0.284	0.164	15.7	27.2	15.7	502	17	3.428	24.8	0.980	2.766	2.744	2.748	2.747	2.907	1.70	8.4	5.77	48.6	0.090	0.994	0.1491	----			
34	2.79	6.61	6.61162	0.20	120	0.08	2.83	0.169	0.289	0.169	16.1	27.6	16.1	633	19	3.043	29.3	0.954	2.680	2.655	2.660	2.659	2.819	1.70	10.6	4.95	52.5	0.093	0.993	0.1509	----			
35	2.87	7.31	7.30544	0.21	120	0.08	2.91	0.173	0.293	0.173	16.6	28.1	16.6	700	20	2.929	31.1	0.944	2.649	2.624	2.628	2.627	2.787	1.70	11.7	4.68	54.9	0.095	0.993	0.1527	----			
36	2.95	7.86	7.86737	0.24	120	0.08	2.99	0.178	0.298	0.178	17.1	28.6	17.1	753	23	3.163	32.8	0.945	2.652	2.628	2.632	2.631	2.791	1.70	12.6	4.71	59.5	0.100	0.993	0.1544	----			
37	3.03	7.10	7.09906	0.25	120	0.08	3.08	0.183	0.303	0.183	17.6	29.0	17.6	680	24	3.658	29.9	0.967	2.720	2.699	2.703	2.702	2.862	1.70	11.4	5.34	60.9	0.101	0.993	0.1560	----			
38	3.12	7.00	6.99713	0.28	120	0.08	3.16	0.188	0.308	0.188	18.0	29.5	18.0	670	27	4.140	29.4	0.979	2.758	2.741	2.744	2.743	2.903	1.70	11.2	5.73	64.4	0.105	0.993	0.1576	----			
39	3.20	7.00	6.99332	0.29	120	0.08	3.24	0.193	0.313	0.193	18.5	30.0	18.5	670	28	4.290	28.9	0.983	2.773	2.756	2.759	2.758	2.918	1.70	11.2	5.88	66.1	0.107	0.993	0.1592	----			
40	3.28	6.70	6.69295	0.29	120	0.08	3.32	0.198	0.318	0.198	19.0	30.5	19.0	642	27	4.276	27.3	0.989	2.790	2.774	2.776	2.776	2.936	1.70	10.8	6.06	65.2	0.106	0.992	0.1607	----			
41	3.36	6.34	6.32951	0.26	120	0.08	3.40	0.203	0.323	0.203	19.4	30.9	19.4	607	25	4.237	25.4	0.995	2.809	2.794	2.796	2.796	2.956	1.70	10.2	6.26	63.8	0.104	0.992	0.1621	----			
42	3.44	6.16	6.14733	0.26	120	0.08	3.49	0.208	0.328	0.208	19.9	31.4	19.9	590	24	4.284	24.4	1.000	2.825	2.811	2.813	2.813	2.973	1.70	9.9	6.45	63.8	0.104	0.992	0.1635	----			
43	3.53	6.01	5.99908	0.26	120	0.08	3.57	0.213	0.333	0.213	20.4	31.9	20.4	576	24	4.399	23.4	1.006	2.844	2.831	2.833	2.832	2.992	1.70	9.7	6.66	64.3	0.105	0.992	0.1649	----			
44	3.61	5.93	5.92588	0.24	120	0.08	3.65	0.218	0.338	0.218	20.9	32.3	20.9	568	23	4.272	22.7	1.006	2.846	2.833	2.835	2.835	2.995	1.70	9.5	6.69	63.7	0.104	0.992	0.1662	----			
45	3.69	5.93	5.92195	0.23	120	0.08	3.73	0.223	0.343	0.223	21.3	32.8	21.3	568	22	3.995	22.1	1.003	2.836	2.823	2.825	2.824	2.984	1.70	9.5	6.57	62.6	0.103	0.991	0.1675	----			
46	3.77	5.37	5.35995	0.21	120	0.08	3.81	0.228	0.348	0.228	21.8	33.3	21.8	514	20	4.084	19.9	1.016	2.875	2.864	2.865	2.865	3.025	1.70	8.6	7.03	60.6	0.101	0.991	0.1687	----			
47	3.85	5.48	5.47107	0.21	120	0.08	3.90	0.233	0.353	0.233	22.3	33.8	22.3	525	20	3.945	19.8	1.013	2.867	2.855	2.857	2.856	3.016	1.70	8.8	6.93	61.0	0.101	0.991	0.1700	----			
48	3.94	5.72	5.71444	0.21	120	0.08	3.98	0.237	0.357	0.237	22.7	34.2	22.7	548	20	3.903	20.2	1.010	2.856	2.845	2.846	2.846	3.006	1.70	9.2	6.81	62.6	0.103	0.991	0.1711	----			
49	4.02	6.32	6.32012	0.22	120	0.08	4.06	0.242	0.362	0.242	23.2	34.7	23.2	605	21	3.636	21.6	0.997	2.815	2.803	2.804	2.804	2.964	1.70	10.2	6.35	64.5	0.105	0.991	0.1723	----			
50	4.10	7.13	7.13112	0.23	120	0.08	4.14	0.247	0.367	0.247	23.7	35.2	23.7	683	22	3.342	23.5	0.982	2.764	2.751	2.753	2.752	2.912	1.70	11.5	5.82	66.7	0.108	0.990	0.1734	----			
51	4.18	7.74	7.73944	0.26	120	0.08	4.22	0.252	0.372	0.252	24.2	35.6	24.2	741	25	3.432	25.0	0.978	2.750	2.737	2.739	2.739	2.899	1.70	12.4	5.69	70.7	0.113	0.990	0.1745	----			
52	4.27	8.80	8.79444	0.29	120	0.08	4.31	0.257	0.377	0.257	24.6	36.1	24.6	843	27	3.348	27.5	0.966	2.711	2.698	2.699	2.699	2.859	1.70	14.1	5.31	75.1	0.119	0.990	0.1755	----			
53	4.35	9.29	9.28482	0.33	120	0.08	4.39	0.262	0.382	0.262	25.1	36.6	25.1	890	31	3.622	28.7	0.968	2.718	2.706	2.707	2.707	2.867	1.70	14.9	5.39	80.4	0.128	0.990	0.1765	----			
54	4.43	10.79	10.7846	0.36	120	0.08	4.47	0.267	0.387	0.267	25.6	37.1	25.6	1,033	35	3.431	32.2	0.952	2.665	2.652	2.654	2.654	2.814	1.70	17.3	4.90	85.0	0.137	0.990	0.1775	----			
55	4.51	11.73	11.7256	0.40	120	0.08	4.55	0.272	0.392	0.272	26.0	37.5	26.0	1,123	39	3.517	34.3	0.948	2.651	2.639	2.640	2.640	2.800	1.70	18.8	4.78	90.1	0.148	0.989	0.1785	----			
56	4.59	12.80	12.7974	0.44	120	0.08	4.63	0.277	0.397	0.277	26.5	38.0	26.5	1,226	42	3.513	36.7	0.942	2.630	2.617	2.619	2.618	2.778	1.70	20.6	4.60	94.7	0.159	0.989	0.1794	----			
57	4.68	14.95	14.9484	0.49	120	0.08	4.72	0.282	0.402	0.282	27.0	38.5	27.0	1,432	47	3.320	41.4	0.925	2.574	2.561	2.563	2.563	2.723	1.70	24.0	4.16	100.0	0.173	0.989	0.1803	----			
58	4.76	16.14	16.1346	0.57	120	0.08	4.80	0.287	0.407	0.287	27.5	38.9	27.5	1,546	54	3.564	44.1	0.925	2.574	2.562	2.564	2.563	2.723	1.70	25.9	4.17	108.1	0.197	0.989	0.1812	----			
59	4.84	18.96	18.9546	0.61	120	0.08	4.88	0.292	0.412	0.292	27.9	39.4	27.9	1,816	59	3.284	50.0	0.906	2.511	2.498	2.500	2.499	2.659	1.70	30.5	3.71	113.0	0.214	0.989	0.1821	----			
60	4.92	21.73	21.7241	0.64	120	0.08	4.96	0.297	0.417	0.297	28.4	39.9	28.4	2,081	61	2.967	55.3	0.887	2.449	2.436	2.437	2.437	2.597	1.70	34.9	3.31	115.5	0.223	0.989	0.1830	----			0.000
61	5.00	24.63	24.6299	0.73	120	0.08	5.04	0.301	0.421	0.301	28.9	40.4	28.9	2,359	69	2.980	61.2	0.878	2.418	2.405	2.406	2.406	2.566	1.70	39.6	3.13	123.7	0.256	0.988	0.1838	----			
62	5.09	25.86	25.8624	0.82	120	0.08	5.13	0.306	0.426	0.306	29.3	40.8	29.3	2,476	78	3.189	63.7	0.880	2.426	2.414	2.415	2.415	2.575	1.70	41.5	3.18	131.9	0.294	0.988	0.1846	----			
63	5.17	27.69	27.6967	0.88	120	0.08	5.21	0.311	0.431	0.311	29.8	41.3	29.8	2,652	84	3.218	67.1	0.877	2.412	2.401	2.402	2.402	2.562	1.70	44.5	3.10	137.9	0.324	0.988	0.1854	----			
64	5.25	29.41	29.4111	0.95	120	0.08	5.29	0.316	0.436	0.316	30.3	41.8	30.3	2,816	91	3.279	70.2	0.874	2.404	2.393	2.394	2.394	2.554	1.70	47.2	3.05	144.3	0.359	0.988	0.1862	----			
65	5.33	30.31	30.3093	1.03	120	0.08	5.37	0.321	0.441	0.321	30.7	42.2	30.7	2,902	99	3.435	71.8	0.877	2.412	2.401	2.402	2.402	2.562	1.70	48.7	3.10	151.0	0.400	0.988	0.1869	----			
66	5.41	31.37	31.367	1.13	120	0.08	5.45	0.326	0.446	0.326	31.2	42.7	31.2	3,004	108	3.637	73.7	0.880	2.421	2.411	2.412	2.412	2.572	1.70	50.4	3.16	159.2	0.455	0.987	0.1877	----			
67	5.50	31.68	31.6739	1.16	120	0.08	5.54	0.331	0.451	0.331	31.7	43.2	31.7	3,034	111	3.694	73.7	0.881	2.426	2.416	2.417	2.417	2.577	1.70	50.9	3.19	162.2	0.477	0.987	0.1884	----			
68	5.58	30.86	30.8521	1.20	120	0.08	5.62	0.336	0.456	0.336	32.2	43.7	32.2	2,955	115	3.944	71.6	0.890	2.454	2.445	2.446	2.446	2.606	1.70	49.6	3.36	166.7	0.511	0.987	0.1891	----			
69	5.66	29.77	29.7598	1.30	120	0.08	5.70	0.341	0.461	0.341	32.6	44.1	32.6	2,851	125	4.431	69.3	0.904	2.500	2.492	2.493	2.493	2.653	1.70	47.8	3.67	175.3	0.581	0.987	0.1898	----			
70	5.74	29.42	29.41	1.30	120	0.08	5.78	0.346	0.466	0.346	33.1	44.6	33.1	2,817	124	4.464	67.9	0.906	2.508	2.500	2.501	2.501	2.661	1.70	47.3	3.72	175.9	0.586	0.987	0.1904	----			
71	5.82	29.23	29.2195	1.30	120	0.08	5.86	0.351	0.471	0.351	33.6	45.1	33.6	2,799	124	4.488	66.8	0.908	2.514	2.507	2.507	2.507	2.667	1.70	46.9	3.76	176.7	0.593	0.986	0.1911	----			
72	5.91	29.25	29.2397	1.30	120	0.08	5.95	0.356	0.476	0.356	34.0	45.5	34.0	2,801	124	4.489	66.2	0.909	2.517	2.509	2.510	2.510	2.670	1.70	47.0	3.78	177.7	0.602	0.986	0.1917	----			
73	5.99	30.32	30.3129	1.32	120	0.08	6.03	0.360	0.480	0.360	34.5	46.0	34.5	2,903	126	4.409	67.6	0.905	2.505	2.497	2.498	2.498	2.658	1.70	48.7	3.70	180.2	0.624	0.986	0.1923	----			
74	6.07	31.24	31.2322	1.40	120	0.08	6.11	0.365	0.485	0.365	35.0	46.5	35.0	2,992	134	4.528	68.9	0.906	2.507	2.500	2.501	2.501	2.661	1.70	50.2	3.72	186.6	0.684	0.986	0.1930	----			
75	6.15	33.34	33.3312	1.51	120	0.08	6.19	0.370	0.490	0.370	35.5	47.0	35.5	3,193	144	4.565	72.5	0.903	2.495	2.488	2.488	2.488	2.648	1.70	53.6	3.64	194.7	0.767	0.986	0.1936	----			
76	6.23	36.70	36.6914	1.61	120	0.08	6.27	0.375	0.495	0.375	35.9	47.4	35.9	3,514	154	4.427	78.3	0.893	2.463	2.456	2.457	2.456	2.616	1.70	58.9	3.43	202.1	0.848	0.985	0.1941	----			
77	6.32	41.45	41.4424	1.70	120	0.08	6.36	0.380	0.500	0.380	36.4	47.9	36.4	3,969	162	4.130	86.3	0.878	2.412	2.405	2.406	2.406	2.566	1.70	66.6	3.12	208.0	0.917	0.985	0.1947	----			
78	6.40	45.24	45.2372	1.82	120	0.08	6.44	0.385	0.505	0.385	36.9	48.4	36.9	4,332	174	4.051	92.6	0.870	2.386	2.379	2.380	2.380	2.540	1.70	72.7	2.98	216.4	1.022	0.985	0.1953	----			
79	6.48	48.26	48.2593	1.84	120	0.08	6.52	0.390	0.510	0.390	37.3	48.8	37.3	4,621	176	3.833	97.0	0.861	2.355	2.348	2.348	2.348	2.508	1.70	77.5	2.81	217.9	1.042	0.985	0.1958	----			
80	6.56	51.25	51.2507	1.88	120	0.08	6.60	0.395	0.515	0.395	37.8	49.3	37.8	4,908	180	3.703	101.3	0.853	2.331	2.324	2.324	2.324	2.484	1.70	82.3	2.69	221.5	1.091	0.985	0.1964	----			
81	6.64	51.28	51.2777	1.98	120	0.08	6.68	0.400	0.520	0.400	38.3	49.8	38.3	4,911	189	3.886	100.9	0.858	2.347	2.341	2.342	2.341	2.501	1.70	82.4	2.78	228.6	1.192	0.985	0.1969	----			
82	6.73	50.14	50.1413	1.97	120	0.08	6.77	0.405	0.525	0.405	38.8	50.3	38.8	4,801	189	3.965	98.1	0.863	2.362	2.355	2.356	2.356	2.516	1.70	80.5	2.85	229.5	1.204	0.984	0.1974	----			
83	6.81	49.86	49.8635	1.98	120	0.08	6.85	0.410	0.530	0.410	39.2	50.7	39.2	4,775	190	4.010	96.9	0.865	2.369	2.363	2.363	2.363	2.523	1.70	80.1	2.89	231.3	1.230	0.984	0.1979	----			
84	6.89	49.82	49.8241	1.95	120	0.08	6.93	0.415	0.535	0.415	39.7	51.2	39.7	4,771	187	3.945	95.8	0.864	2.366	2.360	2.360	2.360	2.520	1.70	80.0	2.87	229.9	1.211	0.984	0.1984	----			
85	6.97	50.41	50.4184	1.92	120	0.08	7.01	0.420	0.540	0.420	40.2	51.7	40.2	4,827	184	3.845	95.9	0.861	2.357	2.351	2.352	2.352	2.512	1.70	81.0	2.83	228.9	1.196	0.984	0.1989	----			
86	7.05	52.82	52.8307	1.87	120	0.08	7.09	0.424	0.544	0.424	40.6	52.1	40.6	5,058	179	3.563	98.7	0.851	2.324	2.318	2.318	2.318	2.478	1.70	84.8	2.66	225.6	1.148	0.984	0.1994	----			
87	7.14	53.40	53.4104	1.87	120	0.08	7.18	0.429	0.549	0.429	41.1	52.6	41.1	5,114	179	3.525	98.8	0.850	2.319	2.313	2.314	2.314	2.474	1.70	85.8	2.64	226.4	1.159	0.983	0.1998	----			
88	7.22	53.28	53.2906	1.95	120	0.08	7.26	0.434	0.554	0.434	41.6	53.1	41.6	5,102	186	3.681	98.1	0.855	2.335	2.330	2.330	2.330	2.490	1.70	85.6	2.72	232.6	1.251	0.983	0.2003	----			
89	7.30	53.25	53.2574	2.01	120	0.08	7.34	0.439	0.559	0.439	42.1	53.6	42.1	5,099	193	3.808	97.6	0.859	2.348	2.342	2.343	2.343	2.503	1.70	85.5	2.78	238.0	1.334	0.983	0.2007	----			
90	7.38	54.71	54.7199	2.06	120	0.08	7.42	0.444	0.564	0.444	42.5	54.0	42.5	5,239	198	3.803	99.3	0.857	2.342	2.337	2.337	2.337	2.497	1.70	87.9	2.76	242.1	1.400	0.983	0.2012	----			
91	7.46	53.76	53.7692	2.07	120	0.08	7.50	0.449	0.569	0.449	43.0	54.5	43.0	5,148	198	3.885	97.0	0.861	2.355	2.350	2.351	2.351	2.511	1.70	86.3	2.82	243.8	1.427	0.983	0.2016	----			
92	7.55	54.30	54.311	2.08	120	0.08	7.59	0.454	0.574	0.454	43.5	55.0	43.5	5,200	199	3.868	97.2	0.861	2.353	2.348	2.349	2.349	2.509	1.70	87.2	2.81	245.4	1.454	0.982	0.2020	----			
93	7.63	54.82	54.8322	2.07	120	0.08	7.67	0.459	0.579	0.459	43.9	55.4	43.9	5,250	198	3.812	97.2	0.859	2.348	2.343	2.344	2.344	2.504	1.70	88.1	2.79	245.4	1.454	0.982	0.2024	----			
94	7.71	55.63	55.645	2.11	120	0.08	7.75	0.464	0.584	0.464	44.4	55.9	44.4	5,327	202	3.818	97.8	0.859	2.347	2.342	2.342	2.342	2.502	1.70	89.4	2.78	248.4	1.506	0.982	0.2028	----			
95	7.79	56.87	56.8864	2.16	120	0.08	7.83	0.469	0.589	0.469	44.9	56.4	44.9	5,446	207	3.831	99.1	0.858	2.344	2.339	2.340	2.340	2.500	1.70	91.3	2.77	252.7	1.581	0.982	0.2032	----			
96	7.87	58.45	58.4665	2.18	120	0.08	7.91	0.474	0.594	0.474	45.4	56.8	45.4	5,597	209	3.764	100.8	0.855	2.333	2.329	2.329	2.329	2.489	1.70	93.9	2.71	254.7	1.616	0.982	0.2036	----			
97	7.96	60.04	60.0589	2.25	120	0.08	8.00	0.479	0.599	0.479	45.8	57.3	45.8	5,749	215	3.771	102.7	0.853	2.328	2.324	2.324	2.324	2.484	1.70	96.4	2.69	259.4	1.704	0.981	0.2040	----			
98	8.04	61.05	61.0723	2.28	120	0.08	8.08	0.484	0.604	0.484	46.3	57.8	46.3	5,846	218	3.766	103.5	0.852	2.325	2.321	2.321	2.321	2.481	1.70	98.1	2.68	262.4	1.761	0.981	0.2044	----			
99	8.12	61.46	61.4835	2.36	120	0.08	8.16	0.488	0.608	0.488	46.8	58.3	46.8	5,885	226	3.869	103.6	0.855	2.334	2.330	2.330	2.330	2.490	1.70	98.7	2.72	268.4	1.878	0.981	0.2048	----			
100	8.20	61.38	61.404	2.40	120	0.08	8.24	0.493	0.613	0.493	47.2	58.7	47.2	5,878	230	3.937	102.9	0.857	2.341	2.338	2.338	2.338	2.498	1.70	98.6	2.76	271.8	1.948	0.981	0.2051	----			
101	8.28	61.66	61.6853	2.40	120	0.08	8.33	0.498	0.618	0.498	47.7	59.2	47.7	5,905	229	3.917	102.6	0.857	2.340	2.337	2.337	2.337	2.497	1.70	99.0	2.75	272.6	1.965	0.981	0.2055	----			
102	8.37	61.46	61.4861	2.45	120	0.08	8.41	0.503	0.623	0.503	48.2	59.7	48.2	5,885	234	4.014	101.7	0.860	2.351	2.347	2.347	2.347	2.507	1.70	98.7	2.81	277.0	2.056	0.980	0.2058	----			
103	8.45	63.45	63.482	2.48	120	0.08	8.49	0.508	0.628	0.508	48.7	60.1	48.7	6,076	237	3.935	103.9	0.856	2.338	2.334	2.335	2.335	2.495	1.70	101.9	2.74	279.3	2.107	0.980	0.2062	----			
104	8.53	64.21	64.2473	2.52	120	0.08	8.57	0.513	0.633	0.513	49.1	60.6	49.1	6,149	241	3.950	104.4	0.856	2.338	2.334	2.334	2.334	2.494	1.70	103.1	2.74	282.6	2.179	0.980	0.2065	----			
105	8.61	65.51	65.5503	2.47	120	0.08	8.65	0.518	0.638	0.518	49.6	61.1	49.6	6,273	237	3.805	105.4	0.852	2.322	2.319	2.319	2.319	2.479	1.70	105.2	2.66	280.4	2.130	0.980	0.2069	----			
106	8.69	63.53	63.5686	2.42	120	0.08	8.74	0.523	0.643	0.523	50.1	61.6	50.1	6,084	232	3.847	101.8	0.856	2.335	2.332	2.332	2.332	2.492	1.70	102.0	2.73	278.5	2.090	0.980	0.2072	----			

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	σ'_{vo} tsf	* σ'_{vo} tsf	** σ'_{vo} tsf	σ_{vo} kPa	σ'_{vo} kPa	* σ'_{vo} kPa	** σ'_{vo} kPa	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration: Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. correction q_{1N}	Kc	clean sand correction $(q_{1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
107	8.75	5.75	5.797	0.297	125	0.28	8.82	0.528	0.528	0.528	50.5	52.0	50.5	0.862	234	4.029	97.9	0.884	2.361	2.358	2.358	2.358	2.516	1.70	98.3	2.86	281.6	2.198	0.990	0.2075	---	---	---	---
108	8.98	6.00	6.051	0.051	125	0.28	9.30	0.533	0.533	0.533	51.0	52.5	51.0	5.651	232	4.140	94.0	0.870	2.381	2.378	2.379	2.379	2.539	1.70	94.8	2.97	281.6	2.157	0.979	0.2078	---	---	---	---
109	9.18	6.25	6.297	0.297	125	0.28	9.58	0.538	0.538	0.538	51.5	53.0	51.5	5.538	250	4.549	92.1	0.861	2.418	2.415	2.416	2.416	2.576	1.70	92.9	3.18	295.4	2.478	0.979	0.2084	---	---	---	---
110	9.35	6.50	6.543	0.543	125	0.28	9.86	0.543	0.543	0.543	52.0	53.4	52.0	5.395	244	4.567	89.3	0.854	2.428	2.425	2.425	2.425	2.585	1.70	90.9	3.24	293.1	2.422	0.979	0.2084	---	---	---	---
111	9.70	6.75	6.795	0.295	125	0.28	9.15	0.547	0.667	0.547	52.4	63.0	52.4	5.097	236	4.671	84.1	0.851	2.452	2.449	2.449	2.449	2.609	1.70	85.5	3.39	289.4	2.335	0.979	0.2087	---	---	---	---
112	9.93	7.00	7.042	0.042	125	0.28	9.23	0.552	0.672	0.552	52.9	64.4	52.9	5.055	227	4.531	82.7	0.849	2.446	2.444	2.444	2.444	2.604	1.70	84.8	3.35	284.1	2.211	0.979	0.2090	---	---	---	---
113	9.97	7.25	7.292	0.292	125	0.28	9.31	0.557	0.677	0.557	53.4	64.8	53.4	5.014	213	4.291	81.2	0.885	2.433	2.430	2.431	2.431	2.591	1.70	84.1	3.27	275.0	2.014	0.978	0.2093	---	---	---	---
114	8.55	7.50	7.542	0.542	125	0.28	9.39	0.562	0.682	0.562	53.8	65.3	53.8	4.887	203	4.203	76.6	0.886	2.435	2.433	2.433	2.433	2.593	1.70	82.0	3.28	269.1	1.892	0.978	0.2096	---	---	---	---
115	9.43	7.75	7.792	0.292	125	0.28	9.47	0.567	0.687	0.567	54.3	65.8	54.3	4.562	190	4.225	73.1	0.893	2.457	2.455	2.455	2.455	2.615	1.70	76.5	3.42	261.7	1.747	0.978	0.2099	---	---	---	---
116	9.61	8.00	8.042	0.042	125	0.28	9.56	0.572	0.692	0.572	54.8	66.3	54.8	4.291	180	4.252	68.5	0.899	2.478	2.476	2.476	2.476	2.636	1.70	72.0	3.55	255.7	1.635	0.978	0.2102	---	---	---	---
117	9.80	8.25	8.292	0.292	125	0.28	9.64	0.577	0.697	0.577	55.2	66.7	55.2	4.027	169	4.261	64.0	0.905	2.498	2.496	2.496	2.496	2.656	1.70	67.5	3.69	249.0	1.516	0.978	0.2104	---	---	---	---
118	9.68	8.50	8.542	0.542	125	0.28	9.72	0.582	0.702	0.582	55.7	67.2	55.7	3.888	162	4.216	61.4	0.907	2.507	2.504	2.504	2.504	2.664	1.70	65.2	3.74	244.2	1.434	0.977	0.2107	---	---	---	---
119	9.80	8.75	8.797	0.297	125	0.28	9.80	0.587	0.707	0.587	56.2	67.7	56.2	3.538	150	4.296	55.8	0.918	2.541	2.539	2.539	2.539	2.699	1.70	59.3	3.99	236.7	1.313	0.977	0.2109	---	---	---	---
120	9.93	9.00	9.042	0.042	125	0.28	9.88	0.592	0.712	0.592	56.7	68.2	56.7	3.194	140	4.319	50.4	0.934	2.594	2.592	2.592	2.592	2.752	1.70	53.6	4.39	230.2	1.290	0.977	0.2112	---	---	---	---
121	9.92	9.25	9.292	0.292	125	0.28	9.97	0.597	0.717	0.597	57.1	68.6	57.1	2.860	138	5.290	42.2	0.962	2.688	2.688	2.688	2.688	2.848	1.70	44.6	5.20	232.2	1.245	0.977	0.2115	---	---	---	---
122	10.01	9.50	9.542	0.042	125	0.28	10.05	0.602	0.722	0.602	57.6	69.1	57.6	2.319	123	5.449	36.7	0.978	2.740	2.739	2.739	2.739	2.899	1.70	38.6	5.89	221.3	1.087	0.977	0.2117	---	---	---	---
123	10.49	9.75	9.797	0.047	125	0.28	10.13	0.607	0.727	0.607	58.1	69.6	58.1	2.087	112	5.514	32.9	0.989	2.777	2.776	2.776	2.776	2.936	1.70	35.0	6.06	212.1	0.987	0.976	0.2120	---	---	---	---
124	10.17	10.00	10.042	0.042	125	0.28	10.21	0.611	0.731	0.611	58.6	70.0	58.6	1.950	98	4.958	30.4	0.987	2.772	2.770	2.770	2.770	2.930	1.70	32.7	6.00	196.3	0.783	0.976	0.2122	---	---	---	---
125	10.25	10.25	10.292	0.292	125	0.28	10.29	0.616	0.736	0.616	59.0	70.5	59.0	1.802	88	4.780	26.0	0.987	2.770	2.769	2.769	2.769	2.929	1.70	31.7	5.99	180.0	0.718	0.976	0.2124	---	---	---	---
126	10.33	10.50	10.542	0.042	125	0.28	10.38	0.621	0.741	0.621	59.5	71.0	59.5	1.653	80	4.504	23.1	0.985	2.766	2.764	2.764	2.764	2.924	1.69	30.6	5.94	181.5	0.636	0.976	0.2127	---	---	---	---
127	10.47	10.75	10.797	0.047	125	0.28	10.46	0.626	0.746	0.626	60.0	71.5	60.0	1.750	71	4.108	27.1	0.980	2.750	2.748	2.748	2.748	2.908	1.69	29.6	5.78	170.7	0.543	0.976	0.2129	---	---	---	---
128	10.50	11.00	11.042	0.042	125	0.28	10.54	0.631	0.751	0.631	60.4	71.9	60.4	1.789	68	3.923	26.9	0.977	2.739	2.738	2.738	2.738	2.898	1.66	29.3	5.68	166.1	0.506	0.976	0.2131	---	---	---	---
129	10.58	11.25	11.292	0.292	125	0.28	10.62	0.636	0.756	0.636	60.9	72.4	60.9	1.606	68	3.912	27.0	0.977	2.737	2.736	2.736	2.736	2.896	1.64	29.3	5.66	165.9	0.504	0.975	0.2133	---	---	---	---
130	10.66	11.50	11.542	0.042	125	0.28	10.70	0.641	0.761	0.641	61.4	72.9	61.4	1.696	70	4.283	25.2	0.981	2.784	2.783	2.783	2.783	2.943	1.64	27.5	6.13	168.7	0.527	0.975	0.2136	---	---	---	---
131	10.74	11.75	11.797	0.047	125	0.28	10.79	0.646	0.766	0.646	61.9	73.3	61.9	1.666	72	4.477	24.7	0.997	2.804	2.803	2.803	2.803	2.963	1.64	26.9	6.34	170.7	0.542	0.975	0.2138	---	---	---	---
132	10.83	12.00	12.042	0.042	125	0.28	10.87	0.651	0.771	0.651	62.3	73.8	62.3	1.683	72	4.430	24.8	0.996	2.800	2.799	2.799	2.799	2.959	1.62	27.0	6.30	169.8	0.536	0.975	0.2140	---	---	---	---
133	10.91	12.25	12.292	0.292	125	0.28	10.95	0.656	0.776	0.656	62.8	74.3	62.8	1.737	73	4.370	25.4	0.992	2.788	2.787	2.787	2.787	2.947	1.61	27.8	6.18	170.2	0.539	0.975	0.2142	---	---	---	---
134	11.00	12.50	12.542	0.042	125	0.28	11.03	0.661	0.781	0.661	63.2	74.8	63.2	1.712	70	4.245	24.8	0.992	2.787	2.786	2.786	2.786	2.946	1.60	27.0	6.16	166.2	0.507	0.975	0.2144	---	---	---	---
135	11.07	12.75	12.797	0.047	125	0.28	11.11	0.666	0.786	0.666	63.7	75.2	63.7	1.679	68	4.234	24.2	0.994	2.795	2.794	2.794	2.794	2.954	1.59	26.3	6.24	164.0	0.490	0.974	0.2146	---	---	---	---
136	11.16	13.00	13.042	0.042	125	0.28	11.20	0.671	0.791	0.671	64.2	75.7	64.2	1.796	65	3.731	25.8	0.978	2.740	2.739	2.739	2.739	2.899	1.58	27.7	5.69	157.6	0.444	0.974	0.2148	---	---	---	---
137	11.24	13.25	13.292	0.292	125	0.28	11.28	0.676	0.796	0.676	64.7	76.2	64.7	2.129	65	3.146	29.9	0.948	2.641	2.639	2.639	2.639	2.799	1.53	32.1	4.78	153.0	0.417	0.974	0.2150	---	---	---	---
138	11.32	13.50	13.542	0.042	125	0.28	11.36	0.680	0.800	0.680	65.2	76.6	65.2	3.032	62	2.095	41.5	0.881	2.418	2.417	2.417	2.417	2.577	1.48	44.2	3.19	140.7	0.339	0.974	0.2152	---	---	---	---
139	11.41	13.75	13.797	0.047	125	0.28	11.41	0.685	0.805	0.685	65.6	77.1	65.6	3.875	61	1.589	51.9	0.835	2.267	2.265	2.265	2.265	2.425	1.44	55.0	2.42	132.8	0.288	0.973	0.2154	---	---	---	---
140	11.49	14.00	14.042	0.042	125	0.28	11.52	0.690	0.810	0.690	66.1	77.6	66.1	4.811	59	1.251	63.3	0.796	2.135	2.133	2.133	2.133	2.293	1.41	66.7	1.93	126.5	0.277	0.973	0.2156	---	---	0.000	---
141	11.58	14.25	14.292	0.292	125	0.28	11.61	0.695	0.815	0.695	66.6	78.1	66.6	5.648	61	1.100	73.3	0.770	2.050	2.048	2.048	2.048	2.208	1.38	77.0	1.69	129.9	0.284	0.973	0.2157	---	---	0.000	---
142	11.66	14.50	14.542	0.042	125	0.28	11.70	0.700	0.820	0.700	67.0	78.5	67.0	5.923	70	1.031	87.6	0.747	1.972	1.970	1.970	1.970	2.130	1.36	91.7	1.51	138.7	0.328	0.973	0.2159	---	---	---	---
143	11.73	14.75	14.797	0.047	125	0.28	11.77	0.705	0.825	0.705	67.5	79.0	67.5	7.416	79	1.074	94.6	0.742	1.957	1.955	1.955	1.955	2.115	1.35	98.9	1.48	146.7	0.373	0.973	0.2161	---	---	---	---
144	11.81	15.00	15.042	0.042	125	0.28	11.85	0.710	0.830	0.710	68.0	79.5	68.0	7.951	82	1.043	100.7	0.734	1.928	1.926	1.926	1.926	2.086	1.34	105.2	1.43	150.4	0.396	0.973	0.2163	---	---	---	---
145	11.89	15.25	15.292	0.292	125	0.28	11.93	0.715	0.835	0.715	68.4	79.9	68.4	8.331	88	1.066	106.0	0.731	1.920	1.918	1.918	1.918	2.078	1.33	109.5	1.42	155.2	0.427	0.972	0.2165	---	---	---	---
146	11.97	15.50	15.542	0.042	125	0.28	12.02	0.720	0.840	0.720	68.9	80.4	68.9	8.679	97	1.122	106.8	0.732	1.923	1.921	1.921	1.921	2.081	1.33	113.5	1.42	161.2	0.470	0.972	0.2168	---	---	---	---
147	12.06	15.75	15.797	0.047	125	0.28	12.10	0.725	0.845	0.725	69.4	80.9	69.4	9.059	111	1.237	113.4	0.737	1.937	1.936	1.936	1.936	2.096	1.32	118.2	1.45	170.9	0.545	0.972	0.2168	---	---	---	---
148	12.14	16.00	16.042	0.042	125	0.28	12.18	0.730	0.850	0.730	69.9	81.4	69.9	9.502	114	1.211	118.3	0.731	1.918	1.916	1.916	1.916	2.076	1.31	123.0	1.41	173.8	0.569	0.972	0.2170	---	---	---	---
149	12.22	16.25	16.292	0.292	125	0.28	12.26	0.734	0.854	0.734	70.3	81.9	70.3	10.339	122	1.165	127.7	0.720	1.882	1.880	1.880	1.880	2.040	1.30	132.7	1.36	179.9	0.622	0.972	0.2171	---	---	---	---
150	12.30	16.50	16.542	0.042	125	0.28	12.34	0.739	0.859	0.739	70.8	82.3	70.8	10.738	122	1.145	131.9	0.715	1.866	1.864	1.864	1.864	2.024	1.29	136.9	1.33	182.8	0.646	0.971	0.2173	---	---	---	---
151	12.39	16.75	16.797	0.047	125	0.28	12.43	0.744	0.864	0.744	71.2	82.8	71.2	10.428	122	1.172	127.8	0.721	1.884	1.883	1.883	1.883	2.043	1.29	132.8	1.36	180.3	0.625	0.971	0.2174	---	---	---	---
152	12.47	17.00	17.042	0.042	125	0.28	12.51	0.749	0.869	0.749	71.7	83.2	71.7	9.999	122	1.283	117.7	0.736	1.936	1.934	1.934	1.934	2.094	1.29	127.1	1.44	176.4	0.581	0.971	0.2176	---	---	---	---
153	12.55	17.25	17.292	0.292	125	0.28	12.59	0.754	0.874	0.754	72.2	83.7	72.2	9.036	119	1.324	110.6	0.745	1.964	1.963	1.963	1.963	2.123	1.29	114.8	1.50	172.0	0.553	0.971	0.2177	---	---	---	---
154	12.63	17.50	17.542	0.042	125	0.28	12.67	0.759	0.879	0.759	72.7	84.2	72.7	8.453	124	1.474	103.5	0.761	2.017	2.016	2.016	2.016	2.176	1.29	107.4	1.61	173.0	0.561	0.971	0.2179	---	---	---	---
155	12.71	17.75	17.797	0.047	125	0.28	12.75	0.764	0.884	0.764	73.2	84.7	73.2	7.601	126	1.680	93.2	0.782	2.088	2.088	2.088	2.088	2.248	1.29	96.8	1.79	173.5	0.565	0.970	0.2180	---	---	---	---
156	12.79	18.00	18.042	0.042	125	0.28	12.84	0.769	0.889	0.769	73.6	85.1	73.6	6.926	128	1.866	84.8	0.801	2.150	2.149	2.149	2.149	2.309	1.28	88.3	1.98	174.5	0.574	0.970	0.2182	---	---	---	---
157	12.88	18.25	18.292	0.292	125	0.28	12.92	0.774	0.894	0.774	74.1	85.6	74.1	5.863	142	2.460	72.3	0.841	2.283	2.283	2.283	2.283	2.443	1.30	75.3	2.49	187.8	0.696	0.970	0.2183	---	---	---	---
158	12.96	18.50	18.542	0.042	125	0.28	13.00	0.779	0.899	0.779	74.5	86.1	74.5	5.739	140	2.472	70.4	0.844	2.293	2.292	2.292	2.292	2.452	1.30	73.3	2.54	186.1	0.679	0.970	0.2185	---	---	---	---
159	13.04	18.75	18.797	0.047	125	0.28	13.08	0.784	0.904	0.784	75.0	86.5	75.0	5.941	132	2.282	71.2	0.835	2.265	2.264	2.264	2.264	2.424	1.29	74.1	2.41	176.8	0.612	0.970	0.2186	---	---	---	---
160	13.12	19.00	19.042	0.042	125	0.28	13.16	0.789	0.909	0.789	75.5	87.0	75.5	6.529	159	2.459	79.3	0.832	2.255	2.254	2.254	2.254	2.414	1.28	82.3	2.37	195.1	0.770	0.969	0.2188	---	---	---	---
161	13.25	19.25	19.292	0.292	125	0.28	13.25	0.794	0.914	0.794	76.0	87.5	76.0	10.900	222	1.730	152.9	0.740	1.948	1.946	1.946	1.946	2.106	1.24	157.5	1.47	231.4	1.232	0.969	0.2189	---	---	---	---
162	13.39	19.50	19.542	0.042	125	0.28	13.33	0.798	0.918	0.798	76.5	88.0	76.5	19.012	242	1.279	221.2	0.679	1.744	1.743	1.743	1.743	1.903	1.21	227.1	1.19	270.8	1.827	0.969	0.2190	---	---	---	---
163	13.41	19.75	19.797	0.047	125	0.28	13.41	0.803	0.923	0.803	76.9	88.4	76.9	28.762	336	1.132	341.2	0.631	1.583	1.583	1.583	1.583	1.743	1.19	349.4	1.07	372.8	4.802	0.969	0.2192	---	---	---	---
164	13.49	20.00	20.042	0.042	125	0.28	13.49	0.808	0.928	0.808	77.4	88.9	77.4	38.627	260	0.759	434.7	0.600	1.377	1.377	1.377	1.377	1.537	1.18	446.0	1.00	446.0	8.443	0.969	0.2193	---	---	---	---
165	13.63	20.25	20.292	0.292	125	0.28	13.57	0.813	0.933	0.813	77.9	89.4	77.9	46.275	280	0.627	515.1	0.600	1.265	1.265	1.265	1.265	1.425	1.17	534.8	1.00	534.8	14.304	0.968	0.2194	---	---	---	---
166	13.66	20.50	20.542	0.042	125	0.28	13.66	0.818	0.938	0.818	78.3	89.8	78.3	55.674	384	0.691	617.8	0.600	1.255	1.255	1.255	1.255	1.415	1.17	641.1	1.00	641.1	24.382	0.968	0.2195	---	---	---	---
167	13.74	20.75	20.797	0.047	125	0.28	13.74	0.823	0.943	0.823	78.8	90.3	78.8	44.184	355	0.804	492.8	0.600	1.366	1.366	1.366	1.366	1.526	1.16	506.9	1.00	506.9	12.196	0.968	0.2197	---	---	---	---
168	13.82	21.00	21.042	0.042	125	0.28	13.82	0.828	0.948	0.828	79.3	90.8	79.3	44.889	434	0.969	501.3	0.600	1.430	1.430	1.430	1.430	1.590	1.16	513.0	1.00	513.0	12.833	0.968	0.2198	---	---	---	---
169	13.90	21.25	21.292	0.292	125	0.28	13.90	0.833	0.953	0.833	79.8	91.3	79.8	45.604	470	0.994	486.3	0.600	1.447	1.447	1.447	1.447	1.607	1.16	497.0	1.00	497.0	11.489	0.968	0.2199	---	---	---	---
170	13.98	21.50	21.542	0.042	125	0.28	13.98	0.838	0.958	0.838	80.2	91.7	80.2	44.191	466	1.056	492.0	0.600	1.467	1.467	1.467	1.467	1.627	1.15	501.6	1.00	501.6	11.820	0.967	0.2200	---	---	---	---
171	14.07	21.75	21.797	0.047	125	0.28	14.07	0.843	0.963	0.843	80.7	92.2	80.7	42.079	380	0.900	466.0	0.600	1.429	1.429	1.429	1.429	1.589	1.15	476.0	1.00	476.0	10.910	0.967	0.2202	---	---	---	---
172	14.15	22.00	22.042	0.042	125	0.28	14.15	0.848	0.968	0.848	81.2	92.7	81.2	38.377	313	0.817	423.2	0.600	1.411	1.411	1.411	1.411	1.571	1.14	432.6	1.00	432.6	7.609	0.967	0.2203	---	---	---	---
173	14.23	22.25	22.292	0.292	125	0.28	14.23	0.853	0.973	0.853	81.6	93.1	81.6	37.039	279	0.755	406.9	0.600	1.394	1.394	1.394	1.394	1.554	1.14	416.1	1.00	416.1	6.779	0.967	0.2204	---	---	---	---
174	14.31	22.50	22.542	0.042	125	0.28	14.31	0.858	0.978	0.858	82.1	93.6	82.1	35.132	283	0.809	385.7	0.600	1.432	1.432	1.432	1.432	1.592	1.13	393.3	1.00	393.3	5.738	0.967	0.2205	---	---	---	---
175	14.39	22.75	22.797	0.047	125	0.28	14.39	0.862	0.982	0.862	82.6	94.1	82.6	31.743	295	0.931	346.0	0.608	1.508	1.508	1.508	1.508	1.668	1.13	354.8	1.02	360.5	4.436	0.967	0.2206	---	---	---	---
176	14.48	23.00	23.042	0.042	125	0.28	14.48	0.867	0.987	0.867	83.1	94.5	83.1	29.333	244	0.833	321.2	0.604	1.493	1.493	1.493	1.493	1.653	1.13	326.4	1.01	326.2	3.367	0.966	0.2207	---	---	---	---
177	14.56	23.25	23.292	0.292	125	0.28	14.56	0.872	0.992	0.872	83.5	95.0	83.5	28.852	192	0.998	313.9	0.600	1.427	1.427	1.427	1.427	1.587	1.12	319.7	1.00	319.7	3.119	0.966	0.2208	---	---	---	---
178	14.64	23.50	23.542	0.042	125	0.28	14.64	0.877	0.997	0.877	84.0	95.5	84.0	28.652	210	0.737	313.4	0.600	1.461	1.461	1.461	1.461	1.621	1.12	316.4	1.00	316.4	3.028	0.966	0.2209	---	---	---	---
179	14.73	23.75	23.797	0.047	125	0.28	14.72	0.882	1.002	0.882	84.5	96.0	84.5	25.206	235	0.930	276.7	0.626	1.573	1.573	1.573	1.573	1.733	1.12	280.9	1.06	297.8	2.535	0.966	0.2210	---	---	---	---
180	14.81	24.00	24.042	0.042	125	0.28	14.80	0.887	1.007	0.887	84.9	96.4	84.9	20.981	260	1.246	229.4	0.673	1.723	1.723	1.723	1.723	1.883	1.13	233.1	1.17	273.5	1.883	0.966	0.2211	---	---	---	---
181	14.89	24.25	24.292	0.292	125	0.28	14.89	0.892	1.012	0.892	85.4	96.9	85.4	17.096	361	2.122	188.3	0.743	1.957	1.957	1.957	1.957	2.117	1.14	191.5	1.49	284.6	2.224	0.965	0.2212	---	---	---	---
182	14.97	24.50	24.542	0.042	125	0.28	14.97	0.897	1.017	0.897	85.9	97.4	85.9	17.796	381	2.150	195.3	0.741	1.952	1.952	1.952	1.952	2.112	1.13	198.5	1.48	293.0	2.420	0.965	0.2213	---	---	---	---
183	15.05	24.75	24.797	0.047	125	0.28	15.05	0.902	1.022	0.902	86.4	97.8	86.4	18.598	378	2.424	171.0	0.761	2.028	2.028	2.028	2.028	2.188	1.13	173.9	1.64	284.8	2.229	0.965	0.2214	---	---	---	---
184	15.13	25.00	25.042	0.042	125	0.28	15.13	0.907	1.027	0.907	86.8	98.3	86.8	12.842	327	2.565	140.5	0.786	2.100	2.100	2.100	2.100	2.260	1.13	143.1	1.83	261.4	1.741	0.965	0.2215	---	---	---	---
185	15.21	25.25	25.292	0.292	125	0.28	15.21	0.912	1.032	0.912	87.3	98.8	87.3	10.049	321	3.225	110.0	0.829	2.244	2.244	2.244	2.244	2.404	1.13	112.2	2.33	261.5	1.742	0.965	0.2216	---	---	---	---
186	15.30	25.50	25.542	0.042	125	0.28	15.30	0.917	1.037	0.917	87.8	99.3	87.8	9.363	278	2.968	104.3	0.823	2.225	2.225	2.

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	* σ'_{vo} tsf	** σ'_{vo} tsf	σ_{vo} kPa	* σ'_{vo} kPa	** σ'_{vo} kPa	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration: Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. corection q_{c1N}	Kc	clean sand correction $(q_{c1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
238	19.52	71.89	71.8922	0.88	120	0.08	19.56	1.172	1.292	1.172	112.3	123.8	112.3	6,884	84	1.247	62.5	0.794	2.128	2.128	2.128	2.128	2.288	0.92	62.6	1.91	119.6	0.239	0.954	0.2251	---			0.001
239	19.60	72.46	72.4627	0.87	120	0.08	19.64	1.177	1.297	1.177	112.7	124.2	112.7	6,939	83	1.220	62.8	0.792	2.120	2.120	2.120	2.120	2.280	0.92	62.9	1.89	118.7	0.235	0.954	0.2252	---			0.001
240	19.68	72.71	72.7114	0.93	120	0.08	19.73	1.182	1.302	1.182	113.2	124.7	113.2	6,963	89	1.306	62.8	0.797	2.138	2.138	2.138	2.138	2.298	0.92	62.9	1.94	122.2	0.250	0.954	0.2252	---			0.001
241	19.77	72.31	72.3122	0.92	120	0.08	19.81	1.187	1.307	1.187	113.7	125.2	113.7	6,924	88	1.291	62.3	0.797	2.138	2.138	2.138	2.138	2.298	0.91	62.3	1.94	121.0	0.245	0.954	0.2252	---			0.001
242	19.85	73.9	73.9019	0.94	120	0.08	19.89	1.192	1.312	1.192	114.2	125.7	114.2	7,077	90	1.294	63.5	0.796	2.132	2.132	2.132	2.132	2.292	0.91	63.5	1.92	122.1	0.249	0.954	0.2253	---			0.001
243	19.93	78.15	78.1518	1.00	120	0.08	19.97	1.197	1.317	1.197	114.6	126.1	114.6	7,484	96	1.299	67.1	0.790	2.115	2.114	2.114	2.114	2.274	0.91	67.0	1.87	125.2	0.263	0.954	0.2253	---			0.001
244	20.01	82.09	82.0934	0.99	120	0.08	20.05	1.202	1.322	1.202	115.1	126.6	115.1	7,861	95	1.229	70.4	0.781	2.083	2.083	2.083	2.083	2.243	0.91	70.2	1.78	124.9	0.261	0.953	0.2254	---			0.001
245	20.09	88.85	88.8544	1.05	120	0.08	20.14	1.207	1.327	1.207	115.6	127.1	115.6	8,508	101	1.203	76.2	0.771	2.050	2.050	2.050	2.050	2.210	0.90	75.9	1.69	128.4	0.277	0.953	0.2254	---			0.001
246	20.18	89.32	89.3245	1.52	120	0.08	20.22	1.212	1.332	1.212	116.0	127.5	116.0	8,553	145	1.719	76.0	0.802	2.153	2.153	2.153	2.153	2.313	0.90	75.7	1.99	150.7	0.398	0.953	0.2254	---			
247	20.26	84.42	84.4243	1.28	120	0.08	20.30	1.217	1.337	1.217	116.5	128.0	116.5	8,084	122	1.532	71.6	0.798	2.139	2.138	2.138	2.138	2.298	0.89	71.4	1.94	138.7	0.328	0.953	0.2255	---			
248	20.34	82.23	82.2341	1.26	120	0.08	20.38	1.222	1.342	1.222	117.0	128.5	117.0	7,874	121	1.558	69.5	0.802	2.153	2.153	2.153	2.153	2.313	0.89	69.2	1.99	137.9	0.324	0.953	0.2255	---			
249	20.42	78.5	78.5028	1.26	120	0.08	20.46	1.227	1.347	1.227	117.5	129.0	117.5	7,517	120	1.627	66.0	0.811	2.182	2.182	2.182	2.182	2.342	0.89	65.8	2.09	137.6	0.322	0.952	0.2256	---			
250	20.51	70.86	70.8692	1.30	120	0.08	20.55	1.232	1.352	1.232	117.9	129.4	117.9	6,786	124	1.860	59.1	0.833	2.257	2.257	2.257	2.257	2.417	0.88	59.0	2.38	140.5	0.338	0.952	0.2256	---			
251	20.59	67.74	67.7539	1.53	120	0.08	20.63	1.236	1.356	1.236	118.4	129.9	118.4	6,487	147	2.305	56.0	0.857	2.336	2.336	2.336	2.336	2.496	0.88	56.0	2.75	153.9	0.419	0.952	0.2256	---			
252	20.67	62.79	62.8034	1.79	120	0.08	20.71	1.241	1.361	1.241	118.9	130.4	118.9	6,013	171	2.900	51.5	0.885	2.431	2.431	2.431	2.431	2.591	0.87	51.5	3.27	168.6	0.526	0.952	0.2257	---			
253	20.75	63.06	63.072	2.02	120	0.08	20.79	1.246	1.366	1.246	119.3	130.8	119.3	6,039	194	3.273	51.4	0.896	2.468	2.468	2.468	2.468	2.628	0.86	51.5	3.50	180.2	0.624	0.952	0.2257	---			
254	20.83	69.19	69.2029	2.58	120	0.08	20.87	1.251	1.371	1.251	119.8	131.3	119.8	6,626	247	3.795	56.3	0.902	2.486	2.486	2.486	2.486	2.646	0.86	56.2	3.62	203.6	0.865	0.951	0.2257	---			
255	20.92	74.48	74.4946	2.90	120	0.08	20.96	1.256	1.376	1.256	120.3	131.8	120.3	7,132	277	3.954	60.5	0.899	2.478	2.478	2.478	2.478	2.638	0.86	60.3	3.57	215.1	1.005	0.951	0.2258	---			
256	21.00	80.95	80.969	3.32	120	0.08	21.04	1.261	1.381	1.261	120.8	132.3	120.8	7,752	318	4.170	65.7	0.897	2.471	2.471	2.471	2.471	2.631	0.85	65.4	3.52	230.1	1.213	0.951	0.2258	---			
257	21.08	78.34	78.36	3.67	120	0.08	21.12	1.266	1.386	1.266	121.2	132.7	121.2	7,502	351	4.756	63.1	0.913	2.525	2.525	2.525	2.525	2.685	0.85	62.8	3.89	244.3	1.436	0.951	0.2258	---			
258	21.16	73.53	73.5602	3.72	120	0.08	21.20	1.271	1.391	1.271	121.7	133.2	121.7	7,041	357	5.152	58.8	0.927	2.571	2.571	2.571	2.571	2.731	0.84	58.6	4.23	247.9	1.497	0.951	0.2258	---			
259	21.24	73.91	73.9571	3.65	120	0.08	21.28	1.276	1.396	1.276	122.2	133.7	122.2	7,078	349	5.020	59.0	0.925	2.562	2.562	2.562	2.562	2.722	0.84	58.8	4.16	244.3	1.435	0.950	0.2259	---			
260	21.33	83.96	84.0114	3.45	120	0.08	21.37	1.281	1.401	1.281	122.6	134.1	122.6	8,040	331	4.176	67.3	0.895	2.464	2.464	2.464	2.464	2.624	0.84	66.9	3.48	232.5	1.248	0.950	0.2259	---			
261	21.41	101.55	101.606	2.10	120	0.08	21.45	1.286	1.406	1.286	123.1	134.6	123.1	9,724	201	2.096	82.8	0.811	2.185	2.184	2.184	2.184	2.344	0.85	81.9	2.10	172.0	0.553	0.950	0.2259	---			
262	21.49	131.61	131.662	1.70	120	0.08	21.53	1.291	1.411	1.291	123.6	135.1	123.6	12,603	163	1.305	108.9	0.743	1.956	1.956	1.956	1.956	2.116	0.86	107.3	1.48	159.2	0.456	0.950	0.2260	---			
263	21.57	147.24	147.285	1.55	120	0.08	21.61	1.296	1.416	1.296	124.1	135.5	124.1	14,100	149	1.064	122.4	0.713	1.859	1.858	1.858	1.858	2.018	0.87	120.4	1.32	159.5	0.457	0.950	0.2260	---			
264	21.65	181.69	181.741	1.21	120	0.08	21.69	1.300	1.420	1.300	124.5	136.0	124.5	17,399	116	0.671	153.0	0.652	1.655	1.654	1.654	1.654	1.814	0.87	150.1	1.12	167.7	0.518	0.950	0.2260	---			
265	21.74	189.13	189.153	1.41	120	0.08	21.78	1.305	1.425	1.305	125.0	136.5	125.0	18,111	135	0.749	158.8	0.658	1.673	1.672	1.672	1.672	1.832	0.87	155.7	1.13	176.0	0.587	0.949	0.2260	---			
266	21.82	181.95	181.983	1.56	120	0.08	21.86	1.310	1.430	1.310	125.5	137.0	125.5	17,424	149	0.861	151.9	0.674	1.728	1.727	1.727	1.727	1.887	0.87	148.9	1.18	175.2	0.580	0.949	0.2261	---			
267	21.90	172.21	172.227	1.70	120	0.08	21.94	1.315	1.435	1.315	125.9	137.4	125.9	16,491	163	0.994	142.7	0.693	1.789	1.789	1.789	1.789	1.949	0.86	140.0	1.24	173.4	0.564	0.949	0.2261	---			
268	21.98	162.31	162.323	1.28	120	0.08	22.02	1.320	1.440	1.320	126.4	137.9	126.4	15,543	122	0.794	134.6	0.679	1.744	1.743	1.743	1.743	1.903	0.86	132.0	1.19	157.3	0.442	0.949	0.2261	---			
269	22.06	133.04	133.066	1.29	120	0.08	22.10	1.325	1.445	1.325	126.9	138.4	126.9	12,740	123	0.976	108.9	0.717	1.872	1.871	1.871	1.871	2.031	0.85	107.0	1.34	143.7	0.356	0.949	0.2261	---			
270	22.15	128.12	128.124	1.29	120	0.08	22.19	1.330	1.450	1.330	127.4	138.8	127.4	12,269	124	1.019	104.4	0.725	1.898	1.897	1.897	1.897	2.057	0.85	102.6	1.38	141.8	0.345	0.948	0.2262	---			
271	22.23	126.75	126.768	1.94	120	0.08	22.27	1.335	1.455	1.335	127.8	139.3	127.8	12,138	185	1.544	102.0	0.764	2.027	2.026	2.026	2.026	2.186	0.84	100.3	1.63	163.8	0.489	0.948	0.2262	---			
272	22.31	96.45	96.4461	2.55	120	0.08	22.35	1.340	1.460	1.340	128.3	139.8	128.3	9,236	244	2.676	75.7	0.842	2.287	2.287	2.287	2.287	2.447	0.82	74.7	2.51	187.8	0.696	0.948	0.2262	---			
273	22.39	97.98	97.9845	2.63	120	0.08	22.43	1.345	1.465	1.345	128.8	140.3	128.8	9,383	252	2.722	76.7	0.842	2.288	2.288	2.288	2.288	2.448	0.82	75.7	2.52	190.6	0.724	0.948	0.2262	---			
274	22.47	79.03	79.0238	2.52	120	0.08	22.51	1.350	1.470	1.350	129.2	140.7	129.2	7,568	241	3.238	60.9	0.879	2.412	2.412	2.412	2.412	2.572	0.81	60.3	3.16	190.4	0.722	0.948	0.2263	---			
275	22.56	53.77	53.8223	2.41	120	0.08	22.60	1.355	1.475	1.355	129.7	141.2	129.7	5,149	231	4.598	40.2	0.950	2.647	2.646	2.646	2.646	2.806	0.79	40.2	4.84	194.5	0.764	0.947	0.2263	---			
276	22.64	51.39	51.4068	2.25	120	0.08	22.68	1.359	1.479	1.359	130.2	141.7	130.2	4,921	215	4.491	38.3	0.952	2.655	2.655	2.655	2.655	2.815	0.79	38.3	4.91	187.8	0.696	0.947	0.2263	---			
277	22.72	48.16	48.1664	2.13	120	0.08	22.76	1.364	1.484	1.364	130.7	142.1	130.7	4,612	204	4.552	35.6	0.960	2.681	2.681	2.681	2.681	2.841	0.78	35.7	5.14	183.3	0.653	0.947	0.2263	---			
278	22.80	50.6	50.6292	1.53	120	0.08	22.84	1.369	1.489	1.369	131.1	142.6	131.1	4,845	147	3.108	37.7	0.921	2.549	2.549	2.549	2.549	2.709	0.79	37.7	4.06	153.1	0.414	0.947	0.2263	---			
279	22.88	52.25	52.2681	1.43	120	0.08	22.92	1.374	1.494	1.374	131.6	143.1	131.6	5,003	137	2.803	39.0	0.908	2.508	2.508	2.508	2.508	2.668	0.79	38.9	3.77	146.7	0.374	0.947	0.2264	---			
280	22.97	53.79	53.8082	1.22	120	0.08	23.01	1.379	1.499	1.379	132.1	143.6	132.1	5,151	117	2.330	40.3	0.889	2.445	2.444	2.444	2.444	2.604	0.79	40.2	3.35	134.7	0.307	0.946	0.2264	---			
281	23.05	52.12	52.1323	1.10	120	0.08	23.09	1.384	1.504	1.384	132.5	144.0	132.5	4,991	106	2.176	38.9	0.887	2.437	2.437	2.437	2.437	2.597	0.79	38.8	3.31	128.4	0.277	0.946	0.2264	---			0.001
282	23.13	50.3	50.3135	1.06	120	0.08	23.17	1.389	1.509	1.389	133.0	144.5	133.0	4,817	102	2.169	37.4	0.891	2.450	2.449	2.449	2.449	2.609	0.78	37.3	3.38	126.3	0.267	0.946	0.2264	---			
283	23.21	48.55	48.5607	1.03	120	0.08	23.25	1.394	1.514	1.394	133.5	145.0	133.5	4,649	98	2.176	35.9	0.895	2.465	2.464	2.464	2.464	2.624	0.78	35.8	3.48	124.6	0.260	0.946	0.2264	---			
284	23.29	44.34	44.3519	1.07	120	0.08	23.33	1.399	1.519	1.399	134.0	145.4	134.0	4,246	103	2.496	32.4	0.917	2.537	2.536	2.536	2.536	2.696	0.77	32.4	3.97	128.7	0.278	0.946	0.2265	---			
285	23.38	39.22	39.2323	1.09	120	0.08	23.42	1.404	1.524	1.404	134.4	145.9	134.4	3,756	104	2.880	28.2	0.943	2.622	2.622	2.622	2.622	2.782	0.77	28.4	4.63	131.5	0.291	0.945	0.2265	---			
286	23.46	35.11	35.1297	1.07	120	0.08	23.50	1.409	1.529	1.409	134.9	146.4	134.9	3,362	102	3.160	24.9	0.963	2.689	2.689	2.689	2.689	2.849	0.76	25.2	5.22	131.4	0.291	0.945	0.2265	---			
287	23.54	36.02	36.0411	1.03	120	0.08	23.58	1.414	1.534	1.414	135.4	146.9	135.4	3,449	99	2.982	25.6	0.955	2.665	2.664	2.664	2.664	2.824	0.76	25.8	4.99	128.9	0.279	0.945	0.2265	---			
288	23.62	37.42	37.4548	1.03	120	0.08	23.66	1.419	1.539	1.419	135.8	147.3	135.8	3,583	99	2.858	26.6	0.948	2.640	2.639	2.639	2.639	2.799	0.76	26.8	4.78	128.0	0.275	0.945	0.2265	---			
289	23.70	39.68	39.7023	0.97	120	0.08	23.74	1.423	1.543	1.423	136.3	147.8	136.3	3,800	93	2.530	28.3	0.931	2.585	2.585	2.585	2.585	2.745	0.76	28.4	4.33	123.3	0.254	0.945	0.2265	---			
290	23.79	43.51	43.5307	0.85	120	0.08	23.83	1.428	1.548	1.428	136.8	148.3	136.8	4,167	81	2.013	31.3	0.903	2.489	2.488	2.488	2.488	2.648	0.76	31.4	3.64	114.1	0.218	0.945	0.2265	---			
291	23.87	45.66	45.6795	0.74	120	0.08	23.91	1.433	1.553	1.433	137.3	148.7	137.3	4,372	71	1.680	33.1	0.883	2.424	2.423	2.423	2.423	2.583	0.77	33.0	3.22	106.3	0.192	0.944	0.2266	---			0.001
292	23.95	45.04	45.0548	0.74	120	0.08	23.99	1.438	1.558	1.438	137.7	149.2	137.7	4,313	71	1.702	32.5	0.886	2.433	2.432	2.432	2.432	2.592	0.76	32.4	3.28	106.3	0.192	0.944	0.2266	---			0.001
293	24.03	44.52	44.5347	0.81	120	0.08	24.07	1.443	1.563	1.443	138.2	149.7	138.2	4,263	78	1.890	31.9	0.896	2.467	2.466	2.466	2.466	2.626	0.76	31.9	3.49	111.1	0.208	0.944	0.2266	---			
294	24.11	46.15	46.1623	0.88	120	0.08	24.15	1.448	1.568	1.448	138.7	150.2	138.7	4,419	84	1.966	33.0	0.895	2.465	2.464	2.464	2.464	2.624	0.76	32.9	3.48	114.6	0.220	0.944	0.2266	---			
295	24.20	46.76	46.7727	0.93	120	0.08	24.24	1.453	1.573	1.453	139.1	150.6	139.1	4,478	89	2.057	33.3	0.898	2.474	2.473	2.473	2.473	2.633	0.75	33.2	3.53	117.5	0.231	0.944	0.2266	---			
296	24.28	45.26	45.2747	0.90	120	0.08	24.32	1.458	1.578	1.458	139.6	151.1	139.6	4,334	87	2.064	32.1	0.902	2.488	2.487	2.487	2.487	2.647	0.75	32.0	3.62	116.1	0.226	0.943	0.2266	---			
297	24.36	45.09	45.1249	0.91	120	0.08	24.40	1.463	1.583	1.463	140.1	151.6	140.1	4,318	87	2.090	31.9	0.904	2.494	2.493	2.493	2.493	2.653	0.75	31.8	3.66	116.5	0.227	0.943	0.2266	---			
298	24.44	45.43	45.4718	0.95	120	0.08	24.48	1.468	1.588	1.468	140.6	152.0	140.6	4,350	91	2.170	32.0	0.906	2.502	2.501	2.501	2.501	2.661	0.74	31.9	3.72	118.8	0.236	0.943	0.2267	---			
299	24.52	46.56	46.5891	0.99	120	0.08	24.56	1.473	1.593	1.473	141.0	152.5	141.0	4,459	95	2.198	32.7	0.905	2.498	2.497	2.497	2.497	2.657	0.74	32.6	3.69	120.5	0.243	0.943	0.2267	---			
300	24.61	47.54	47.5669	0.91	120	0.08	24.65	1.478	1.598	1.478	141.5	153.0	141.5	4,552	87	1.980	33.5	0.894	2.462	2.461	2.461	2.461	2.621	0.74	33.3	3.46	115.2	0.222	0.943	0.2267	---			
301	24.69	49.29	49.3189	0.84	120	0.08	24.73	1.483	1.603	1.483	142.0	153.5	142.0	4,720	80	1.755	34.8	0.881	2.416	2.415	2.415	2.415	2.575	0.74	34.6	3.18	110.0	0.204	0.942	0.2267	---			0.001
302	24.77	47.98	48.0058	0.79	120	0.08	24.81	1.487	1.607	1.487	142.4	153.9	142.4	4,595	75	1.688	33.8	0.881	2.417	2.416	2.416	2.416	2.576	0.74	33.6	3.18	106.9	0.193	0.942	0.2267	---			0.001
303	24.85	41.98	41.9978	0.74	120	0.08	24.89	1.492	1.612	1.492	142.9	154.4	142.9	4,020	70	1.815	29.1	0.902	2.487	2.486	2.486	2.486	2.646	0.73	29.1	3.62	105.4	0.189	0.942	0.2267	---			
304	24.93	38.64	38.6528	0.63	120	0.08	24.98	1.497	1.617	1.497	143.4	154.9	143.4	3,700	60	1.688	26.6	0.906	2.500	2.499	2.499	2.499	2.659	0.73	26.7	3.71	98.9	0.170	0.942	0.2267	---			
305	25.02	33.67	33.6778	0.62	120	0.08	25.06	1.502	1.622	1.502	143.9	155.3	143.9	3,224	59	1.927	22.8	0.932	2.589	2.588	2.588	2.588	2.748	0.72	23.0	4.36	100.0	0.173	0.942	0.2268	*******			
306	25.10	24.68	24.6854	0.58	120	0.08	25.14	1.507	1.624	1.507	144.3	155.5	144.3	2,363	55	2.481	16.0	0.989	2.777	2.776	2.776	2.776	2.936	0.71	16.4	6.06	99.6	0.172	0.941	0.2272	*******			
307	25.18	20.93	20.9364	0.57	120	0.08	25.22	1.512	1.626	1.512	144.8	155.7	144.8	2,004	54	2.915	13.2	1.021	2.885	2.884	2.884	2.884	3.044	0.69	13.7	7.25	99.6	0.172	0.941	0.2275	*******			
308	25.26	20.87	20.8741	0.54	120	0.08	25.30	1.517	1.629	1.517	145.3	156.0	145.3	1,999	52	2.785	13.2	1.018	2.875	2.874	2.874	2.874	3.034	0.69	13.7	7.14	97.5	0.166	0.941	0.2279	*******			
309	25.34	22.46	22.4641	0.37	120	0.08	25.39	1.522	1.631	1.522	145.7	156.2	145.7	2,151	35	1.758	14.4	0.975	2.731	2.730	2.730	2.730	2.890	0.70	14.9	5.60	83.4	0.134	0.941	0.2282	*******			
310	25.43	24.24	24.2442	0.37	120	0.08	25.47	1.527	1.633	1.527	146.2	156.4	146.2	2,321	35	1.629	15.7	0.960	2.682	2.681	2.681	2.681	2.841	0.70	16.1	5.14	82.9	0.133	0.941	0.2286	*******			
311	25.51	25.71	25.7112	0.42	120	0.08	25.55	1.532	1.636	1.532	146.7	156.6	146.7	2,462	40	1.725	16.7	0.958	2.673	2.672	2.672	2.672	2.832	0.70	17.1	5.06	86.3	0.140	0.941	0.2290	*******			
312	25.59	27.91	27.9082	0.49	120	0.08	25.63	1.537	1.638	1.537	147.1	156.9	147.1	2,673	47	1.862	18.2	0.954	2.661	2.659	2.659	2.659	2.819	0.70	18.5	4.95	91.5	0.151	0.940	0.2293	*******			
313	25.67	34.74	34.7397	0.63	120	0.08	25.71	1.542	1.641	1.542	147.6	157.1	147.6	3,327	60	1.886	23.0	0.929	2.579	2.578	2.578	2.578	2.738	0.71	23.1	4.28	99.1	0.170	0.940	0.2297	*******			
314	25.75	33.53	33.5353	0.67	120	0.08	25.80	1.546	1.643	1.546	148.1	157.3	148.1	3,211	64	2.089	22.0	0.942	2.621	2.620	2.620	2.620	2.780	0.70	22.2	4.61	102.3	0.179	0.940	0.2300	*******			
315	25.84	31.32	31.3282	0.77	120	0.08	25.88	1.551	1.645	1.551	148.6	157.6	148.6	2,999	74	2.593	20.2	0.968	2.706	2.705	2.705	2.705	2.865	0.69	20.4	5.36	109.7	0.203	0.940	0.2304	*******			
316	25.92	29.86	29.868	0.82	120	0.08	25.96	1.556	1.648	1.556	149.0	157.8	149.0	2,859	78	2.879	19.1	0.982	2.754	2.753	2.753	2.753	2.913	0.68	19.3	5.83	112.6	0.213	0.940	0.2307	*******			
317	26.00	30.64	30.6659	0.91	120	0.08	26.04	1.561	1.650	1.561	149.5	158.0	149.5	2,934	87	3.112	19.5	0.986	2.767	2.766	2.766	2.766	2.926	0.68	19.7	5.96	117.5	0.231	0.939	0.2311	*******			
318	26.08	31.2	31.2175	0.89	120	0.08	26.12	1.566	1.652	1.566	150.0	158.2	150.0	2,988	85	3.010	19.9	0.981	2.752	2.751	2.751	2.751	2.911	0.68	20.1	5.80	116.5	0.227	0.939	0.2314	*******			
319	26.16	31.21	31.2277	0.88	120	0.08	26.21	1.571	1.655	1.571	150.4	158.5	150.4	2,989	85	2.983	19.8	0.981	2.750	2.749	2.749	2.749	2.909	0.68	20.0	5.79	115.9	0.225	0.939	0.2318	*******			
320	26.25	29.71	29.7293	0.87	120	0.08	26.29	1.576	1.657	1.576	150.9	158.7	150.9	2,845	83	3.092	18.7	0.990	2.780	2.779	2.779	2.779	2.939	0.67	18.9	6.09	115.2	0.222	0.939	0.2321	*******			
321	26.33	27.71	27.7273	0.83	120	0.08	26.37	1.581	1.659	1.581	151.4	158.9	151.4	2,654	79	3.157	17.2	1.000	2.813	2.812	2.812	2.812	2.972	0.67	17.5	6.44	112.8	0.214	0.939	0.2325	*******			
322	26.41	25.94	25.9595	0.77	120	0.08	26.45	1.586	1.662	1.586	151.9	159.1	151.9	2,484	74	3.178	16.0	1.008	2.841	2.840	2.840	2.840	3.000	0.67	16.3	6.74	110.0	0.204	0.938	0.2328	*******			
323	26.49	24.98	25.0013	0.76	120	0.08	26.53	1.591	1.664	1.591	152.3	159.4	152.3	2,392	72	3.232	15.2	1.014	2.861	2.860	2.860	2.860	3.020	0.66	15.6	6.97	108.9	0.200	0.938	0.2332	*******			
324	26.57	23.99	24.0114	0.74	120	0.08	26.62	1.596	1.667	1.596	152.8	159.6	152.8	2,297	71	3.318	14.5	1.021	2.885	2.884	2.884	2.884	3.044	0.66	14.9	7.25	108.0	0.197	0.938	0.2335	*******			
325	26.66	22.34	22.3606	0.71	120	0.08	26.70	1.601	1.669	1.601	153.3	159.8	153.3	2,139	68	3.438	13.3	1.033	2.923	2.923	2.923	2.923	3.083	0.65	13.8	7.71	106.2	0.191	0.938	0.2339	*******			
326	26.74	21.31	21.3307	0.69	120	0.08	26.78	1.606	1.671	1.606	153.7	160.0	153.7	2,041	66	3.517	12.6	1.041	2.949	2.949	2.948	2.948	3.108	0.65	13.1	8.03	104.8	0.187	0.938	0.2342	*******			
327	26.82	19.89	19.9113	0.74	120	0.08	26.86	1.610	1.674	1.610	154.2	160.3	154.2	1,905	70	4.021	11.5	1.060	3.014	3.013	3.013	3.013	3.173	0.64	12.0	8.88	107.0	0.194	0.937	0.2345	*******			
328	26.90	21.13	21.1576	0.80	120	0.08	26.94	1.615	1.676	1.615	154.7	160.5	154.7	2,023	76	4.089	12.3	1.055	2.996	2.996	2.995	2.995	3.155	0.64	12.8	8.64	110.5	0.205	0.937	0.2349	*******			
329	26.98	22.82	22.8535	0.84	120	0.08	27.03	1.620	1.678	1.620	155.2	160.7	155.2	2,185	80	3.948	13.4	1.043	2.958	2.957	2.957	2.957	3.117	0.64	13.8	8.14	112.6	0.213	0.937	0.2352	*******			
330	27.07	24.8	24.8364	0.88	120	0.08	27.11	1.625	1.681	1.625	155.6	160.9	155.6	2,375	84	3.784	14.7	1.030	2.915	2.914	2.914	2.914	3.074	0.64	15.1	7.61	114.6	0.220	0.937	0.2355	*******			
331	27.15	24.59	24.628	0.88	120	0.08	27.19	1.630	1.683	1.630	156.1	161.2	156.1	2,355	84	3.820	14.5	1.032	2.922	2.921	2.921	2.921	3.081	0.64	14.9	7.69	114.4	0.219	0.937	0.2359	*******			
332	27.23	23.93	23.9662	0.90	120	0.08	27.27	1.635	1.685	1.635	156.6	161.4	156.6	2,292	86	4.028	14.0	1.040	2.948	2.947	2.947	2.947	3.107	0.64	14.4	8.02	115.3	0.223	0.937	0.2362	*******			
333	27.31	22.61	22.6481	0.94	120	0.08	27.35	1.640	1.688	1.640	157.0	161.6	157.0	2,165	90	4.497	13.0	1.056	3.002	3.001	3.001	3.001	3.161	0.63	13.5	8.72	117.3	0.230	0.936	0.2365	*******			
334	27.39	21.14	21.1818	0.95	120	0.08	27.44	1.645	1.690	1.645	157.5	161.8	157.5	2,024	91	4.873	12.0	1.071	3.052	3.051	3.051	3.051	3.211	0.62	12.5	9.41	117.1	0.229	0.936	0.2369	*******			
335	27.48	23.23	23.2718	0.90	120	0.08	27.52	1.650	1.693	1.650	158.0	162.1	158.0	2,225	86	4.147	13.4	1.047	2.971	2.970	2.970	2.970	3.130	0.63	13.8	8.31	114.6	0.220	0.936	0.2372	*******			
336	27.56	28.34	28.3798	0.81	120	0.08	27.60	1.655	1.695	1.655	158.5	162.3	158.5	2,714	77	3.020	16.9	0.998	2.807	2.806	2.806	2.806	2.966	0.64	17.1	6.37	109.3	0.201	0.936	0.2375	*******			
337	27.64	34.09	34.1401	0.64	120	0.08	27.68	1.660	1.697	1.660	158.9	162.5	158.9	3,264	61	1.970	21.0	0.942	2.621	2.620	2.620	2.620	2.780	0.65	21.1	4.61	97.3	0.166	0.936	0.2379	*******			
338	27.72	38.45	38.5354	0.54	120	0.08	27.76	1.665	1.700	1.665	159.4	162.8	159.4	3,682	52	1.465	24.2	0.905	2.499	2.497	2.496	2.496	2.656	0.66	24.1	3.69	89.0	0.146	0.935	0.2382	*******			
339	27.80	42.13	42.2497	0.46	120	0.08	27.85	1.670	1.702	1.670	159.9	163.0	159.9	4,034	44	1.147	26.9	0.876	2.402	2.400	2.400	2.400	2.560	0.67	26.7	3.09	82.5	0.132	0.935	0.2385	0.57	0.025	0.018	
340	27.89	43.59	43.8298	0.56	120	0.08	27.93	1.674	1.704	1.674	160.3	163.2	160.3	4,174	53	1.324	27.7	0.883	2.425	2.423	2.423	2.423	2.583	0.67	27.5	3.22	88.5	0.145	0.935	0.2388	0.63	0.025	0.017	
341	27.97	43.83	44.6391	0.56	120	0.08	28.01	1.679	1.707	1.679	160.8	163.4	160.8	4,197	54	1.336	27.8	0.883	2.426	2.424	2.424	2.424	2.584	0.67	27.5	3.23	88.9	0.145	0.935	0.2392	0.63	0.025	0.017	
342	28.05	43.05	43.9418	0.68	120	0.08	28.09	1.684	1.709	1.684	161.3	163.7	161.3	4,122	65	1.637	27.0	0.901	2.486	2.484	2.484	2.484	2.644	0.66	26.8	3.61	96.6	0.164	0.935	0.2395	*******			
343	28.13	41.48	42.4682	0.86	120	0.08	28.17	1.689	1.711	1.689	161.8	163.9	161.8	3,972	82	2.154	25.6	0.928	2.575	2.574	2.574	2.574	2.734	0.65	25.4	4.25	107.8	0.197	0.934	0.2398	*******			
344	28.21	35.69	36.7041	0.92	120	0.08	28.26	1.694	1.714	1.694	162.2	164.1	162.2	3,418	88	2.692	21.4	0.964	2.695	2.693	2.693	2.693	2.853	0.64	21.4	5.26	112.6	0.213	0.934	0.2401	*******			
345	28.30	33.06	34.001	0.82	120	0.08	28.34	1.699	1.716	1.699	162.7	164.3	162.7	3,166	79	2.627	19.7	0.971	2.718	2.717	2.717	2.717	2.877	0.63	19.7	5.48	108.0	0.197	0.934	0.2404	*******			
346	28.38	25.99	26.7672	0.78	120	0.08	28.42	1.704	1.718	1.704	163.2	164.6	163.2	2,489	74	3.191	14.9	1.015	2.866	2.865	2.865	2.865	3.025	0.62	15.1	7.02	106.3	0.192	0.934	0.2407	*******			
347	28.46	19.87	20.4966	0.70	120	0.08	28.50	1.709	1.721	1.709	163.6	164.8	163.6	1,903	67	3.854	10.8	1.063	3.025	3.024	3.024	3.024	3.184	0.60	11.3	9.03	101.8	0.178	0.934	0.2411	*******			
348	28.54	16.58	17.0932	0.70	120	0.08	28.58	1.714	1.723	1.714	164.1	165.0	164.1	1,588	67	4.675	8.7	1.100	3.152	3.151	3.151	3.151	3.311	0.59	9.2	10.89	100.4	0.174	0.933	0.2414	*******			
349	28.62	17.45	17.9032	0.82	120	0.08	28.67	1.719	1.726	1.719	164.6	165.2	164.6	1,671	78	5.206	9.1	1.100	3.162	3.162	3.162	3.162	3.322	0.59	9.7	11.05	106.9	0.194	0.933	0.2417	*******			
350	28.71	19.46	19.8991	0.78	120	0.08	28.75	1.724	1.728	1.724	165.1	165.5	165.1	1,863	75	4.392	10.4	1.077	3.072	3.072	3.071	3.071	3.231	0.59	10.9	9.70	105.4	0.189	0.933	0.2420	*******			
351	28.79	21.48	21.9063	0.76	120	0.08	28.83	1.729	1.730	1.729	165.5	165.7	165.5	2,057	73	3.848	11.7	1.055	2.997	2.997	2.997	2.997	3.157	0.60	12.1	8.66	104.7	0.187	0.933	0.2423	*******			
352	28.87	20.72	21.0768	0.75	120	0.08	28.91	1.733	1.733	1.733	166.0	165.9	166.0	1,984	72	3.955	11.2	1.062	3.020	3.020	3.020	3.020	3.180	0.59	11.6	8.97	104.0	0.184	0.933	0.2426	*******			
353	28.95	23.31	23.6027	0.77	120	0.08	28.99	1.738	1.735	1.738	166.5	166.1	166.5	2,232	73	3.546	12.8	1.039	2.945	2.944	2.944	2.944	3.104	0.60	13.2	7.97	104.8	0.187	0.932	0.2429	*******			
354	29.04	23.5	23.8209	0.79	120	0.08	29.08	1.743	1.737	1.742	166.9	166.4	166.8	2,250	76	3.649	12.9	1.041	2.950	2.949	2.949	2.949	3.109	0.60	13.2	8.04	106.3	0.192	0.932	0.2432	*******			
355	29.12	22.74	23.109	0.76	120	0.08	29.16	1.748	1.740	1.745	167.4	166.6	167.1	2,178	73	3.620	12.4	1.044	2.961	2.961	2.960	2.960	3.120	0.59	12.8	8.19	104.4	0.186	0.932	0.2435	*******			
356	29.20	23.05	23.4608	0.77	120	0.08	29.24	1.753	1.742	1.747	167.9	166.8	167.3	2,207	73	3.592	12.6	1.042	2.954	2.953	2.953	2.953	3.113	0.59	12.9	8.10	104.6	0.186	0.932	0.2438	*******			
357	29.28	24.41	24.8157	0.88	120	0.08	29.32	1.758	1.744	1.749	168.4	167.0	167.5	2,338	84	3.880	13.3	1.042	2.954	2.953	2.953	2.953	3.113	0.59	13.7	8.09	110.5	0.206	0.932	0.2441	*******			
358	29.36	24.18	24.5684	0.96	120	0.08	29.40	1.763	1.747	1.752	168.8	167.3	167.7	2,315	92	4.282	13.1	1.051	2.986	2.985	2.985	2.985	3.145	0.59	13.5	8.50	114.4	0.219	0.932	0.2444	*******			
359	29.45	23.98	24.3805	1.06	120	0.08	29.49	1.768	1.749	1.754	169.3	167.5	168.0	2,296	101	4.750	12.9	1.061	3.019	3.018	3.018	3.018	3.178	0.58	13.3	8.95	118.6	0.235	0.931	0.2447	*******			
360	29.53	23	23.3848	1.06	120	0.08	29.57	1.773	1.752	1.756	169.8	167.7	168.2	2,202	102	4.998	12.3	1.071	3.050	3.050	3.050	3.050	3.210	0.58	12.6	9.38	118.6	0.235	0.931	0.2450	*******			
361	29.61	23.6	23.945	1.04	120	0.08	29.65	1.778	1.754	1.759	170.2	168.0	168.4	2,260	99	4.752	12.6	1.064	3.026	3.026	3.026	3.026	3.186	0.58	13.0	9.05	117.6	0.231	0.931	0.2453	*******			
362	29.69	23.65	23.9864	0.99	120	0.08	29.73	1.783	1.756	1.761	170.7	168.2	168.6	2,265	95	4.532	12.7	1.060	3.013	3.012	3.012	3.012	3.172	0.58	13.0	8.86	115.4	0.223	0.931	0.2456	*******			
363	29.77	24.72	25.0643	1.02	120	0.08	29.81	1.788	1.759	1.763	171.2	168.4	168.9	2,367	98	4.461	13.3	1.053	2.992	2.991	2.991	2.991	3.151	0.58	13.6	8.58	117.0	0.229	0.931	0.2459	*******			
364	29.86	24.62	24.9446	1.08	120	0.08	29.90	1.793	1.761	1.766	171.7	168.6	169.1	2,358	103	4.709	13.2	1.058	3.009	3.008	3.008	3.008	3.168	0.58	13.5	8.81	119.3	0.238	0.930	0.2462	*******			
365	29.94	25.62	25.9086	1.12	120	0.08	29.98	1.797	1.763	1.768	172.1	168.9	169.3	2,453	107	4.697	13.8	1.054	2.994	2.993	2.993	2.993	3.153	0.58	14.1	8.61	121.3	0.246	0.930	0.2465	*******			
366	30.02	30.13	30.368	1.20	120	0.08	30.06	1.802	1.766	1.771	172.6	169.1	169.5	2,885	115	4.233	16.6	1.026	2.903	2.902	2.902	2.902	3.062	0.59	16.8	7.45	125.1	0.262	0.930	0.2468	*******			
367	30.101	32.47	32.67	1.23	120	0.08	30.14	1.807	1.768	1.773	173.1	169.3	169.8	3,109	118	4.005	18.1	1.013	2.859	2.858	2.858	2.858	3.018	0.59	18.2	6.94	126.3	0.267	0.929	0.2469	*******			
368	30.183	34.29	34.4563	1.28	120	0.08	30.22	1.812	1.770	1.775	173.5	169.5	170.0	3,284	122	3.932	19.2	1.006	2.834	2.833	2.832	2.832	2.992	0.59	19.3	6.66	128.3	0.276	0.928	0.2471	*******			

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	σ'_{vo} tsf *	σ'_{vo} tsf **	σ_{vo} kPa	σ'_{vo} kPa *	σ'_{vo} kPa **	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration: Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. corection q_{c1N}	Kc	clean sand correction $(q_{c1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
369	30.265	33.78	33.958	1.38	120	0.08	30.31	1.817	1.773	1.778	174.0	169.8	170.2	3,235	132	4.327	18.8	1.016	2.868	2.867	2.867	2.867	3.027	0.59	18.8	7.05	132.8	0.298	0.928	0.2472	*******			
370	30.347	30.88	30.9549	1.46	120	0.08	30.39	1.822	1.775	1.780	174.5	170.0	170.5	2,957	139	5.011	16.9	1.039	2.945	2.944	2.944	2.944	3.104	0.58	17.0	7.98	135.6	0.312	0.927	0.2474	*******			
371	30.429	30.55	30.7347	1.53	120	0.08	30.47	1.827	1.778	1.782	175.0	170.2	170.7	2,925	147	5.341	16.6	1.046	2.969	2.968	2.968	2.968	3.128	0.58	16.7	8.28	138.5	0.327	0.926	0.2476	*******			
372	30.511	29.96	30.1676	1.51	120	0.08	30.55	1.832	1.780	1.785	175.4	170.4	170.9	2,869	145	5.383	16.2	1.049	2.979	2.978	2.978	2.978	3.138	0.58	16.4	8.41	137.6	0.322	0.926	0.2477	*******			
373	30.593	30.47	30.6757	1.44	120	0.08	30.63	1.837	1.782	1.787	175.9	170.7	171.1	2,918	138	5.015	16.5	1.041	2.952	2.951	2.951	2.951	3.111	0.58	16.7	8.06	134.5	0.306	0.925	0.2479	*******			
374	30.675	30.88	31.101	1.36	120	0.08	30.72	1.842	1.785	1.789	176.4	170.9	171.4	2,957	130	4.687	16.8	1.034	2.927	2.926	2.926	2.926	3.086	0.58	17.0	7.75	131.4	0.291	0.924	0.2480	*******			
375	30.758	29.84	30.1192	1.31	120	0.08	30.80	1.847	1.787	1.792	176.8	171.1	171.6	2,857	125	4.669	16.2	1.037	2.939	2.938	2.938	2.938	3.098	0.58	16.3	7.90	129.1	0.280	0.924	0.2482	*******			
376	30.840	29.51	29.8252	1.30	120	0.08	30.88	1.852	1.789	1.794	177.3	171.3	171.8	2,826	125	4.711	15.9	1.040	2.947	2.946	2.946	2.946	3.106	0.58	16.1	8.00	128.8	0.279	0.923	0.2483	*******			
377	30.922	28.42	28.7767	1.31	120	0.08	30.96	1.857	1.792	1.797	177.8	171.6	172.0	2,721	126	4.943	15.2	1.048	2.975	2.974	2.974	2.974	3.134	0.57	15.4	8.36	129.0	0.280	0.922	0.2485	*******			
378	31.004	27.11	27.5052	1.30	120	0.08	31.04	1.861	1.794	1.799	178.3	171.8	172.3	2,596	124	5.133	14.4	1.057	3.005	3.004	3.004	3.004	3.164	0.57	14.6	8.75	128.0	0.275	0.922	0.2486	*******			
379	31.086	25.67	26.0728	1.27	120	0.08	31.13	1.866	1.796	1.801	178.7	172.0	172.5	2,458	122	5.340	13.5	1.067	3.037	3.037	3.037	3.037	3.197	0.57	13.8	9.20	126.5	0.268	0.921	0.2488	*******			
380	31.168	25.19	25.5757	1.16	120	0.08	31.21	1.871	1.799	1.804	179.2	172.2	172.7	2,412	111	4.975	13.2	1.063	3.024	3.024	3.023	3.023	3.183	0.57	13.5	9.02	121.8	0.248	0.920	0.2489	*******			
381	31.250	23.83	24.1967	1.07	120	0.08	31.29	1.876	1.801	1.806	179.7	172.5	172.9	2,282	103	4.888	12.4	1.068	3.041	3.040	3.040	3.040	3.200	0.57	12.7	9.25	117.7	0.232	0.920	0.2491	*******			
382	31.332	23.21	23.5607	0.99	120	0.08	31.37	1.881	1.803	1.808	180.1	172.7	173.2	2,223	95	4.628	12.0	1.067	3.036	3.035	3.035	3.035	3.195	0.56	12.4	9.19	113.8	0.217	0.919	0.2492	*******			
383	31.414	22.83	23.175	0.99	120	0.08	31.45	1.886	1.806	1.811	180.6	172.9	173.4	2,186	95	4.746	11.8	1.071	3.050	3.050	3.050	3.050	3.210	0.56	12.1	9.38	113.9	0.217	0.918	0.2494	*******			
384	31.496	22.91	23.2593	1.08	120	0.08	31.54	1.891	1.808	1.813	181.1	173.2	173.6	2,194	103	5.119	11.7	1.077	3.071	3.071	3.071	3.071	3.231	0.56	12.1	9.68	117.4	0.230	0.918	0.2495	*******			
385	31.578	23.27	23.6183	1.13	120	0.08	31.62	1.896	1.811	1.815	181.6	173.4	173.8	2,228	108	5.287	11.9	1.078	3.075	3.074	3.074	3.074	3.234	0.56	12.3	9.74	119.6	0.239	0.917	0.2497	*******			
386	31.660	25.26	25.597	1.13	120	0.08	31.70	1.901	1.813	1.818	182.0	173.6	174.1	2,419	108	4.837	13.1	1.061	3.018	3.017	3.017	3.017	3.177	0.56	13.4	8.94	120.1	0.241	0.916	0.2498	*******			
387	31.742	28.26	28.602	1.08	120	0.08	31.78	1.906	1.815	1.820	182.5	173.8	174.3	2,706	103	4.090	15.0	1.034	2.927	2.926	2.926	2.926	3.086	0.57	15.2	7.75	118.2	0.234	0.916	0.2499	*******			
388	31.824	34.3	34.6378	1.03	120	0.08	31.86	1.911	1.818	1.823	183.0	174.1	174.5	3,285	98	3.168	18.9	0.990	2.781	2.779	2.779	2.779	2.939	0.58	18.9	6.09	115.2	0.222	0.915	0.2501	*******			
389	31.906	42.28	42.5685	1.08	120	0.08	31.95	1.916	1.820	1.825	183.4	174.3	174.7	4,049	103	2.681	24.0	0.952	2.654	2.652	2.652	2.652	2.812	0.60	23.8	4.89	116.3	0.226	0.914	0.2502	*******			
390	31.988	49.47	49.6844	1.14	120	0.08	32.03	1.920	1.822	1.827	183.9	174.5	175.0	4,737	109	2.395	28.7	0.924	2.564	2.561	2.561	2.561	2.721	0.60	28.2	4.15	117.2	0.230	0.914	0.2503	*******			
391	32.070	45.9	46.0473	1.20	120	0.08	32.11	1.925	1.825	1.830	184.4	174.7	175.2	4,395	114	2.717	26.2	0.944	2.628	2.626	2.626	2.626	2.786	0.60	25.9	4.67	120.7	0.244	0.913	0.2505	*******			
392	32.152	64.34	64.4665	1.55	120	0.08	32.19	1.930	1.827	1.832	184.8	175.0	175.4	6,161	149	2.488	38.1	0.899	2.479	2.477	2.477	2.477	2.637	0.61	37.1	3.56	132.1	0.294	0.912	0.2506	*******			
393	32.234	72.41	72.4868	1.72	120	0.08	32.27	1.935	1.829	1.834	185.3	175.2	175.7	6,934	164	2.433	43.4	0.884	2.431	2.428	2.428	2.428	2.588	0.61	42.1	3.25	136.9	0.319	0.912	0.2507	1.31	0.003	0.001	
394	32.316	74.2	74.2684	1.74	120	0.08	32.36	1.940	1.832	1.837	185.8	175.4	175.9	7,105	167	2.411	44.5	0.881	2.420	2.417	2.417	2.417	2.577	0.62	43.1	3.19	137.5	0.322	0.911	0.2509	1.33	0.003	0.001	
395	32.398	75.83	75.9359	1.72	120	0.08	32.44	1.945	1.834	1.839	186.3	175.6	176.1	7,261	165	2.327	45.6	0.876	2.402	2.399	2.399	2.399	2.559	0.62	44.2	3.08	136.2	0.315	0.910	0.2510	1.30	0.003	0.001	
396	32.480	75.22	75.3843	1.78	120	0.08	32.52	1.950	1.837	1.841	186.7	175.9	176.3	7,203	171	2.432	45.1	0.881	2.418	2.416	2.416	2.416	2.576	0.61	43.6	3.18	138.8	0.329	0.910	0.2511	1.35	0.003	0.001	
397	32.562	83.11	83.3674	1.89	120	0.08	32.60	1.955	1.839	1.844	187.2	176.1	176.6	7,959	181	2.330	50.3	0.866	2.371	2.368	2.368	2.368	2.528	0.62	48.5	2.91	141.4	0.343	0.909	0.2513	> 1.4			
398	32.644	100.07	100.304	2.10	120	0.08	32.68	1.960	1.841	1.846	187.7	176.3	176.8	9,583	201	2.140	61.7	0.839	2.281	2.278	2.277	2.277	2.437	0.63	59.3	2.47	146.5	0.373	0.908	0.2514	> 1.4			
399	32.726	111.06	111.259	2.05	120	0.08	32.77	1.965	1.844	1.848	188.1	176.5	177.0	10,635	196	1.879	69.4	0.816	2.205	2.202	2.201	2.201	2.361	0.63	66.6	2.16	143.9	0.357	0.908	0.2515	> 1.4			
400	32.808	120.14	120.314	1.76	120	0.08	32.85	1.970	1.846	1.851	188.6	176.8	177.2	11,505	169	1.490	76.4	0.787	2.107	2.103	2.103	2.103	2.263	0.64	73.1	1.84	134.2	0.305	0.907	0.2516	1.25	0.003	0.001	
401	32.890	129.63	129.769	1.48	120	0.08	32.93	1.975	1.848	1.853	189.1	177.0	177.5	12,413	141	1.156	83.9	0.756	2.004	2.000	2.000	2.000	2.160	0.65	80.2	1.57	126.2	0.267	0.906	0.2517	1.10	0.006	0.003	
402	32.972	140.72	140.847	1.39	120	0.08	33.01	1.980	1.851	1.856	189.6	177.2	177.7	13,475	133	1.003	92.2	0.735	1.934	1.929	1.929	1.929	2.089	0.66	88.0	1.44	126.3	0.267	0.906	0.2519	1.10	0.006	0.003	
403	33.054	155.9	155.983	1.41	120	0.08	33.10	1.984	1.853	1.858	190.0	177.4	177.9	14,929	135	0.913	103.4	0.715	1.870	1.865	1.865	1.865	2.025	0.67	98.5	1.33	131.4	0.291	0.905	0.2520	1.19	0.006	0.002	
404	33.136	155.71	155.79	1.78	120	0.08	33.18	1.989	1.855	1.860	190.5	177.7	178.1	14,911	170	1.157	101.9	0.737	1.940	1.936	1.936	1.936	2.096	0.66	97.1	1.45	140.6	0.338	0.904	0.2521	1.39	0.003	0.001	
405	33.218	160.74	160.784	2.10	120	0.08	33.26	1.994	1.858	1.863	191.0	177.9	178.4	15,392	201	1.323	104.6	0.746	1.971	1.967	1.967	1.967	2.127	0.66	99.6	1.51	150.0	0.394	0.904	0.2522	> 1.4			
406	33.300	158.97	159.021	2.27	120	0.08	33.34	1.999	1.860	1.865	191.4	178.1	178.6	15,223	217	1.445	102.8	0.756	2.003	1.999	1.999	1.999	2.159	0.65	97.9	1.57	153.8	0.419	0.903	0.2523	> 1.4			
407	33.382	150.98	151.039	2.37	120	0.08	33.42	2.004	1.863	1.867	191.9	178.4	178.8	14,458	227	1.590	96.6	0.770	2.050	2.047	2.047	2.047	2.207	0.65	92.1	1.68	155.1	0.427	0.902	0.2524	> 1.4			
408	33.464	138.8	138.862	2.35	120	0.08	33.51	2.009	1.865	1.870	192.4	178.6	179.0	13,291	225	1.721	87.8	0.786	2.104	2.101	2.100	2.100	2.260	0.64	83.8	1.83	153.3	0.415	0.902	0.2526	> 1.4			
409	33.546	119.26	119.32	2.38	120	0.08	33.59	2.014	1.867	1.872	192.9	178.8	179.3	11,420	228	2.032	73.9	0.817	2.208	2.205	2.205	2.205	2.365	0.63	70.7	2.17	153.7	0.418	0.901	0.2527	> 1.4			
410	33.628	101.89	101.944	2.45	120	0.08	33.67	2.019	1.870	1.874	193.3	179.0	179.5	9,757	235	2.456	61.6	0.852	2.322	2.319	2.319	2.319	2.479	0.61	59.2	2.66	157.5	0.444	0.900	0.2528	> 1.4			
411	33.710	79.48	79.5269	2.38	120	0.08	33.75	2.024	1.872	1.877	193.8	179.3	179.7	7,611	228	3.074	46.4	0.898	2.477	2.475	2.475	2.475	2.635	0.60	44.9	3.54	159.1	0.455	0.900	0.2529	*******			
412	33.792	66.22	66.265	2.17	120	0.08	33.83	2.029	1.874	1.879	194.3	179.5	179.9	6,341	208	3.387	37.8	0.926	2.571	2.568	2.568	2.568	2.728	0.59	36.8	4.21	154.6	0.424	0.899	0.2530	*******			
413	33.874	54.05	54.0956	2.01	120	0.08	33.92	2.034	1.877	1.882	194.7	179.7	180.2	5,176	193	3.872	30.0	0.960	2.684	2.682	2.682	2.682	2.842	0.58	29.4	5.15	151.3	0.402	0.898	0.2531	*******			
414	33.956	47.07	47.1199	1.96	120	0.08	34.00	2.039	1.879	1.884	195.2	179.9	180.4	4,507	188	4.357	25.6	0.986	2.769	2.768	2.768	2.768	2.928	0.57	25.2	5.97	150.4	0.397	0.898	0.2532	*******			
415	34.038	43.6	43.6684	1.90	120	0.08	34.08	2.044	1.881	1.886	195.7	180.2	180.6	4,175	182	4.579	23.4	0.999	2.812	2.811	2.811	2.811	2.971	0.56	23.1	6.42	148.6	0.385	0.897	0.2533	*******			
416	34.120	44.52	44.5953	1.64	120	0.08	34.16	2.048	1.884	1.889	196.2	180.4	180.9	4,263	157	3.854	24.1	0.981	2.753	2.751	2.751	2.751	2.911	0.57	23.8	5.81	138.4	0.326	0.896	0.2534	*******			
417	34.202	46.18	46.2624	1.56	120	0.08	34.24	2.053	1.886	1.891	196.6	180.6	181.1	4,422	149	3.538	25.2	0.970	2.714	2.712	2.712	2.712	2.872	0.57	24.9	5.43	135.0	0.309	0.896	0.2535	*******			
418	34.284	41.79	41.8839	1.50	120	0.08	34.33	2.058	1.888	1.893	197.1	180.8	181.3	4,002	144	3.773	22.5	0.987	2.770	2.769	2.769	2.769	2.929	0.56	22.2	5.98	133.1	0.299	0.895	0.2536	*******			
419	34.366	39.89	39.9943	1.53	120	0.08	34.41	2.063	1.891	1.896	197.6	181.1	181.5	3,820	147	4.045	21.2	0.998	2.809	2.807	2.807	2.807	2.967	0.56	21.1	6.38	134.5	0.306	0.894	0.2537	*******			
420	34.448	37.68	37.7961	1.34	120	0.08	34.49	2.068	1.893	1.898	198.0	181.3	181.8	3,608	128	3.754	19.9	0.998	2.808	2.807	2.806	2.806	2.966	0.56	19.9	6.38	126.8	0.270	0.894	0.2538	*******			
421	34.530	41.17	41.305	1.33	120	0.08	34.57	2.073	1.896	1.900	198.5	181.5	182.0	3,942	127	3.404	22.1	0.979	2.747	2.745	2.745	2.745	2.905	0.56	21.9	5.75	126.0	0.266	0.893	0.2539	*******			
422	34.612	77.63	77.8199	1.82	120	0.08	34.65	2.078	1.898	1.903	199.0	181.7	182.2	7,434	174	2.404	45.3	0.879	2.413	2.410	2.410	2.410	2.570	0.60	43.8	3.15	137.8	0.323	0.892	0.2540	1.32	0.003	0.001	
423	34.694	105.67	105.883	2.42	120	0.08	34.74	2.083	1.900	1.905	199.5	182.0	182.4	10,119	231	2.333	63.4	0.844	2.297	2.294	2.294	2.294	2.454	0.61	60.8	2.55	154.7	0.425	0.892	0.2541	> 1.4			
424	34.776	123.67	123.812	2.83	120	0.08	34.82	2.088	1.903	1.908	199.9	182.2	182.7	11,843	271	2.324	75.1	0.828	2.244	2.240	2.240	2.240	2.400	0.61	71.7	2.31	166.0	0.505	0.891	0.2542	> 1.4			
425	34.859	109.3	109.403	2.67	120	0.08	34.90	2.093	1.905	1.910	200.4	182.4	182.9	10,467	255	2.489	65.4	0.847	2.307	2.304	2.304	2.304	2.464	0.61	62.6	2.59	162.3	0.478	0.890	0.2543	> 1.4			
426	34.941	75.03	75.1359	2.47	120	0.08	34.98	2.098	1.907	1.912	200.9	182.6	183.1	7,185	237	3.389	42.7	0.915	2.533	2.530	2.530	2.530	2.690	0.58	41.3	3.93	162.0	0.475	0.890	0.2544	*******			
427	35.023	55.92	56.0669	2.19	120	0.08	35.06	2.103	1.910	1.915	201.3	182.9	183.3	5,355	210	4.077	30.5	0.963	2.693	2.691	2.691	2.691	2.851	0.56	29.9	5.23	156.2	0.435	0.889	0.2545	*******			
428	35.105	44.54	44.8465	2.23	120	0.08	35.15	2.108	1.912	1.917	201.8	183.1	183.6	4,265	213	5.244	23.4	1.011	2.852	2.851	2.850	2.850	3.010	0.55	23.1	6.86	158.4	0.449	0.888	0.2546	*******			
429	35.187	44.26	44.7628	1.72	120	0.08	35.23	2.112	1.914	1.919	202.3	183.3	183.8	4,238	165	4.079	23.5	0.989	2.777	2.776	2.775	2.775	2.935	0.56	23.2	6.05	140.5	0.338	0.888	0.2547	*******			
430	35.269	48.18	48.8972	1.58	120	0.08	35.31	2.117	1.917	1.922	202.8	183.6	184.0	4,614	151	3.428	26.0	0.964	2.694	2.692	2.692	2.692	2.852	0.56	25.6	5.25	134.4	0.306	0.887	0.2547	*******			
431	35.351	54.75	55.6375	1.60	120	0.08	35.39	2.122	1.919	1.924	203.2	183.8	184.2	5,243	153	3.040	30.2	0.939	2.612	2.610	2.610	2.610	2.770	0.57	29.5	4.53	133.8	0.303	0.886	0.2548	*******			
432	35.433	70.45	71.3576	1.71	120	0.08	35.47	2.127	1.922	1.926	203.7	184.0	184.5	6,746	164	2.504	40.2	0.894	2.463	2.460	2.460	2.460	2.620	0.59	39.0	3.45	134.5	0.306	0.886	0.2549	*******			
433	35.515	83.87	84.2219	1.97	120	0.08	35.56	2.132	1.924	1.929	204.2	184.2	184.7	8,031	189	2.415	48.7	0.872	2.391	2.388	2.387	2.387	2.547	0.59	46.9	3.02	141.8	0.345	0.885	0.2550	> 1.4			
434	35.597	79.69	79.9492	2.17	120	0.08	35.64	2.137	1.926	1.931	204.6	184.5	184.9	7,631	208	2.796	45.7	0.891	2.454	2.451	2.451	2.451	2.611	0.59	44.1	3.40	149.6	0.392	0.884	0.2551	*******			
435	35.679	72.78	72.9744	2.37	120	0.08	35.72	2.142	1.929	1.933	205.1	184.7	185.1	6,969	227	3.352	40.9	0.918	2.543	2.540	2.540	2.540	2.700	0.58	39.5	4.00	158.1	0.448	0.884	0.2552	*******			
436	35.761	69.04	69.2096	2.23	120	0.08	35.80	2.147	1.931	1.936	205.6	184.9	185.4	6,611	213	3.331	38.5	0.923	2.560	2.557	2.557	2.557	2.717	0.57	37.4	4.12	154.0	0.419	0.883	0.2552	*******			
437	35.843	71.56	71.7096	2.05	120	0.08	35.88	2.152	1.933	1.938	206.1	185.1	185.6	6,853	196	2.948	40.3	0.908	2.509	2.507	2.507	2.506	2.666	0.58	39.0	3.76	146.7	0.374	0.882	0.2553	*******			
438	35.925	74.86	75.0026	2.04	120	0.08	35.97	2.157	1.936	1.941	206.5	185.4	185.8	7,169	196	2.809	42.4	0.899	2.479	2.476	2.476	2.476	2.636	0.58	41.0	3.55	145.8	0.368	0.882	0.2554	*******			
439	36.007	81.13	81.2637	1.97	120	0.08	36.05	2.162	1.938	1.943	207.0	185.6	186.1	7,769	188	2.490	46.6	0.879	2.414	2.411	2.411	2.411	2.571	0.59	44.9	3.15	141.6	0.344	0.881	0.2555	1.39	0.003	0.001	
440	36.089	78.31	78.4292	1.92	120	0.08	36.13	2.167	1.940	1.945	207.5	185.8	186.3	7,499	183	2.516	44.8	0.884	2.430	2.427	2.427	2.427	2.587	0.58	43.2	3.25	140.2	0.336	0.880	0.2556	1.36	0.003	0.001	
441	36.171	67.08	67.1814	1.88	120	0.08	36.21	2.171	1.943	1.948	207.9	186.0	186.5	6,424	180	2.890	37.4	0.913	2.528	2.525	2.525	2.525	2.685	0.57	36.3	3.89	141.1	0.341	0.880	0.2556	*******			
442	36.253	54.47	54.56	1.78	120	0.08	36.29	2.176	1.945	1.950	208.4	186.3	186.7	5,216	171	3.412	29.4	0.951	2.653	2.651	2.651	2.651	2.811	0.56	28.8	4.88	140.3	0.337	0.879	0.2557	*******			
443	36.335	46.5	46.5798	1.74	120	0.08	36.38	2.181	1.948	1.952	208.9	186.5	187.0	4,453	167	3.924	24.4	0.981	2.753	2.751	2.751	2.751	2.911	0.55	24.1	5.81	139.9	0.335	0.878	0.2558	*******			
444	36.417	40.75	40.8234	1.67	120	0.08	36.46	2.186	1.950	1.955	209.4	186.7	187.2	3,902	160	4.328	20.9	1.005	2.832	2.830	2.830	2.830	2.990	0.54	20.8	6.63	137.8	0.324	0.878	0.2558	*******			
445	36.499	38.7	38.7724	1.58	120	0.08	36.54	2.191	1.952	1.957	209.8	186.9	187.4	3,706	151	4.322	19.7	1.011	2.851	2.849	2.849	2.849	3.009	0.54	19.6	6.84	134.5	0.306	0.877	0.2559	*******			
446	36.581	37.75	37.8269	1.58	120	0.08	36.62	2.196	1.955	1.959	210.3	187.2	187.6	3,615	151	4.433	19.1	1.016	2.868	2.866	2.866	2.866	3.026	0.53	19.1	7.04	134.3	0.305	0.876	0.2560	*******			
447	36.663	38.22	38.3023	1.45	120	0.08	36.70	2.201	1.957	1.962	210.8	187.4	187.9	3,660	139	4.028	19.5	1.006	2.835	2.834	2.833	2.833	2.993	0.54	19.4	6.67	129.5	0.282	0.876	0.2561	*******			
448	36.745	34.38	34.4573	1.35	120	0.08	36.79	2.206	1.959	1.964	211.2	187.6	188.1	3,292	129	4.193	17.2	1.022	2.887	2.886	2.886	2.886	3.046	0.53	17.3	7.27	125.5	0.264	0.875	0.2561	*******			
449	36.827	31.51	31.5753	1.19	120	0.08	36.87	2.211	1.962	1.967	211.7	187.8	188.3	3,017	114	4.072	15.6	1.029	2.913	2.911	2.911	2.911	3.071	0.53	15.7	7.57	119.1	0.237	0.874	0.2562	*******			
450	36.909	29.59	29.6529	1.12	120	0.08	36.95	2.216	1.964	1.969	212.2	188.1	188.5	2,834	107	4.095	14.5	1.037	2.939	2.938	2.938	2.938	3.098	0.53	14.7	7.90	116.0	0.225	0.874	0.2563	*******			
451	36.991	31.86	31.9196	0.97	120	0.08	37.03	2.221	1.966	1.971	212.7	188.3	188.8	3,051	93	3.259	15.9	1.009	2.846	2.844	2.844	2.844	3.004	0.53	16.1	6.79	109.0	0.201	0.873	0.2563	*******			
452	37.073	35.55	35.605	0.90	120	0.08	37.11	2.226	1.969	1.974	213.1	188.5	189.0	3,404	87	2.713	18.2	0.981	2.752	2.749	2.749	2.749	2.909	0.54	18.2	5.79	105.5	0.189	0.872	0.2564	*******			
453	37.155	40.23	40.2796	0.79	120	0.08	37.20	2.231	1.971	1.976	213.6	188.8	189.2	3,852	75	2.071	21.2	0.944	2.629	2.626	2.626	2.626	2.786	0.55	21.1	4.66	98.4	0.168	0.872	0.2564	*******			
454	37.237	44.89	44.9378	0.84	120	0.08	37.28	2.235	1.973	1.978	214.1	189.0	189.4	4,299	81	1.979	24.1	0.927	2.573	2.570	2.570	2.570	2.730	0.56	23.8	4.22	100.2	0.174	0.871	0.2565	*******			
455	37.319	57.93	57.9735	1.22	120	0.08	37.36	2.240	1.976	1.981	214.5	189.2	189.7	5,547	117	2.193	31.8	0.906	2.504	2.501	2.501	2.501	2.661	0.57	31.0	3.72	115.4	0.223	0.870	0.2566	*******			
456	37.401	76.41	76.4522	1.83	120	0.08	37.44	2.245	1.978	1.983	215.0	189.4	189.9	7,317	175	2.462	42.9	0.886	2.437	2.434	2.434	2.434	2.594	0.57	41.4	3.29	136.2	0.315	0.870	0.2566	1.27	0.003	0.001	
457	37.483	85.52	85.5531	1.81	120	0.08	37.52	2.250	1.981	1.985	215.5	189.7	190.1	8,189	173	2.169	48.9	0.863	2.359	2.355	2.355	2.355	2.515	0.58	47.0	2.85	133.7	0.302	0.869	0.2567	1.22	0.003	0.001	
458	37.565	65.51	65.5446	1.75	120	0.08	37.61	2.255	1.983	1.988	216.0	189.9	190.3	6,273	168	2.771	35.9	0.914	2.529	2.526	2.526	2.526	2.686	0.56	34.8	3.90	135.6	0.312	0.868	0.2567	*******			
459	37.647	51.42	51.4565	1.68	120	0.08	37.69	2.260	1.985	1.990	216.4	190.1	190.6	4,924	161	3.424	27.0	0.960	2.682	2.679	2.679	2.679	2.839	0.55	26.5	5.13	135.8	0.313	0.868	0.2568	*******			
460	37.729	41.95	42.0426	1.57	120	0.08	37.77	2.265	1.988	1.993	216.9	190.3	190.8	4,017	150	3.951	21.3	0.995	2.800	2.798	2.798	2.798	2.958	0.53	21.1	6.29	132.8	0.298	0.867	0.2569	*******			
461	37.811	40.26	40.4075	1.38	120	0.08	37.85	2.270	1.990	1.995	217.4	190.6	191.0	3,855	132	3.627	20.4	0.992	2.790	2.788	2.788	2.788	2.948	0.53	20.3	6.19	125.4	0.264	0.866	0.2569	*******			
462	37.893	41.1	41.3017	1.17	120	0.08	37.93	2.275	1.992	1.997	217.8	190.8	191.3	3,936	112	3.001	21.1	0.974	2.728	2.725	2.725	2.725	2.885	0.54	20.9	5.55	116.2	0.226	0.866	0.2570	*******			
463	37.975	37.75	37.9686	0.84	120	0.08	38.02	2.280	1.995	2.000	218.3	191.0	191.5	3,615	81	2.374	19.4	0.964	2.696	2.693	2.693	2.693	2.853	0.54	19.3	5.25	101.4	0.177	0.865	0.2570	*******			
464	38.057	35.11	35.4029	0.81	120	0.08	38.10	2.285	1.997	2.002	218.8	191.2	191.7	3,362	77	2.455	17.8	0.975	2.734	2.732	2.732	2.731	2.891	0.54	17.8	5.62	100.0	0.173	0.864	0.2571	*******			
465	38.139	39.04	39.4251	1.08	120	0.08	38.18	2.290	1.999	2.004	219.3	191.5	191.9	3,738	103	2.931	19.9	0.978	2.742	2.740	2.740	2.740	2.900	0.54	19.8	5.69	112.5	0.212	0.864	0.2571	*******			
466	38.221	47.05	47.5382	1.15	120	0.08	38.26	2.295	2.002	2.007	219.7	191.7	192.2	4,506	111	2.578	24.7	0.945	2.634	2.631	2.631	2.631	2.791	0.55	24.3	4.71	114.3	0.219	0.863	0.2572	*******			
467	38.303	52.31	52.7957	1.12	120	0.08	38.34	2.299	2.004	2.009	220.2	191.9	192.4	5,009	107	2.238	28.0	0.921	2.553	2.550	2.550	2.550	2.710	0.55	27.4	4.07	111.4	0.209	0.862	0.2572	*******			
468	38.385	49.3	49.7321	1.24	120	0.08	38.43	2.304	2.007	2.011	220.7	192.1	192.6	4,721	118	2.628	25.9	0.942	2.622	2.620	2.619	2.619	2.779	0.55	25.4	4.61	117.3	0.230	0.862	0.2573	*******			
469	38.467	45.64	46.3293	1.71	120	0.08	38.51	2.309	2.009	2.014	221.1	192.4	192.8	4,370	164	3.946	23.2	0.987	2.772	2.770	2.770	2.770	2.930	0.53	22.9	6.00	137.0	0.319	0.861	0.2573	*******			
470	38.549	48.35	49.4168	1.74	120	0.08	38.59	2.314	2.011	2.016	221.6	192.6	193.1	4,630	167	3.788	24.8	0.977	2.739	2.737	2.737	2.737	2.897	0.53	24.3	5.66	137.9	0.324	0.860	0.2574	*******			
471	38.631	52.12	53.4354	1.68	120	0.08	38.67	2.319	2.014	2.018	222.1	192.8	193.3	4,991	161	3.375	27.1	0.958	2.677	2.674	2.674	2.674	2.834	0.54	26.5	5.08	134.8	0.308	0.860	0.2574	*******			
472	38.713	61.97	62.8851	1.67	120	0.08	38.75	2.324	2.016	2.021	222.5	193.0	193.5	5,934	160	2.805	33.2	0.922	2.558	2.555	2.555	2.555	2.715	0.55	32.2	4.11	132.4	0.296	0.859	0.2575	*******			
473	38.795	51.85	53.0387	1.65	120	0.08	38.84	2.329	2.018	2.023	223.0	193.3	193.7	4,965	158	3.330	26.9	0.958	2.675	2.673	2.673	2.673	2.833	0.54	26.3	5.07	133.5	0.301	0.858	0.2575	*******			
474	38.877	48.77	50.002	1.58	120	0.08	38.92	2.334	2.021	2.026	223.5	193.5	194.0	4,670	151	3.400	25.0	0.967	2.705	2.702	2.702	2.702	2.862	0.53	24.6	5.34	131.3	0.291	0.858	0.2575	*******			
475	38.960	42.94	44.3085	1.46	120	0.08	39.00	2.339	2.023	2.028	224.0	193.7	194.2	4,112	140	3.589	21.6	0.986	2.769	2.766	2.766	2.766	2.926	0.53	21.4	5.96	127.4	0.272	0.857	0.2576	*******			
476	39.042	41.63	43.1362	1.39	120	0.08	39.08	2.344	2.025	2.030	224.4	194.0	194.4	3,986	133	3.533	20.8	0.988	2.776	2.774	2.774	2.774	2.934	0.53	20.7	6.04	124.7	0.260	0.856	0.2576	*******			
477	39.124	42.67	44.1811	1.32	120	0.08	39.16	2.349	2.028	2.033	224.9	194.2	194.6	4,086	126	3.264	21.5	0.978	2.744	2.742	2.741	2.741	2.901	0.53	21.3	5.71	121.6	0.247	0.856	0.2577	*******			
478	39.206	40.95	42.3219	1.19	120	0.08	39.25	2.354	2.030	2.035	225.4	194.4	194.9	3,921	114	3.078	20.6	0.978	2.743	2.741	2.740	2.740	2.900	0.53	20.4	5.70	116.4	0.227	0.855	0.2577	*******			
479	39.288	40.55	41.8447	1.21	120	0.08	39.33	2.358	2.032	2.037	225.8	194.6	195.1	3,883	116	3.173	20.3	0.982	2.756	2.754	2.753	2.753	2.913	0.53	20.1	5.83	117.4	0.231	0.854	0.2577	*******			
480	39.370	41.25	42.7807	1.29	120	0.08	39.41	2.363	2.035	2.040	226.3	194.9	195.3	3,950	123	3.312	20.6	0.984	2.762	2.760	2.760	2.760	2.920	0.52	20.4	5.89	120.5	0.243	0.854	0.2577	*******			
481	39.452	40.76	42.5105	1.28	120	0.08	39.49	2.368	2.037	2.042	226.8	195.1	195.5	3,903	123	3.342	20.3	0.986	2.770	2.768	2.767	2.767	2.927	0.52	20.1	5.97	120.3	0.242	0.853	0.2577	*******			
482	39.534	39.88	41.2997	1.22	120	0.08	39.57	2.373	2.040	2.044	227.3	195.3	195.8	3,819	117	3.261	19.8	0.987	2.772	2.769	2.769	2.769	2.929	0.52	19.7	5.99	117.8	0.232	0.852	0.2578	*******			
483	39.616	38.95	40.5173	1.11	120	0.08	39.66	2.378	2.042	2.047	227.7	195.5	196.0	3,730	106	3.038	19.3	0.983	2.761	2.758	2.758	2.758	2.918	0.52	19.2	5.88	113.1	0.214	0.852	0.2578	*******			
484	39.698	38.11	39.8926	1.11	120	0.08	39.74	2.383	2.044	2.049	228.2	195.8	196.2	3,649	107	3.118	18.8	0.988	2.777	2.775	2.775	2.775	2.935	0.52	18.7	6.04	113.3	0.215	0.851	0.2578	*******			
485	39.780	38.14	40.0486	1.09	120	0.08	39.82	2.388	2.047	2.052	228.7	196.0	196.5	3,652	105	3.060	18.8	0.987	2.772	2.769	2.769	2.769	2.929	0.52	18.8	5.99	112.3	0.212	0.850	0.2579	*******			
486	39.862	40.92	42.9967	1.08	120	0.08	39.90	2.393	2.049	2.054	229.1	196.2	196.7	3,918	104	2.808	20.5	0.971	2.720	2.718	2.717	2.717	2.877	0.53	20.3	5.48	111.3	0.208	0.850	0.2579	*******			
487	39.944	41.28	43.2136	1.17	120	0.08	39.98	2.398	2.051	2.056	229.6	196.4	196.9	3,953	112	3.004	20.6	0.976	2.737	2.734	2.734	2.734	2.894	0.52	20.4	5.64	115.0	0.221	0.849	0.2579	*******			
488	40.026	41.61	43.3119	1.05	120	0.08	40.07	2.403	2.054	2.059	230.1	196.7	197.1	3,985	101	2.688	20.9	[illegible]	2.702	2.699	2.699	2.699	2.859	0.53	20.7	5.31	109.8	0.203	0.848	0.2580	*******			
489	40.108	38.26	39.8267	0.86	120	0.08	40.15	2.408	2.056	2.061	230.6	196.9	197.4	3,664	82	2.390	19.1	0.966	2.703	2.700	2.700	2.700	2.860	0.53	19.0	5.32	100.9	0.176	0.848	0.2580	*******			
490	40.190	37.51	38.9171	0.78	120	0.08	40.23	2.413	2.058	2.063	231.0	197.1	197.6	3,592	75	2.228	18.7	0.963	2.692	2.689	2.689	2.689	2.849	0.53	18.6	5.22	97.2	0.165	0.847	0.2580	*******			
491	40.272	34.03	35.532	0.81	120	0.08	40.31	2.418	2.061	2.066	231.5	197.3	197.8	3,259	78	2.562	16.5	0.986	2.770	2.767	2.767	2.767	2.927	0.52	16.6	5.97	99.3	0.171	0.846	0.2581	*******			
492	40.354	33.66	35.2774	0.89	120	0.08	40.39	2.422	2.063	2.068	232.0	197.6	198.0	3,223	85	2.852	16.2	0.997	2.804	2.802	2.802	2.802	2.962	0.51	16.3	6.33	103.3	[illegible]	0.846	0.2581	*******			
493	40.436	34.38	36.0379	0.89	120	0.08	40.48	2.427	2.066	2.070	232.4	197.8	198.3	3,292	85	2.779	16.6	0.992	2.789	2.787	2.787	2.786	2.946	0.51	16.7	6.17	103.0	0.182	0.845	0.2581	*******			
494	40.518	34.56	36.1974	0.88	120	0.08	40.56	2.432	2.068	2.073	232.9	198.0	198.5	3,309	84	2.736	16.7	0.990	2.783	2.781	2.780	2.780	2.940	0.51	16.8	6.10	102.5	0.180	0.844	0.2582	*******			
495	40.600	32.45	34.1687	0.99	120	0.08	40.64	2.437	2.070	2.075	233.4	198.2	198.7	3,107	94	3.285	15.4	1.013	2.860	2.858	2.858	2.858	3.018	0.51	15.5	6.94	107.6	0.196	0.844	0.2582	*******			
496	40.682	30.94	32.7243	1.18	120	0.08	40.72	2.442	2.073	2.077	233.9	198.5	198.9	2,963	113	4.151	14.3	[illegible]	2.946	2.945	2.945	2.945	3.105	0.50	14.5	7.98	115.8	0.224	0.843	0.2582	*******			
497	40.764	31.81	33.7376	1.24	120	0.08	40.80	2.447	2.075	2.080	234.3	198.7	199.2	3,046	119	4.220	14.7	1.038	2.941	2.939	2.939	2.939	3.099	0.50	14.9	7.91	118.0	0.233	0.842	0.2583	*******			
498	40.846	41.24	42.8903	1.14	120	0.08	40.89	2.452	2.077	2.082	234.8	198.9	199.4	3,949	109	2.931	20.3	0.975	2.734	2.732	2.731	2.731	2.891	0.52	20.1	5.61	113.1	0.214	0.842	0.2583	*******			
499	40.928	41.43	43.1629	1.04	120	0.08	40.97	2.457	2.080	2.085	235.3	199.2	199.6	3,967	100	2.669	20.5	0.967	2.706	2.703	2.703	2.703	2.863	0.52	20.3	5.35	108.6	0.199	0.841	0.2583	*******			

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	* σ'_{vo} tsf	** σ'_{vo} tsf	σ_{vo} kPa	* σ'_{vo} kPa	** σ'_{vo} kPa	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. corection q_{c1N}	Kc	clean sand correction $(q_{c1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
500	41.010	50.42	51.4037	1.26	120	0.08	41.05	2.462	2.082	2.087	235.7	199.4	199.8	4,828	121	2.636	25.6	0.943	2.627	2.624	2.624	2.624	2.784	0.53	25.1	4.65	116.7	0.228	0.840	0.2583	*******			
501	41.092	58.57	59.9093	1.57	120	0.08	41.13	2.467	2.084	2.089	236.2	199.6	200.1	5,609	151	2.802	30.2	0.932	2.589	2.586	2.585	2.585	2.745	0.53	29.4	4.34	127.4	0.272	0.840	0.2583	*******			
502	41.174	62.76	63.4985	1.43	120	0.08	41.22	2.472	2.087	2.092	236.7	199.8	200.3	6,010	137	2.365	32.9	0.909	2.513	2.510	2.509	2.509	2.669	0.54	31.9	3.78	120.6	0.243	0.839	0.2583	*******			
503	41.256	55.83	56.2018	1.27	120	0.08	41.30	2.477	2.089	2.094	237.2	200.1	200.5	5,346	122	2.380	28.8	0.923	2.560	2.556	2.556	2.556	2.716	0.53	28.1	4.11	115.6	0.224	0.838	0.2584	*******			
504	41.338	65.64	66.0755	1.69	120	0.08	41.38	2.482	2.092	2.096	237.6	200.3	200.7	6,286	162	2.676	34.3	0.915	2.534	2.531	2.530	2.530	2.690	0.54	33.2	3.93	130.3	0.286	0.838	0.2584	*******			
505	41.420	138.29	138.61	2.60	120	0.08	41.46	2.486	2.094	2.099	238.1	200.5	201.0	13,243	249	1.914	79.5	0.805	2.167	2.162	2.162	2.162	2.322	0.58	75.3	2.02	152.2	0.408	0.837	0.2584	> 1.4			
506	41.502	155.67	155.98	2.75	120	0.08	41.54	2.491	2.096	2.101	238.6	200.7	201.2	14,907	263	1.793	90.8	0.786	2.106	2.101	2.101	2.101	2.261	0.58	85.8	1.83	156.9	0.439	0.836	0.2584	> 1.4			
507	41.584	201.43	201.417	3.07	120	0.08	41.63	2.496	2.099	2.103	239.0	201.0	201.4	19,289	294	1.541	121.2	0.746	1.971	1.966	1.966	1.966	2.126	0.60	114.0	1.50	171.4	0.548	0.836	0.2584	> 1.4			
508	41.666	86.38	86.3126	2.94	120	0.08	41.71	2.501	2.101	2.106	239.5	201.2	201.7	8,272	282	3.509	45.5	0.912	2.523	2.520	2.520	2.520	2.680	0.53	43.6	3.85	167.8	0.519	0.835	0.2584	*******			
509	41.748	62.09	62.0453	1.70	120	0.08	41.79	2.506	2.103	2.108	240.0	201.4	201.9	5,946	163	2.860	31.9	0.928	2.576	2.573	2.573	2.573	2.733	0.53	31.0	4.24	131.3	0.290	0.834	0.2584	*******			
510	41.830	44.72	44.7249	1.41	120	0.08	41.87	2.511	2.106	2.111	240.5	201.6	202.1	4,282	135	3.341	21.8	0.979	2.746	2.743	2.743	2.743	2.903	0.51	21.5	5.73	123.1	0.254	0.834	0.2585	*******			
511	41.912	35.51	35.8085	1.05	120	0.08	41.95	2.516	2.108	2.113	240.9	201.9	202.3	3,400	101	3.195	16.7	1.002	2.823	2.821	2.820	2.820	2.980	0.50	16.8	6.53	109.6	0.202	0.833	0.2585	*******			
512	41.994	32.83	33.2317	0.79	120	0.08	42.04	2.521	2.110	2.115	241.4	202.1	202.6	3,144	75	2.590	15.4	0.994	2.797	2.794	2.794	2.794	2.954	0.50	15.6	6.24	97.3	0.166	0.832	0.2585	*******			
513	42.076	35.01	36.2008	0.70	120	0.08	42.12	2.526	2.113	2.118	241.9	202.3	202.8	3,353	67	2.140	16.8	0.971	2.719	2.716	2.716	2.716	2.876	0.51	16.9	5.46	92.2	0.153	0.832	0.2585	*******			
514	42.158	35.43	36.8388	0.66	120	0.08	42.20	2.531	2.115	2.120	242.3	202.5	203.0	3,393	63	1.997	17.1	0.964	2.696	2.693	2.693	2.693	2.853	0.51	17.1	5.25	90.0	0.148	0.831	0.2585	*******			
515	42.240	37.98	39.8142	0.75	120	0.08	42.28	2.536	2.117	2.122	242.8	202.8	203.2	3,637	72	2.110	18.4	0.960	2.683	2.679	2.679	2.679	2.839	0.51	18.4	5.13	94.4	0.158	0.830	0.2585	*******			
516	42.322	43.84	46.0353	1.03	120	0.08	42.36	2.541	2.120	2.125	243.3	203.0	203.5	4,198	99	2.499	21.5	0.957	2.672	2.669	2.669	2.669	2.829	0.51	21.3	5.03	107.0	0.194	0.830	0.2585	*******			
517	42.404	51.12	53.7084	1.50	120	0.08	42.45	2.545	2.122	2.127	243.8	203.2	203.7	4,895	143	3.084	25.3	0.957	2.674	2.671	2.671	2.671	2.831	0.51	24.8	5.05	125.1	0.262	0.829	0.2585	*******			
518	42.486	74.51	77.0503	2.54	120	0.08	42.53	2.550	2.125	2.129	244.2	203.4	203.9	7,135	243	3.527	38.2	0.929	2.579	2.576	2.575	2.575	2.735	0.52	36.8	4.26	156.7	0.438	0.828	0.2585	*******			
519	42.568	93.36	96.0296	3.87	120	0.08	42.61	2.555	2.127	2.132	244.7	203.7	204.1	8,940	371	4.264	48.3	0.924	2.564	2.561	2.561	2.561	2.721	0.52	46.2	4.15	191.7	0.736	0.828	0.2585	*******			
520	42.650	131.17	132.054	5.13	120	0.08	42.69	2.560	2.129	2.134	245.2	203.9	204.4	12,561	491	3.985	70.3	0.885	2.432	2.429	2.429	2.429	2.589	0.54	66.6	3.26	217.3	1.034	0.827	0.2585	> 1.4			
521	42.732	187.4	187.76	4.90	120	0.08	42.77	2.565	2.132	2.137	245.6	204.1	204.6	17,945	470	2.653	106.5	0.809	2.181	2.177	2.177	2.177	2.337	0.57	100.3	2.07	208.0	0.916	0.826	0.2585	> 1.4			
522	42.814	164.73	164.733	5.06	120	0.08	42.86	2.570	2.134	2.139	246.1	204.4	204.8	15,775	484	3.118	91.5	0.838	2.277	2.274	2.273	2.273	2.433	0.55	86.3	2.45	211.8	0.964	0.826	0.2585	> 1.4			
523	42.896	117.94	118.063	5.51	120	0.08	42.94	2.575	2.136	2.141	246.6	204.6	205.0	11,294	527	4.774	61.6	0.914	2.529	2.526	2.526	2.526	2.686	0.53	58.5	3.89	227.9	1.181	0.825	0.2585	*******			
524	42.978	120.93	122.42	5.60	120	0.08	43.02	2.580	2.139	2.144	247.1	204.8	205.3	11,580	536	4.733	63.3	0.911	2.518	2.516	2.515	2.515	2.675	0.53	60.1	3.82	229.5	1.205	0.824	0.2585	*******			
525	43.061	137.23	140.01	4.32	120	0.08	43.10	2.585	2.141	2.146	247.5	205.0	205.5	13,141	414	3.211	74.7	0.859	2.346	2.342	2.342	2.342	2.502	0.55	70.7	2.78	196.3	0.783	0.824	0.2585	> 1.4			
526	43.143	238.12	243.312	3.62	120	0.08	43.18	2.590	2.143	2.148	248.0	205.3	205.7	22,802	346	1.535	143.1	0.730	1.920	1.915	1.915	1.914	2.074	0.60	134.2	1.41	189.2	0.710	0.823	0.2585	> 1.4			
527	43.225	359.54	359.648	3.19	120	0.08	43.27	2.595	2.146	2.151	248.5	205.5	205.9	34,430	306	0.895	231.9	0.637	1.607	1.602	1.602	1.602	1.762	0.64	216.3	1.08	233.6	1.266	0.822	0.2585	> 1.4			
528	43.307	435.47	435.487	1.73	120	0.08	43.35	2.600	2.148	2.153	248.9	205.7	206.2	41,701	165	0.399	300.1	0.600	1.301	1.301	1.301	1.301	1.461	0.65	268.7	1.00	268.7	1.884	0.822	0.2585	> 1.4			
529	43.389	466.33	466.307	1.63	120	0.08	43.43	2.605	2.151	2.155	249.4	205.9	206.4	44,656	156	0.351	325.4	0.600	1.244	1.244	1.244	1.244	1.404	0.65	287.6	1.00	287.6	2.291	0.821	0.2585	> 1.4			
530	43.471	490.41	490.408	1.32	120	0.08	43.51	2.609	2.153	2.158	249.9	206.2	206.6	46,962	127	0.271	348.4	0.600	1.160	1.160	1.160	1.160	1.320	0.65	302.2	1.00	302.2	2.647	0.820	0.2585	> 1.4			
531	43.553	523.54	523.523	1.61	120	0.08	43.59	2.614	2.155	2.160	250.4	206.4	206.9	50,134	154	0.310	371.1	0.600	1.170	1.170	1.170	1.170	1.330	0.65	322.4	1.00	322.4	3.197	0.820	0.2585	> 1.4			
532	43.635	518.73	518.71	1.87	120	0.08	43.68	2.619	2.158	2.162	250.8	206.6	207.1	49,674	179	0.362	363.8	0.600	1.216	1.216	1.216	1.216	1.376	0.65	319.2	1.00	319.2	3.106	0.819	0.2585	> 1.4			
533	43.717	457.59	457.631	1.90	120	0.08	43.76	2.624	2.160	2.165	251.3	206.8	207.3	43,819	182	0.418	314.9	0.600	1.298	1.298	1.298	1.298	1.458	0.65	281.4	1.00	281.4	2.153	0.818	0.2585	> 1.4			
534	43.799	425.55	425.583	2.06	120	0.08	43.84	2.629	2.162	2.167	251.8	207.1	207.5	40,751	198	0.488	288.2	0.600	1.367	1.367	1.367	1.367	1.527	0.65	261.5	1.00	261.5	1.744	0.818	0.2585	> 1.4			
535	43.881	415.56	415.552	2.16	120	0.08	43.92	2.634	2.165	2.170	252.2	207.3	207.8	39,794	207	0.522	279.5	0.600	1.394	1.394	1.394	1.394	1.554	0.65	255.2	1.00	255.2	1.626	0.817	0.2584	> 1.4			
536	43.963	389.04	389.034	1.60	120	0.08	44.00	2.639	2.167	2.172	252.7	207.5	208.0	37,254	153	0.414	263.9	0.600	1.351	1.351	1.351	1.351	1.511	0.65	238.8	1.00	238.8	1.346	0.816	0.2584	> 1.4			
537	44.045	380.48	380.45	1.30	120	0.08	44.09	2.644	2.169	2.174	253.2	207.7	208.2	36,435	125	0.344	260.2	0.600	1.311	1.311	1.311	1.311	1.471	0.65	233.4	1.00	233.4	1.262	0.816	0.2584	> 1.4			
538	44.127	362.38	362.354	1.22	120	0.08	44.17	2.649	2.172	2.177	253.7	208.0	208.4	34,702	117	0.340	246.9	0.600	1.326	1.326	1.326	1.326	1.486	0.65	222.1	1.00	222.1	1.099	0.815	0.2584	> 1.4			
539	44.209	332.99	332.969	1.17	120	0.08	44.25	2.654	2.174	2.179	254.1	208.2	208.7	31,887	112	0.353	224.6	0.600	1.366	1.366	1.366	1.366	1.526	0.65	204.0	1.00	204.0	0.869	0.814	0.2584	> 1.4			
540	44.291	318.47	318.437	1.19	120	0.08	44.33	2.659	2.177	2.181	254.6	208.4	208.9	30,497	113	0.375	213.1	0.600	1.397	1.397	1.397	1.397	1.557	0.65	195.0	1.00	195.0	0.769	0.814	0.2584	> 1.4			
541	44.373	310.49	310.46	0.96	120	0.08	44.41	2.664	2.179	2.184	255.1	208.6	209.1	29,733	92	0.312	209.2	0.600	1.363	1.363	1.363	1.363	1.523	0.65	190.0	1.00	190.0	0.718	0.813	0.2584	> 1.4			
542	44.455	309.15	309.124	0.80	120	0.08	44.50	2.669	2.181	2.186	255.5	208.9	209.3	29,604	77	0.262	209.9	0.600	1.327	1.327	1.327	1.327	1.487	0.65	189.0	1.00	189.0	0.708	0.812	0.2584	> 1.4			
543	44.537	310.28	310.254	0.94	120	0.08	44.58	2.673	2.184	2.188	256.0	209.1	209.6	29,712	90	0.305	209.1	0.600	1.358	1.358	1.358	1.358	1.518	0.65	189.6	1.00	189.6	0.714	0.812	0.2583	> 1.4			
544	44.619	308.37	308.345	0.83	120	0.08	44.66	2.678	2.186	2.191	256.5	209.3	209.8	29,530	79	0.271	208.7	0.600	1.335	1.335	1.335	1.335	1.495	0.65	188.3	1.00	188.3	0.701	0.811	0.2583	> 1.4			
545	44.701	304.06	304.042	0.84	120	0.08	44.74	2.683	2.188	2.193	257.0	209.6	210.0	29,117	80	0.278	205.2	0.600	1.346	1.346	1.346	1.346	1.506	0.65	185.5	1.00	185.5	0.674	0.810	0.2583	> 1.4			
546	44.783	309.32	309.292	0.93	120	0.08	44.82	2.688	2.191	2.196	257.4	209.8	210.2	29,620	89	0.302	208.1	0.600	1.358	1.358	1.358	1.358	1.518	0.65	188.6	1.00	188.6	0.704	0.810	0.2583	> 1.4			
547	44.865	317.02	316.996	0.76	120	0.08	44.91	2.693	2.193	2.198	257.9	210.0	210.5	30,358	73	0.242	215.9	0.600	1.302	1.302	1.302	1.302	1.462	0.65	193.2	1.00	193.2	0.751	0.809	0.2583	> 1.4			
548	44.947	311.75	311.723	0.73	120	0.08	44.99	2.698	2.195	2.200	258.4	210.2	210.7	29,853	70	0.238	212.0	0.600	1.305	1.305	1.305	1.305	1.465	0.64	189.9	1.00	189.9	0.717	0.808	0.2582	> 1.4			
549	45.029	311.69	311.663	0.71	120	0.08	45.07	2.703	2.198	2.203	258.8	210.5	210.9	29,847	68	0.228	212.3	0.600	1.297	1.297	1.297	1.297	1.457	0.64	189.7	1.00	189.7	0.715	0.808	0.2582	> 1.4			
550	45.111	319.22	319.195	0.65	120	0.08	45.15	2.708	2.200	2.205	259.3	210.7	211.1	30,569	62	0.204	218.8	0.600	1.267	1.267	1.267	1.267	1.427	0.64	194.2	1.00	194.2	0.761	0.807	0.2582	> 1.4			
551	45.193	312.63	312.606	0.59	120	0.08	45.23	2.713	2.202	2.207	259.8	210.9	211.4	29,937	56	0.190	214.3	0.600	1.263	1.263	1.263	1.263	1.423	0.64	190.0	1.00	190.0	0.718	0.806	0.2582	> 1.4			
552	45.275	275.87	275.878	0.57	120	0.08	45.32	2.718	2.205	2.210	260.3	211.1	211.6	26,417	55	0.210	186.0	0.600	1.331	1.331	1.331	1.331	1.491	0.64	167.6	1.00	167.6	0.518	0.806	0.2582	> 1.4			
553	45.357	274.94	274.925	0.77	120	0.08	45.40	2.723	2.207	2.212	260.7	211.4	211.8	26,328	74	0.284	182.8	0.600	1.390	1.390	1.390	1.390	1.550	0.64	166.9	1.00	166.9	0.512	0.805	0.2581	> 1.4			
554	45.439	264.39	264.351	0.78	120	0.08	45.48	2.728	2.210	2.214	261.2	211.6	212.1	25,318	75	0.297	174.6	0.600	1.416	1.416	1.416	1.416	1.576	0.64	160.4	1.00	160.4	0.464	0.804	0.2581	> 1.4			
555	45.521	231.99	231.982	0.90	120	0.08	45.56	2.732	2.212	2.217	261.7	211.8	212.3	22,215	86	0.392	149.1	0.614	1.529	1.527	1.527	1.527	1.687	0.64	139.2	1.00	139.2	0.331	0.804	0.2581	1.33	0.003	0.001	
556	45.603	194.22	194.207	0.96	120	0.08	45.64	2.737	2.214	2.219	262.1	212.0	212.5	18,599	92	0.501	121.0	0.651	1.663	1.652	1.651	1.651	1.811	0.62	113.3	1.11	126.3	0.267	0.803	0.2581	1.07	0.006	0.003	
557	45.685	152.77	152.733	0.93	120	0.08	45.73	2.742	2.217	2.222	262.6	212.3	212.7	14,629	89	0.621	91.5	0.697	1.814	1.805	1.804	1.804	1.964	0.60	86.1	1.26	108.1	0.197	0.802	0.2580	0.79	0.025	0.014	
558	45.767	129.1	129.101	1.07	120	0.08	45.81	2.747	2.219	2.224	263.1	212.5	213.0	12,363	102	0.844	74.5	0.742	1.963	1.955	1.954	1.954	2.114	0.58	70.3	1.48	104.1	0.185	0.802	0.2580	0.74	0.025	0.014	
559	45.849	108.12	108.156	1.12	120	0.08	45.89	2.752	2.221	2.226	263.5	212.7	213.2	10,354	107	1.060	60.2	0.782	2.095	2.087	2.087	2.087	2.247	0.56	57.1	1.79	102.2	0.179	0.801	0.2580	0.72	0.025	0.014	
560	45.931	82.06	82.0426	1.01	120	0.08	45.97	2.757	2.224	2.229	264.0	212.9	213.4	7,858	97	1.279	43.7	0.830	2.254	2.248	2.248	2.248	2.408	0.54	41.8	2.34	97.9	0.167	0.800	0.2580	0.67	0.025	0.015	
561	46.013	62.47	62.403	1.03	120	0.08	46.05	2.762	2.226	2.231	264.5	213.2	213.6	5,982	99	1.723	31.4	0.888	2.445	2.440	2.439	2.439	2.599	0.52	30.4	3.32	101.1	0.176	0.800	0.2579	0.71	0.025	0.014	
562	46.095	44.78	44.7184	1.10	120	0.08	46.14	2.767	2.228	2.233	265.0	213.4	213.9	4,288	106	2.623	20.9	0.963	2.695	2.691	2.691	2.691	2.851	0.49	20.6	5.24	107.9	0.197	0.799	0.2579	*******			
563	46.177	36.79	36.7166	1.11	120	0.08	46.22	2.772	2.231	2.236	265.4	213.6	214.1	3,523	106	3.263	16.3	1.006	2.836	2.833	2.833	2.833	2.993	0.47	16.4	6.67	109.2	0.201	0.798	0.2579	*******			
564	46.259	33.73	33.6686	1.10	120	0.08	46.30	2.777	2.233	2.238	265.9	213.8	214.3	3,230	105	3.541	14.7	1.024	2.895	2.892	2.892	2.892	3.052	0.46	14.8	7.34	108.7	0.200	0.798	0.2578	*******			
565	46.341	33.8	33.7479	1.07	120	0.08	46.38	2.782	2.236	2.240	266.4	214.1	214.5	3,237	102	3.450	14.7	1.021	2.887	2.884	2.884	2.884	3.044	0.46	14.8	7.25	107.6	0.196	0.797	0.2578	*******			
566	46.423	29.54	29.4986	1.04	120	0.08	46.46	2.787	2.238	2.243	266.8	214.3	214.8	2,829	100	3.887	12.4	1.048	2.976	2.974	2.974	2.974	3.134	0.46	12.7	8.36	106.2	0.191	0.796	0.2578	*******			
567	46.505	29.37	29.3364	1.03	120	0.08	46.55	2.792	2.240	2.245	267.3	214.5	215.0	2,812	98	3.860	12.3	1.049	2.977	2.975	2.975	2.975	3.135	0.45	12.6	8.37	105.6	0.190	0.796	0.2577	*******			
568	46.587	34.2	34.1755	1.13	120	0.08	46.63	2.796	2.243	2.247	267.8	214.8	215.2	3,275	108	3.592	14.8	1.024	2.895	2.893	2.892	2.892	3.052	0.46	14.9	7.35	109.8	0.203	0.795	0.2577	*******			
569	46.669	42.13	42.1163	1.41	120	0.08	46.71	2.801	2.245	2.250	268.3	215.0	215.4	4,034	135	3.580	18.9	0.999	2.812	2.809	2.809	2.809	2.969	0.47	18.7	6.40	120.0	0.241	0.794	0.2577	*******			
570	46.751	53.41	53.3991	1.51	120	0.08	46.79	2.806	2.247	2.252	268.7	215.2	215.7	5,115	145	2.982	25.1	0.955	2.667	2.663	2.663	2.663	2.823	0.49	24.5	4.98	122.2	0.250	0.794	0.2576	*******			
571	46.833	54.45	54.4377	1.57	120	0.08	46.87	2.811	2.250	2.255	269.2	215.4	215.9	5,214	150	3.036	25.6	0.954	2.665	2.661	2.661	2.661	2.821	0.49	25.0	4.97	124.2	0.258	0.793	0.2576	*******			
572	46.915	52.5	52.4803	1.79	120	0.08	46.96	2.816	2.252	2.257	269.7	215.7	216.1	5,027	171	3.603	24.3	0.974	2.731	2.727	2.727	2.727	2.887	0.48	23.7	5.57	132.2	0.295	0.792	0.2576	*******			
573	46.997	49.03	49.0128	1.92	120	0.08	47.04	2.821	2.254	2.259	270.1	215.9	216.3	4,695	184	4.155	22.2	0.995	2.800	2.797	2.797	2.797	2.957	0.47	21.8	6.28	136.8	0.318	0.792	0.2575	*******			
574	47.079	47.59	47.5797	2.07	120	0.08	47.12	2.826	2.257	2.262	270.6	216.1	216.6	4,557	199	4.633	21.2	1.009	2.845	2.843	2.842	2.842	3.002	0.46	20.9	6.77	141.5	0.344	0.791	0.2575	*******			
575	47.162	52.68	52.6752	2.30	120	0.08	47.20	2.831	2.259	2.264	271.1	216.3	216.8	5,045	220	4.610	23.8	0.997	2.806	2.804	2.804	2.804	2.964	0.47	23.3	6.35	148.0	0.382	0.790	0.2574	*******			
576	47.244	54.6	54.5861	2.14	120	0.08	47.28	2.836	2.262	2.266	271.6	216.6	217.0	5,228	205	4.126	25.0	0.983	2.759	2.756	2.756	2.756	2.916	0.47	24.4	5.86	142.9	0.352	0.790	0.2574	*******			
577	47.326	56.19	56.1753	2.31	120	0.08	47.37	2.841	2.264	2.269	272.0	216.8	217.3	5,381	221	4.332	25.7	0.984	2.764	2.761	2.761	2.761	2.921	0.47	25.1	5.91	148.1	0.382	0.789	0.2574	*******			
578	47.408	61.04	61.0208	2.32	120	0.08	47.45	2.846	2.266	2.271	272.5	217.0	217.5	5,845	222	3.988	28.4	0.968	2.708	2.705	2.705	2.705	2.865	0.48	27.6	5.36	147.8	0.380	0.788	0.2573	*******			
579	47.490	69.42	69.3922	2.29	120	0.08	47.53	2.851	2.269	2.273	273.0	217.2	217.7	6,648	220	3.446	33.2	0.940	2.616	2.613	2.612	2.612	2.772	0.49	32.0	4.55	145.6	0.367	0.788	0.2573	*******			
580	47.572	62.8	62.7524	2.23	120	0.08	47.61	2.856	2.271	2.276	273.4	217.5	217.9	6,014	213	3.713	29.4	0.958	2.676	2.673	2.673	2.673	2.833	0.48	28.5	5.07	144.5	0.361	0.787	0.2572	*******			
581	47.654	68.5	68.4552	2.11	120	0.08	47.69	2.860	2.273	2.278	273.9	217.7	218.2	6,560	202	3.207	32.8	0.935	2.599	2.596	2.595	2.595	2.755	0.49	31.6	4.42	139.6	0.333	0.786	0.2572	*******			
582	47.736	68.51	68.464	2.07	120	0.08	47.78	2.865	2.276	2.281	274.4	217.9	218.4	6,561	198	3.150	32.8	0.933	2.594	2.590	2.590	2.590	2.750	0.49	31.6	4.38	138.4	0.326	0.786	0.2572	*******			
583	47.818	71.39	71.3429	2.05	120	0.08	47.86	2.870	2.278	2.283	274.9	218.1	218.6	6,836	196	2.987	34.5	0.924	2.563	2.559	2.559	2.559	2.719	0.49	33.2	4.13	137.1	0.320	0.785	0.2571	*******			
584	47.900	71.47	71.4222	1.97	120	0.08	47.94	2.875	2.280	2.285	275.3	218.4	218.8	6,844	188	2.869	34.6	0.920	2.551	2.546	2.546	2.546	2.706	0.49	33.3	4.04	134.4	0.306	0.784	0.2571	*******			
585	47.982	70.76	70.7104	1.96	120	0.08	48.02	2.880	2.283	2.288	275.8	218.6	219.1	6,776	188	2.889	34.1	0.922	2.557	2.552	2.552	2.552	2.712	0.49	32.9	4.09	134.2	0.305	0.784	0.2570	*******			
586	48.064	70.43	70.3794	1.93	120	0.08	48.10	2.885	2.285	2.290	276.3	218.8	219.3	6,744	185	2.859	33.9	0.921	2.555	2.551	2.551	2.551	2.711	0.49	32.7	4.08	133.2	0.300	0.783	0.2570	*******			
587	48.146	70.78	70.7292	1.89	120	0.08	48.19	2.890	2.287	2.292	276.7	219.0	219.5	6,778	181	2.790	34.2	0.919	2.546	2.542	2.542	2.542	2.702	0.49	32.9	4.01	131.8	0.293	0.782	0.2569	*******			
588	48.228	68.92	68.8693	1.61	120	0.08	48.27	2.895	2.290	2.295	277.2	219.3	219.7	6,600	154	2.443	33.4	0.909	2.517	2.512	2.512	2.512	2.672	0.49	32.2	3.79	122.2	0.250	0.782	0.2569	*******			
589	48.310	68.27	68.2193	1.49	120	0.08	48.35	2.900	2.292	2.297	277.7	219.5	220.0	6,538	142	2.273	33.2	0.904	2.499	2.494	2.494	2.494	2.654	0.50	32.0	3.67	117.6	0.231	0.781	0.2568	*******			
590	48.392	66.35	66.2988	1.36	120	0.08	48.43	2.905	2.295	2.299	278.2	219.7	220.2	6,354	130	2.140	32.3	0.902	2.493	2.488	2.487	2.487	2.647	0.50	31.1	3.63	113.0	0.214	0.780	0.2568	*******			
591	48.474	64.04	63.9879	1.38	120	0.08	48.51	2.910	2.297	2.302	278.6	220.0	220.4	6,132	133	2.264	30.8	0.911	2.523	2.518	2.518	2.518	2.678	0.49	29.8	3.84	114.4	0.219	0.780	0.2567	*******			
592	48.556	63.3	63.2477	1.51	120	0.08	48.60	2.915	2.299	2.304	279.1	220.2	220.6	6,062	144	2.494	30.2	0.921	2.556	2.552	2.551	2.551	2.711	0.49	29.2	4.08	119.2	0.237	0.779	0.2567	*******			
593	48.638	62.56	62.5047	1.80	120	0.08	48.68	2.920	2.302	2.307	279.6	220.4	220.9	5,991	172	3.013	29.4	0.940	2.618	2.614	2.613	2.613	2.773	0.48	28.4	4.56	129.7	0.283	0.778	0.2566	*******			
594	48.72	62.5	62.4423	2.10	120	0.08	48.76	2.924	2.304	2.309	280.0	220.6	221.1	5,985	201	3.518	29.0	0.955	2.666	2.662	2.662	2.662	2.822	0.47	28.0	4.98	139.5	0.333	0.778	0.2566	*******			
595	48.80	61.98	61.9209	2.32	120	0.08	48.84	2.929	2.306	2.311	280.5	220.9	221.3	5,935	222	3.925	28.4	0.966	2.703	2.700	2.700	2.700	2.860	0.47	27.5	5.32	146.4	0.372	0.777	0.2565	*******			
596	48.88	65.4	65.3409	2.43	120	0.08	48.92	2.934	2.309	2.314	281.0	221.1	221.5	6,263	233	3.895	30.2	0.959	2.682	2.678	2.678	2.678	2.838	0.47	29.2	5.12	149.3	0.390	0.776	0.2565	*******			
597	48.97	68.2	68.1404	2.62	120	0.08	49.01	2.939	2.311	2.316	281.5	221.3	221.8	6,531	250	4.007	31.6	0.958	2.676	2.673	2.672	2.672	2.832	0.47	30.4	5.07	154.2	0.421	0.776	0.2564	*******			
598	49.05	71.1	71.0404	2.73	120	0.08	49.09	2.944	2.313	2.318	281.9	221.5	222.0	6,809	262	4.010	33.0	0.953	2.662	2.658	2.658	2.658	2.818	0.47	31.8	4.94	157.1	0.441	0.775	0.2564	*******			
599	49.13	68.69	68.6282	2.87	120	0.08	49.17	2.949	2.316	2.321	282.4	221.8	222.2	6,578	275	4.364	31.5	0.965	2.701	2.698	2.698	2.698	2.858	0.47	30.4	5.30	161.1	0.469	0.774	0.2563	*******			
600	49.21	68.02	67.9587	3.02	120	0.08	49.25	2.954	2.318	2.323	282.9	222.0	222.5	6,514	289	4.638	31.0	0.972	2.725	2.722	2.722	2.722	2.882	0.47	29.9	5.52	165.2	0.499	0.774	0.2563	*******			
601	49.29	64.58	64.5205	2.93	120	0.08	49.34	2.959	2.321	2.325	283.3	222.2	222.7	6,184	281	4.756	29.2	0.981	2.752	2.749	2.748	2.748	2.908	0.46	28.2	5.78	163.0	0.483	0.773	0.2562	*******			
602	49.38	70.06	70.0026	2.88	120	0.08	49.42	2.964	2.323	2.328	283.8	222.4	222.9	6,709	276	4.295	32.2	0.962	2.690	2.687	2.687	2.687	2.847	0.47	31.0	5.20	161.1	0.469	0.772	0.2562	*******			
603	49.46	87.28	87.2282	2.85	120	0.08	49.50	2.969	2.325	2.330	284.3	222.7	223.1	8,358	273	3.383	42.0	0.916	2.536	2.532	2.532	2.532	2.692	0.49	40.0	3.94	157.7	0.444	0.772	0.2561	*******			
604	49.54	133.66	133.613	2.36	120	0.08	49.58	2.974	2.328	2.332	284.8	222.9	223.4	12,799	226	1.802	70.7	0.810	2.186	2.180	2.179	2.179	2.339	0.53	66.6	2.08	138.6	0.328	0.771	0.2560	1.32	0.003	0.001	
605	49.62	163.42	163.368	1.86	120	0.08	49.66	2.979	2.330	2.335	285.2	223.1	223.6	15,649	178	1.161	91.3	0.747	1.978	1.970	1.969	1.969	2.129	0.55	85.5	1.51	129.2	0.280	0.770	0.2560	1.13	0.006	0.002	
606	49.70	190.52	190.46	1.81	120	0.08	49.75	2.983	2.332	2.337	285.7	223.3	223.8	18,244	173	0.963	109.6	0.713	1.866	1.857	1.857	1.856	2.016	0.57	102.3	1.32	135.3	0.310	0.769	0.2559	1.25	0.003	0.001	
607	49.79	204.82	204.763	1.81	120	0.08	49.83	2.988	2.335	2.340	286.2	223.6	224.0	19,614	173	0.895	119.3	0.698	1.818	1.809	1.808	1.808	1.968	0.57	111.2	1.26	140.1	0.336	0.769	0.2559	1.36	0.003	0.001	
608	49.87	232.75	232.694	1.81	120	0.08	49.91	2.993	2.337	2.342	286.6	223.8	224.3	22,288	173	0.786	138.6	0.673	1.732	1.723	1.722	1.722	1.882	0.59	128.9	1.17	151.1	0.401	0.768	0.2558	> 1.4			
609	49.95	281.44	281.383	1.81	120	0.08	49.99	2.998	2.339	2.344	287.1	224.0	224.5	26,951	173	0.649	173.0	0.635	1.605	1.598	1.598	1.598	1.758	0.60	160.4	1.08	172.8	0.560	0.767	0.2557	> 1.4			
610	50.03	318.05	317.998	1.81	120	0.12	50.11	3.004	2.343	2.348	287.7	224.4	224.8	30,456	173	0.573	199.1	0.613	1.524	1.522	1.522	1.522	1.682	0.61	184.4	1.03	189.2	0.710	0.767	0.2557	> 1.4			

Project Name	Welfare Complex
Project No.	03019-001
Sounding No.	CPT-02
Date of Sounding	05/16/19
Depth to Groundwater During Sampling (ft)	43
Estimated Depth to Historic High Groundwater (ft)	39
PHGA (g)	0.4
Moment Magnitude (Mw)	7.4
Depth of Fill (ft)	2
Magnitude Weighting Factor CM	1.035

$CM = 10^{2.201} / M_w^{2.06}$

Dry Settlement 0.07 **Pradel** These formulas have been adjusted to add settlement in the top 60 feet only (not down to 100 feet plus)

Total Settlement 0.07 **I&Y**
Liquefaction-induced Settlement ____

Total Settlement 0.07 **T&S**
Liquefaction-induced Settlement ____

0.448039

******* Ic > 2.6, layer is probably too clay-rich to liquefy
--- Layer is above groundwater level and is unlikely to liquefy

** During Sampling
* During Liquefaction

Ic adjustment 0.16
add if CPT underestimates clay content (i.e., Bonneville data)

Stress Reduction Coefficient
r_d=1.0 - 0.00765z for z <= 9.15m
r_d=1.174 - 0.0267z for 9.15m < z >= 23m

if FS < 1.1 layer will liquefy
if FS > 1.1 and < 1.4 layer may liquefy
if FS > 1.4 layer is safe from liquefaction

Layer #	Depth to Midpoint (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	* σ'_{vo} tsf	** σ'_{vo} tsf	σ_{vo} kPa	* σ'_{vo} kPa	** σ'_{vo} kPa	qc kPa	fs kPa	F	Q	n	Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. correction q_{1N}	K_c	clean sand correction $(q_{1N})_{cs}$	CSR	CRR$_{7.5}$	r_d	PSHA FS	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
																			Ic criteria by iteration																
1	0.08	16.81	16.9	0.06	120	0.12	0.12	0.005	0.125	0.005	0.5	12.0	0.5	1,620	5	0.313	179.6	0.600	1.310	1.310	1.310	1.310	1.470	1.70	27.2	1.00	27.2	0.273	1.000	0.0102	---				
2	0.16	22.69	22.7	0.08	120	0.08	0.21	0.011	0.311	1.1	12.6	1.1	2.173	7	0.344	162.3	0.600	1.373	1.373	1.373	1.373	1.533	1.70	36.4	1.00	36.4	0.280	1.000	0.0220	---					
3	0.24	26.31	26.3	0.17	120	0.08	0.29	0.016	0.416	1.5	13.0	1.5	2.519	18	0.639	222.0	0.621	1.549	1.549	1.549	1.549	1.709	1.70	42.3	1.04	44.1	0.287	0.999	0.0306	---					
4	0.33	27.81	28.1	0.27	120	0.09	0.37	0.021	0.521	2.0	13.5	2.0	2.576	26	1.016	235.9	0.667	1.723	1.694	1.704	1.700	1.862	1.70	43.2	1.15	49.9	0.292	0.999	0.0386	---					
5	0.41	32.25	32.3	0.34	120	0.08	0.45	0.026	0.146	0.026	2.5	14.0	2.5	2,610	41	1.557	244.0	0.704	1.886	1.810	1.833	1.826	1.988	1.70	43.8	1.28	56.3	0.297	0.999	0.0460	---				
6	0.49	37.22	37.2	0.42	120	0.08	0.53	0.031	0.151	0.031	2.9	14.4	2.9	2,655	56	1.888	236.0	0.725	1.969	1.815	1.901	1.894	2.056	1.70	44.5	1.38	61.3	0.302	0.999	0.0530	---				
7	0.57	27.85	27.9	0.34	120	0.08	0.62	0.036	0.156	0.036	3.4	14.9	3.4	2,648	63	2.365	236.4	0.749	2.050	1.856	1.980	1.974	2.136	1.70	44.4	1.52	67.6	0.109	0.999	0.0595	---				
8	0.65	27.39	27.4	0.41	120	0.08	0.70	0.041	0.161	0.041	3.9	15.4	3.9	2,614	64	2.458	220.8	0.758	2.075	1.867	2.008	2.004	2.165	1.70	43.8	1.59	69.5	0.111	0.998	0.0656	---				
9	0.74	26.72	26.7	0.48	120	0.08	0.78	0.046	0.166	0.046	4.4	15.9	4.4	2,559	65	2,531	205.6	0.766	2.098	2.016	2.036	2.031	2.192	1.70	42.9	1.65	70.7	0.113	0.998	0.0714	---				
10	0.82	26.96	26.9	0.54	120	0.08	0.86	0.050	0.170	0.050	4.8	16.3	4.8	2,488	62	2,482	188.9	0.770	2.111	2.031	2.050	2.045	2.207	1.70	41.7	1.68	70.2	0.112	0.998	0.0768	---				
11	0.91	29.98	29.9	0.61	120	0.09	0.94	0.055	0.175	0.055	5.3	16.8	5.3	2,431	70	2,147	176.3	0.763	2.093	2.008	2.029	2.024	2.185	1.70	40.8	1.63	66.5	0.107	0.998	0.0819	---			0.001	
12	0.98	29.14	29.1	0.68	120	0.08	1.03	0.060	0.180	0.060	5.8	17.3	5.8	2,312	48	1,956	152.8	0.763	2.094	2.006	2.028	2.022	2.184	1.70	39.8	1.63	63.1	0.103	0.998	0.0867	---			0.001	
13	1.07	24.98	25.0	0.65	120	0.08	1.11	0.065	0.185	0.065	6.2	17.7	6.2	2,186	38	1,761	136.9	0.762	2.094	2.003	2.026	2.020	2.181	1.70	36.7	1.62	59.5	0.100	0.998	0.0913	---			0.001	
14	1.15	23.08	23.1	0.64	120	0.08	1.19	0.070	0.190	0.070	6.7	18.2	6.7	2,103	36	1,722	126.9	0.767	2.107	2.018	2.040	2.035	2.196	1.70	35.3	1.66	58.5	0.099	0.997	0.0956	---			0.001	
15	1.23	19.80	19.8	0.57	120	0.08	1.27	0.075	0.195	0.075	7.2	18.7	7.2	1,904	33	1,737	113.0	0.778	2.141	2.056	2.077	2.072	2.233	1.70	31.9	1.75	55.8	0.096	0.997	0.0998	---			0.001	
16	1.31	18.49	18.5	0.50	120	0.08	1.35	0.080	0.200	0.080	7.7	19.1	7.7	1,762	31	1,763	102.7	0.788	2.171	2.091	2.110	2.105	2.266	1.70	29.6	1.85	54.5	0.095	0.997	0.1037	---			0.002	
17	1.39	17.41	17.4	0.50	120	0.08	1.43	0.085	0.205	0.085	8.1	19.6	8.1	1,667	30	1,812	95.4	0.797	2.198	2.122	2.140	2.136	2.297	1.70	28.0	1.94	54.2	0.095	0.997	0.1074	---			0.002	
18	1.48	16.75	16.8	0.51	120	0.08	1.52	0.090	0.210	0.090	8.6	20.1	8.6	1,599	29	1,812	89.3	0.803	2.216	2.143	2.160	2.156	2.317	1.70	26.8	2.00	53.8	0.094	0.997	0.1109	---			0.002	
19	1.56	16.35	16.4	0.51	120	0.08	1.60	0.095	0.215	0.095	9.1	20.6	9.1	1,474	29	1,994	82.3	0.819	2.264	2.198	2.213	2.210	2.370	1.70	24.7	2.20	54.3	0.095	0.996	0.1143	---			0.002	
20	1.64	17.42	17.4	0.54	120	0.08	1.68	0.100	0.220	0.100	9.5	21.0	9.5	1,362	30	2,210	76.1	0.835	2.314	2.254	2.267	2.264	2.425	1.70	22.8	2.42	55.2	0.096	0.996	0.1175	---			0.002	
21	1.72	19.45	19.5	0.60	120	0.08	1.76	0.105	0.225	0.105	10.0	21.5	10.0	1,276	31	2,400	71.1	0.850	2.357	2.303	2.315	2.312	2.473	1.70	21.4	2.63	56.4	0.097	0.996	0.1206	---			0.002	
22	1.81	17.21	17.2	0.53	120	0.08	1.85	0.109	0.229	0.109	10.5	22.0	10.5	1,169	31	2,702	65.4	0.867	2.411	2.363	2.373	2.371	2.531	1.70	19.6	2.93	57.5	0.098	0.996	0.1235	---			0.002	
23	1.89	11.42	11.4	0.35	120	0.08	1.93	0.114	0.234	0.114	11.0	22.4	11.0	1,055	33	3,058	61.4	0.884	2.464	2.427	2.429	2.428	2.588	1.70	18.4	3.25	55.7	0.098	0.996	0.1263	---			0.001	
24	1.97	11.22	11.2	0.28	120	0.08	2.01	0.119	0.239	0.119	11.4	22.9	11.4	1,079	35	3,237	59.5	0.892	2.487	2.447	2.455	2.454	2.614	1.70	18.1	3.41	61.8	0.102	0.995	0.1290	---			0.001	
25	2.05	11.39	11.4	0.27	120	0.08	2.09	0.124	0.244	0.124	11.9	23.4	11.9	1,050	36	3,461	57.2	0.902	2.517	2.480	2.487	2.486	2.646	1.70	17.8	3.62	63.8	0.104	0.995	0.1318	---			0.001	
26	2.13	10.75	10.8	0.26	120	0.08	2.17	0.129	0.249	0.129	12.4	23.9	12.4	1,030	35	3,405	54.7	0.904	2.524	2.489	2.496	2.494	2.655	1.70	17.3	3.68	63.6	0.104	0.995	0.1341	---			0.001	
27	2.21	11.17	11.2	0.27	120	0.08	2.26	0.134	0.254	0.134	12.8	24.3	12.8	1,070	35	3,335	54.8	0.902	2.516	2.481	2.488	2.487	2.647	1.70	17.9	3.63	65.1	0.106	0.995	0.1365	---			0.001	
28	2.34	11.81	11.8	0.29	120	0.08	2.34	0.139	0.259	0.139	13.3	24.8	13.3	1,118	33	2,972	54.8	0.892	2.483	2.447	2.454	2.453	2.613	1.70	19.8	3.41	63.9	0.104	0.995	0.1388	---			0.001	
29	2.38	12.72	12.7	0.33	120	0.08	2.42	0.144	0.264	0.144	13.8	25.3	13.8	1,218	30	2,481	55.8	0.874	2.424	2.386	2.393	2.392	2.552	1.70	20.4	3.05	62.2	0.102	0.994	0.1410	---			0.001	
30	2.46	13.42	13.4	0.40	120	0.08	2.50	0.149	0.269	0.149	14.2	25.7	14.2	1,291	27	2,100	56.0	0.859	2.376	2.336	2.343	2.342	2.502	1.70	21.7	2.78	60.2	0.100	0.994	0.1431	---			0.001	
31	2.54	15.63	15.6	0.48	120	0.08	2.58	0.154	0.274	0.154	14.7	26.2	14.7	1,379	27	1,994	57.5	0.851	2.352	2.311	2.319	2.317	2.478	1.70	23.1	2.66	61.5	0.102	0.994	0.1452	---			0.001	
32	2.62	17.91	17.9	0.59	120	0.08	2.67	0.159	0.279	0.159	15.2	26.7	15.2	1,335	30	2,264	55.8	0.865	2.395	2.358	2.365	2.364	2.524	1.70	22.4	2.89	64.7	0.105	0.994	0.1471	---			0.001	
33	2.71	18.41	18.4	0.64	120	0.08	2.75	0.164	0.284	0.164	15.7	27.2	15.7	1,351	30	2,258	55.2	0.866	2.396	2.361	2.367	2.366	2.526	1.70	22.7	2.90	65.8	0.106	0.994	0.1491	---			0.001	
34	2.79	13.26	13.2	0.47	120	0.08	2.83	0.169	0.289	0.169	16.1	27.6	16.1	1,327	30	2,301	53.4	0.870	2.410	2.376	2.382	2.381	2.541	1.70	22.3	2.99	66.5	0.107	0.993	0.1509	---			0.001	
35	2.87	11.46	11.5	0.39	120	0.08	2.91	0.173	0.293	0.173	16.6	28.1	16.6	1,283	34	2,646	51.9	0.885	2.457	2.427	2.432	2.431	2.591	1.70	21.5	3.27	70.5	0.113	0.993	0.1527	---			0.001	
36	2.95	13.86	13.9	0.48	120	0.08	2.99	0.178	0.298	0.178	17.1	28.6	17.1	1,327	41	3,092	53.5	0.896	2.490	2.464	2.468	2.467	2.627	1.70	22.3	3.50	77.9	0.124	0.993	0.1544	---				
37	3.03	16.50	16.5	0.63	120	0.08	3.08	0.183	0.303	0.183	17.6	29.0	17.6	1,389	47	3,409	55.3	0.902	2.507	2.483	2.487	2.486	2.646	1.70	23.3	3.62	84.3	0.136	0.993	0.1560	---				
38	3.12	18.61	18.6	0.74	120	0.08	3.16	0.188	0.308	0.188	18.0	29.5	18.0	1,486	54	3,659	56.2	0.904	2.512	2.489	2.493	2.492	2.652	1.70	24.0	3.66	91.3	0.151	0.993	0.1576	---				
39	3.20	19.41	19.4	0.83	120	0.08	3.24	0.193	0.313	0.193	18.5	30.0	18.5	1,577	58	3,706	60.3	0.902	2.504	2.482	2.485	2.485	2.645	1.70	26.0	3.61	95.6	0.161	0.993	0.1592	---				
40	3.28	17.81	17.8	0.79	120	0.08	3.32	0.198	0.318	0.198	19.0	30.5	19.0	1,717	60	3,824	64.1	0.899	2.494	2.474	2.477	2.476	2.636	1.70	28.8	3.56	102.4	0.180	0.992	0.1607	---				
41	3.36	16.16	16.1	0.73	120	0.08	3.40	0.203	0.323	0.203	19.4	30.9	19.4	1,835	68	3,724	66.5	0.893	2.474	2.454	2.457	2.456	2.616	1.70	30.8	3.43	105.5	0.189	0.992	0.1621	---				
42	3.44	16.07	16.1	0.77	120	0.08	3.48	0.208	0.328	0.208	19.9	31.4	19.9	1,920	68	3,598	67.8	0.888	2.457	2.437	2.440	2.440	2.600	1.70	32.2	3.33	107.1	0.194	0.992	0.1635	---			0.000	
43	3.53	17.41	17.4	0.83	120	0.08	3.57	0.213	0.333	0.213	20.4	31.9	20.4	2,016	70	3,502	69.3	0.883	2.442	2.422	2.425	2.424	2.584	1.70	33.8	3.23	109.1	0.201	0.992	0.1649	---			0.000	
44	3.61	22.61	22.6	0.93	120	0.08	3.65	0.218	0.338	0.218	20.9	32.3	20.9	2,168	68	3,082	71.6	0.868	2.392	2.371	2.374	2.374	2.534	1.70	36.4	2.95	107.1	0.194	0.992	0.1662	---			0.000	
45	3.69	23.41	23.4	0.98	120	0.08	3.73	0.223	0.343	0.223	21.3	32.8	21.3	2,267	61	2,712	72.2	0.855	2.351	2.329	2.332	2.331	2.492	1.70	38.0	2.73	103.8	0.194	0.991	0.1675	---			0.000	
46	3.77	24.11	24.1	1.04	120	0.08	3.81	0.228	0.348	0.228	21.8	33.3	21.8	2,377	58	2,363	72.9	0.842	2.306	2.283	2.286	2.286	2.446	1.70	39.9	2.51	100.0	0.173	0.991	0.1687	---			0.001	
47	3.85	23.37	23.4	1.07	120	0.08	3.89	0.233	0.353	0.233	22.3	33.8	22.3	2,479	51	2,101	73.6	0.830	2.268	2.244	2.248	2.247	2.407	1.70	41.6	2.34	97.4	0.166	0.991	0.1700	---			0.001	
48	3.93	22.85	22.9	1.06	120	0.08	3.98	0.237	0.357	0.237	22.7	34.2	22.7	2,649	48	1,834	76.8	0.816	2.220	2.195	2.198	2.198	2.358	1.70	44.4	2.15	96.4	0.161	0.991	0.1711	---			0.001	
49	4.02	25.67	25.7	1.13	120	0.08	4.06	0.242	0.362	0.242	23.2	34.7	23.2	2,769	48	1,747	77.3	0.809	2.198	2.173	2.177	2.176	2.336	1.70	46.5	2.07	96.2	0.163	0.991	0.1723	---			0.001	
50	4.10	29.47	29.5	1.40	120	0.08	4.14	0.247	0.367	0.247	23.7	35.2	23.7	2,817	50	1,789	77.7	0.810	2.202	2.179	2.182	2.181	2.342	1.70	47.3	2.09	98.7	0.169	0.990	0.1734	---			0.001	
51	4.18	28.45	28.4	1.34	120	0.08	4.22	0.252	0.372	0.252	24.2	35.6	24.2	2,724	50	1,865	74.9	0.818	2.225	2.203	2.206	2.205	2.366	1.70	45.7	2.18	99.5	0.172	0.990	0.1745	---			0.001	
52	4.27	27.21	27.2	1.27	120	0.08	4.31	0.257	0.377	0.257	24.6	36.1	24.6	2,628	52	2,009	72.2	0.828	2.257	2.236	2.239	2.239	2.399	1.70	44.1	2.31	101.7	0.178	0.990	0.1755	---			0.001	
53	4.35	27.72	27.7	1.34	120	0.08	4.39	0.262	0.382	0.262	25.1	36.6	25.1	2,661	54	2,034	72.2	0.829	2.260	2.240	2.242	2.242	2.402	1.70	44.8	2.32	103.6	0.183	0.990	0.1765	---			0.001	
54	4.43	29.32	29.3	1.54	120	0.08	4.47	0.267	0.387	0.267	25.6	37.1	25.6	2,796	53	1,908	74.0	0.820	2.233	2.212	2.215	2.215	2.375	1.70	46.9	2.21	103.8	0.184	0.990	0.1775	---			0.001	
55	4.51	31.07	31.1	1.72	120	0.08	4.55	0.272	0.392	0.272	26.0	37.5	26.0	2,975	54	1,848	77.1	0.814	2.210	2.190	2.193	2.192	2.352	1.70	49.9	2.13	106.2	0.191	0.989	0.1785	---			0.000	
56	4.59	33.02	33.0	1.97	120	0.08	4.63	0.277	0.397	0.277	26.5	38.0	26.5	3,164	56	1,792	80.2	0.807	2.188	2.168	2.170	2.170	2.330	1.70	53.1	2.05	108.7	0.200	0.989	0.1794	---			0.000	
57	4.67	32.82	32.8	2.02	120	0.08	4.71	0.282	0.402	0.282	27.0	38.5	27.0	3,294	55	1,694	81.8	0.800	2.165	2.146	2.148	2.147	2.307	1.70	55.3	1.97	109.0	0.200	0.989	0.1803	---			0.000	
58	4.75	30.74	30.7	1.94	120	0.08	4.79	0.287	0.407	0.287	27.5	38.9	27.5	3,422	59	1,736	83.8	0.800	2.163	2.144	2.146	2.146	2.306	1.70	57.4	1.97	112.9	0.214	0.989	0.1812	---			0.000	
59	4.83	28.12	28.1	1.72	120	0.08	4.87	0.292	0.412	0.292	28.0	39.4	28.0	3,477	57	1,857	83.8	0.798	2.156	2.130	2.133	2.132	2.293	1.70	58.3	1.92	112.3	0.212	0.989	0.1821	---			0.000	
60	4.91	28.47	28.5	1.78	120	0.08	4.95	0.297	0.417	0.297	28.4	39.9	28.4	3,465	55	1,791	82.3	0.794	2.143	2.124	2.126	2.126	2.286	1.70	58.1	1.90	110.7	0.206	0.989	0.1830	---			0.000	
61	5.00	32.29	32.3	2.14	120	0.08	5.04	0.301	0.421	0.301	28.9	40.4	28.9	3,570	59	1,866	84.1	0.796	2.148	2.131	2.133	2.132	2.292	1.70	59.9	1.92	115.3	0.222	0.988	0.1838	---			0.000	
62	5.08	35.23	35.2	2.53	120	0.08	5.12	0.306	0.426	0.306	29.3	40.8	29.3	3,859	60	1,859	85.0	0.791	2.143	2.126	2.128	2.127	2.287	1.70	61.4	1.91	117.2	0.230	0.988	0.1846	---				
63	5.17	40.71	40.7	3.27	120	0.08	5.21	0.311	0.431	0.311	29.8	41.3	29.8	3,668	69	1,782	89.8	0.795	2.146	2.129	2.131	2.131	2.291	1.70	65.4	1.92	125.8	0.284	0.988	0.1854	---				
64	5.25	41.64	41.6	3.41	120	0.08	5.29	0.316	0.436	0.316	30.3	41.8	30.3	4,010	74	1,952	91.6	0.797	2.152	2.136	2.138	2.138	2.298	1.70	67.3	1.94	130.6	0.297	0.988	0.1862	---				
65	5.33	42.56	42.6	3.57	120	0.08	5.37	0.321	0.441	0.321	30.7	42.3	30.7	4,076	82	2,057	92.8	0.804	2.173	2.158	2.160	2.159	2.319	1.70	68.4	2.01	137.6	0.322	0.988	0.1869	---				
66	5.41	43.47	43.5	3.74	120	0.08	5.45	0.326	0.446	0.326	31.2	42.7	31.2	4,244	87	2,055	95.4	0.802	2.168	2.153	2.155	2.155	2.315	1.70	71.2	2.00	142.2	0.347	0.987	0.1877	---				
67	5.50	44.37	44.4	3.91	120	0.08	5.54	0.331	0.451	0.331	31.7	43.2	31.7	4,290	105	2,467	97.2	0.818	2.218	2.205	2.207	2.206	2.366	1.70	72.0	2.18	156.9	0.439	0.987	0.1884	---				
68	5.58	45.28	45.3	4.09	120	0.08	5.62	0.336	0.456	0.336	32.2	43.7	32.2	4,365	120	2,778	98.9	0.828	2.248	2.238	2.239	2.239	2.399	1.70	73.2	2.31	169.0	0.529	0.987	0.1891	---				
69	5.70	47.41	47.4	4.38	120	0.12	5.74	0.341	0.461	0.341	32.8	44.1	32.8	4,388	124	2,862	98.7	0.830	2.258	2.247	2.248	2.248	2.408	1.70	73.6	2.35	172.8	0.558	0.987	0.1898	---				
70	5.79	49.35	49.4	4.66	120	0.08	5.83	0.346	0.466	0.346	33.1	44.6	33.1	4,428	129	2,833	98.8	0.833	2.266	2.256	2.257	2.256	2.416	1.70	74.3	2.38	176.8	0.594	0.987	0.1904	---				
71	5.87	47.47	47.5	4.50	120	0.08	5.91	0.351	0.471	0.351	33.6	45.1	33.6	4,536	129	2,869	99.9	0.830	2.258	2.245	2.246	2.246	2.406	1.70	76.1	2.34	177.8	0.603	0.986	0.1911	---				
72	5.95	47.84	47.8	4.57	120	0.08	5.99	0.356	0.476	0.356	34.0	45.6	34.0	4,579	130	2,851	99.7	0.829	2.253	2.243	2.244	2.244	2.404	1.70	76.8	2.33	178.9	0.613	0.986	0.1917	---				
73	6.03	47.28	47.3	4.54	120	0.08	6.07	0.361	0.481	0.361	34.5	46.0	34.5	4,591	134	2,945	99.3	0.833	2.264	2.255	2.256	2.256	2.416	1.70	77.0	2.38	183.1	0.651	0.986	0.1923	---				
74	6.11	46.26	46.3	4.52	120	0.08	6.15	0.366	0.486	0.366	35.0	46.5	35.0	4,541	135	2,990	97.8	0.836	2.274	2.265	2.266	2.266	2.426	1.70	76.2	2.42	184.3	0.662	0.986	0.1930	---				
75	6.19	45.14	45.1	4.49	120	0.08	6.23	0.370	0.490	0.370	35.5	47.0	35.5	4,419	138	3,141	94.7	0.843	2.298	2.289	2.290	2.290	2.450	1.70	74.1	2.53	187.4	0.682	0.986	0.1936	---				
76	6.27	43.75	43.8	4.35	120	0.08	6.31	0.375	0.495	0.375	35.9	47.4	35.9	4,261	142	3,365	91.3	0.853	2.330	2.322	2.323	2.323	2.483	1.70	71.5	2.68	191.8	0.736	0.985	0.1941	---				
77	6.36	43.80	43.8	4.37	120	0.08	6.40	0.380	0.500	0.380	36.4	47.9	36.4	4,157	141	3,428	88.8	0.857	2.345	2.337	2.337	2.337	2.497	1.70	69.7	2.76	192.1	0.739	0.985	0.1947	---				
78	6.44	47.41	47.4	4.73	120	0.08	6.48	0.385	0.505	0.385

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	* σ'_{vo} tsf	** σ'_{vo} tsf	σ_{vo} kPa	σ'_{vo} kPa	* σ'_{vo} kPa	** σ'_{vo} kPa	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. correction q_{1N}	K_c	clean sand correction $(q_{1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
107	8.75	25.00	25.000	1.20	120	0.28	8.82	0.528	0.528	0.528	50.5	50.5	50.5	50.5	2,475	115	4,731	43.4	0.950	2.846	2.846	2.846	2.846	2.936	1.70	41.8	4.84	201.2	0.837	0.980	0.2075	---	---	---	---
108	8.98	25.00	25.000	1.17	120	0.28	9.26	0.533	0.533	0.533	51.0	52.5	51.0	51.0	2,355	107	4,451	40.9	0.954	2.861	2.858	2.859	2.859	2.919	1.70	39.5	4.94	195.3	0.772	0.979	0.2078	---	---	---	---
109	9.18	25.00	25.000	1.17	120	0.28	9.46	0.538	0.538	0.538	51.5	53.5	51.5	51.5	2,307	106	4,713	39.8	0.957	2.873	2.870	2.871	2.871	2.931	1.70	38.7	5.05	195.4	0.774	0.979	0.2081	---	---	---	---
110	9.36	25.00	25.000	1.17	120	0.28	9.65	0.543	0.543	0.543	52.0	53.4	52.0	52.0	2,271	105	4,750	39.0	0.960	2.882	2.880	2.880	2.880	2.940	1.70	38.1	5.13	195.5	0.775	0.979	0.2084	---	---	---	---
111	9.10	25.00	25.000	1.17	120	0.28	9.15	0.547	0.667	0.547	52.4	63.0	52.4	2,223	103	4,757	37.9	0.963	2.891	2.889	2.889	2.889	2.889	2.949	1.70	37.3	5.21	194.3	0.763	0.979	0.2087	---	---	---	---
112	9.23	25.00	25.000	1.17	120	0.28	9.23	0.552	0.672	0.552	52.9	64.4	52.9	2,159	104	4,918	36.8	0.969	2.711	2.709	2.709	2.709	2.869	1.70	36.2	5.40	195.7	0.777	0.979	0.2090	---	---	---	---
113	9.37	25.00	25.000	1.17	120	0.28	9.31	0.557	0.677	0.557	53.4	64.8	53.4	2,128	105	5,050	35.9	0.973	2.725	2.723	2.723	2.723	2.883	1.70	35.7	5.54	197.6	0.788	0.978	0.2093	---	---	---	---
114	9.55	21.70	21.700	1.17	120	0.28	9.39	0.562	0.682	0.562	53.8	65.3	53.8	2,078	106	5,242	34.9	0.979	2.745	2.743	2.743	2.743	2.903	1.70	34.9	5.73	199.8	0.822	0.978	0.2096	---	---	---	---
115	9.47	24.83	24.830	1.17	120	0.28	9.47	0.567	0.687	0.567	54.3	65.8	54.3	2,005	104	5,096	34.8	0.978	2.737	2.735	2.735	2.735	2.895	1.70	35.1	5.65	198.5	0.808	0.978	0.2099	---	---	---	---
116	9.39	23.95	23.950	1.17	120	0.28	9.55	0.572	0.692	0.572	54.8	66.3	54.8	2,065	103	5,117	34.1	0.979	2.744	2.743	2.743	2.743	2.903	1.70	34.6	5.73	198.3	0.805	0.978	0.2102	---	---	---	---
117	9.60	21.32	21.320	1.17	120	0.28	9.64	0.577	0.697	0.577	55.2	66.7	55.3	2,042	104	5,211	33.5	0.982	2.755	2.753	2.754	2.754	2.914	1.70	34.2	5.83	199.7	0.821	0.978	0.2104	---	---	---	---
118	9.68	20.41	20.410	1.17	120	0.28	9.72	0.582	0.702	0.582	55.7	67.2	55.7	1,964	102	5,329	33.1	0.985	2.775	2.774	2.774	2.774	2.934	1.70	33.9	6.04	196.0	0.812	0.977	0.2107	---	---	---	---
119	9.80	18.01	18.010	1.17	120	0.28	9.80	0.587	0.707	0.587	56.2	67.7	56.2	1,813	97	5,512	29.5	0.989	2.811	2.810	2.810	2.810	2.970	1.70	33.4	6.42	185.1	0.711	0.977	0.2110	---	---	---	---
120	9.92	17.11	17.110	1.17	120	0.28	9.88	0.592	0.712	0.592	56.7	68.2	56.7	1,639	91	5,724	26.6	1.012	2.855	2.854	2.854	2.854	3.014	1.70	32.9	6.90	169.7	0.715	0.977	0.2112	---	---	---	---
121	9.92	15.12	15.120	0.87	120	0.28	9.97	0.597	0.717	0.597	57.1	68.6	57.1	1,451	84	5,999	23.4	1.028	2.908	2.907	2.907	2.907	3.067	1.70	24.3	7.52	183.1	0.651	0.977	0.2115	---	---	---	---
122	10.01	15.12	15.120	0.78	120	0.28	10.05	0.602	0.722	0.602	57.6	69.1	57.6	1,280	74	6,085	20.6	1.042	2.954	2.953	2.953	2.953	3.113	1.70	21.5	8.09	173.7	0.568	0.977	0.2117	---	---	---	---
123	10.19	17.27	17.270	0.78	120	0.28	10.13	0.607	0.727	0.607	58.1	69.6	58.1	1,175	69	6,147	18.7	1.052	2.986	2.985	2.986	2.986	3.146	1.70	19.7	8.51	167.7	0.519	0.976	0.2120	---	---	---	---
124	10.17	18.31	18.310	0.87	120	0.28	10.21	0.611	0.731	0.611	58.6	70.0	58.6	1,160	68	5,896	18.3	1.050	2.981	2.981	2.981	2.981	3.141	1.70	19.5	8.45	164.3	0.482	0.976	0.2122	---	---	---	---
125	10.25	17.65	17.650	0.95	120	0.28	10.29	0.616	0.736	0.616	59.0	70.5	59.0	1,209	62	5,419	18.9	1.040	2.947	2.946	2.946	2.946	3.106	1.70	20.3	8.00	162.4	0.478	0.976	0.2124	---	---	---	---
126	10.33	17.72	17.720	0.95	120	0.28	10.38	0.621	0.741	0.621	59.5	71.0	59.5	1,314	63	5,054	20.3	1.027	2.903	2.902	2.902	2.902	3.062	1.70	22.0	7.47	164.5	0.494	0.976	0.2127	---	---	---	---
127	10.42	17.72	17.720	0.95	120	0.28	10.46	0.626	0.746	0.626	60.0	71.5	60.0	1,416	67	4,921	21.7	1.016	2.874	2.873	2.873	2.873	3.033	1.70	23.8	7.12	169.1	0.530	0.976	0.2129	---	---	---	---
128	10.50	18.32	18.320	0.95	120	0.28	10.54	0.631	0.751	0.631	60.4	71.9	60.4	1,486	72	5,037	22.6	1.016	2.867	2.866	2.866	2.866	3.026	1.69	24.8	7.04	174.6	0.575	0.976	0.2131	---	---	---	---
129	10.62	18.47	18.470	1.08	120	0.28	10.62	0.636	0.756	0.636	60.9	72.4	60.9	1,572	82	5,423	23.8	1.017	2.872	2.871	2.871	2.871	3.031	1.68	26.0	7.10	184.8	0.667	0.975	0.2133	---	---	---	---
130	10.66	17.76	17.760	1.08	120	0.28	10.70	0.641	0.761	0.641	61.4	72.9	61.4	1,666	87	5,394	25.0	1.012	2.854	2.853	2.853	2.853	3.013	1.66	27.3	6.90	186.3	0.701	0.975	0.2136	---	---	---	---
131	10.74	19.15	19.150	1.08	120	0.28	10.79	0.646	0.766	0.646	61.9	73.3	61.9	1,834	96	5,091	27.3	0.999	2.810	2.809	2.809	2.809	2.969	1.64	29.6	6.41	189.8	0.716	0.975	0.2138	---	---	---	---
132	10.83	21.26	21.260	1.08	120	0.28	10.87	0.651	0.771	0.651	62.3	73.8	62.3	2,039	94	4,768	30.0	0.984	2.760	2.759	2.759	2.759	2.919	1.61	32.5	5.89	191.1	0.729	0.975	0.2140	---	---	---	---
133	10.91	25.77	25.770	1.08	120	0.28	10.95	0.656	0.776	0.656	62.8	74.3	62.8	2,468	99	4,105	35.8	0.954	2.660	2.659	2.659	2.659	2.819	1.58	38.4	4.95	190.2	0.720	0.975	0.2142	---	---	---	---
134	11.00	29.76	29.760	1.08	120	0.28	11.03	0.661	0.781	0.661	63.2	74.8	63.3	2,852	98	3,400	41.3	0.925	2.566	2.565	2.565	2.565	2.725	1.55	44.1	4.18	184.4	0.693	0.974	0.2144	---	---	---	---
135	11.07	33.78	33.780	1.08	120	0.28	11.11	0.666	0.786	0.666	63.7	75.2	63.7	3,233	94	2,979	45.5	0.902	2.489	2.488	2.488	2.488	2.648	1.52	48.5	3.63	176.0	0.587	0.974	0.2146	---	---	---	---
136	11.16	39.05	39.050	1.08	120	0.28	11.20	0.671	0.791	0.671	64.2	75.7	64.2	3,642	90	2,503	50.5	0.877	2.405	2.403	2.403	2.403	2.563	1.49	53.6	3.11	166.6	0.510	0.974	0.2148	---	---	---	---
137	11.24	45.26	45.260	1.08	120	0.28	11.28	0.676	0.796	0.676	64.7	76.2	64.7	4,112	85	2,101	56.1	0.851	2.318	2.318	2.318	2.318	2.478	1.47	59.5	2.66	158.0	0.447	0.974	0.2150	---	---	---	---
138	11.32	46.27	46.270	0.87	120	0.28	11.36	0.680	0.800	0.680	65.2	76.6	65.2	4,479	79	1,779	60.3	0.830	2.248	2.246	2.246	2.246	2.406	1.44	63.8	2.34	149.1	0.388	0.974	0.2152	---	---	---	---
139	11.41	47.28	47.280	0.87	120	0.28	11.44	0.685	0.805	0.685	65.6	77.1	65.6	4,884	71	1,538	62.4	0.814	2.196	2.194	2.194	2.194	2.354	1.42	65.8	2.14	140.6	0.338	0.973	0.2154	---	---	---	---
140	11.48	43.11	43.110	0.87	120	0.28	11.52	0.690	0.810	0.690	66.1	77.6	66.1	4,694	69	1,434	64.8	0.805	2.165	2.163	2.163	2.163	2.323	1.41	68.1	2.02	137.9	0.324	0.973	0.2156	---	---	---	---
141	11.61	39.94	39.940	0.87	120	0.28	11.61	0.695	0.815	0.695	66.6	78.1	66.6	5,114	72	1,417	67.1	0.800	2.149	2.147	2.147	2.147	2.307	1.40	70.6	1.97	139.2	0.331	0.973	0.2157	---	---	---	---
142	11.65	32.48	32.480	0.87	120	0.28	11.69	0.700	0.820	0.700	67.0	78.5	67.0	5,223	74	1,417	68.3	0.798	2.143	2.141	2.141	2.141	2.301	1.39	71.8	1.95	140.1	0.336	0.973	0.2159	---	---	---	---
143	11.73	25.50	25.500	0.87	120	0.28	11.77	0.705	0.825	0.705	67.5	79.0	67.5	5,353	78	1,469	69.6	0.799	2.146	2.145	2.145	2.145	2.305	1.38	73.1	1.96	143.5	0.355	0.973	0.2161	---	---	---	---
144	11.81	21.70	21.700	0.87	120	0.28	11.85	0.710	0.830	0.710	68.0	79.5	68.0	5,409	81	1,508	70.0	0.801	2.151	2.150	2.150	2.150	2.310	1.38	73.6	1.98	145.0	0.367	0.973	0.2163	---	---	---	---
145	11.89	22.69	22.690	0.87	120	0.28	11.93	0.715	0.835	0.715	68.4	79.9	68.4	5,516	82	1,503	71.0	0.799	2.146	2.144	2.144	2.144	2.304	1.37	74.2	1.96	145.3	0.370	0.972	0.2165	---	---	---	---
146	11.97	23.68	23.680	0.87	120	0.28	12.02	0.720	0.840	0.720	68.9	80.4	68.9	5,612	79	1,423	71.8	0.784	2.127	2.125	2.125	2.125	2.285	1.36	75.2	1.90	143.0	0.352	0.972	0.2168	---	---	---	---
147	12.06	26.93	26.930	0.87	120	0.28	12.10	0.725	0.845	0.725	69.4	80.9	69.4	5,677	75	1,329	72.1	0.767	2.106	2.104	2.104	2.104	2.264	1.35	75.5	1.84	136.8	0.329	0.972	0.2168	---	---	---	---
148	12.14	36.18	36.180	0.87	120	0.28	12.18	0.730	0.850	0.730	69.8	81.4	69.9	5,638	59	1,058	70.8	0.771	2.050	2.048	2.049	2.049	2.209	1.33	74.1	1.69	125.1	0.262	0.972	0.2170	---	---	0.001	---
149	12.22	45.37	45.370	0.87	120	0.28	12.26	0.734	0.854	0.734	70.3	81.9	70.3	5,730	56	1,088	71.5	0.764	2.029	2.027	2.027	2.027	2.187	1.32	74.7	1.64	122.3	0.250	0.972	0.2171	---	---	0.001	---
150	12.30	56.56	56.560	0.87	120	0.28	12.34	0.739	0.859	0.739	70.8	82.3	70.8	6,027	58	0.941	74.7	0.756	2.001	1.999	1.999	1.999	2.159	1.31	78.0	1.57	122.8	0.251	0.971	0.2173	---	---	0.001	---
151	12.43	67.74	67.740	0.87	120	0.28	12.43	0.744	0.864	0.744	71.2	82.8	71.3	6,341	58	0.909	78.1	0.750	1.982	1.980	1.980	1.980	2.140	1.30	81.5	1.53	124.8	0.261	0.971	0.2174	---	---	0.001	---
152	12.51	72.79	72.790	0.87	120	0.28	12.51	0.749	0.869	0.749	71.7	83.2	71.7	6,776	63	0.933	83.0	0.744	1.962	1.960	1.960	1.960	2.120	1.29	86.4	1.49	129.0	0.280	0.971	0.2176	---	---	0.001	---
153	12.59	75.34	75.340	0.87	120	0.28	12.59	0.754	0.874	0.754	72.2	83.7	72.2	7,205	71	0.992	87.9	0.743	1.958	1.957	1.957	1.957	2.117	1.29	91.4	1.49	135.9	0.313	0.971	0.2177	---	---	---	---
154	12.67	76.59	76.590	0.87	120	0.28	12.67	0.759	0.879	0.759	72.7	84.2	72.7	7,507	77	1,059	88.9	0.747	1.972	1.971	1.971	1.971	2.131	1.28	92.4	1.51	139.8	0.334	0.971	0.2179	---	---	---	---
155	12.75	78.15	78.150	0.87	120	0.28	12.75	0.764	0.884	0.764	73.2	84.7	73.2	7,500	83	1,120	91.0	0.750	1.980	1.978	1.978	1.978	2.138	1.28	94.2	1.53	144.4	0.360	0.970	0.2180	---	---	---	---
156	12.84	77.67	77.670	0.87	120	0.28	12.84	0.769	0.889	0.769	73.6	85.1	73.6	7,573	86	1,194	91.6	0.754	1.995	1.994	1.994	1.994	2.154	1.27	95.1	1.56	148.4	0.384	0.970	0.2182	---	---	---	---
157	12.92	76.73	76.730	0.87	120	0.28	12.92	0.774	0.894	0.774	74.1	85.6	74.1	7,587	93	1,236	91.5	0.757	2.005	2.004	2.004	2.004	2.164	1.27	94.9	1.58	150.2	0.395	0.970	0.2183	---	---	---	---
158	13.00	79.53	79.530	0.87	120	0.28	13.00	0.779	0.899	0.779	74.5	86.1	74.5	7,607	94	1,248	91.4	0.758	2.008	2.007	2.007	2.007	2.167	1.26	94.7	1.59	150.6	0.398	0.970	0.2185	---	---	---	---
159	13.08	79.84	79.840	0.87	120	0.28	13.08	0.784	0.904	0.784	75.0	86.5	75.0	7,635	95	1,262	91.3	0.759	2.011	2.010	2.010	2.010	2.170	1.26	94.6	1.60	151.1	0.401	0.970	0.2186	---	---	---	---
160	13.16	78.91	78.910	0.87	120	0.28	13.16	0.789	0.909	0.789	75.5	87.0	75.5	7,652	104	1,375	91.4	0.766	2.038	2.035	2.035	2.035	2.195	1.25	94.8	1.65	156.5	0.436	0.969	0.2188	---	---	---	---
161	13.25	77.94	77.940	0.87	120	0.28	13.25	0.794	0.914	0.794	76.0	87.5	76.0	7,560	119	1,593	90.2	0.781	2.083	2.082	2.082	2.082	2.242	1.25	93.4	1.78	165.8	0.499	0.969	0.2189	---	---	---	---
162	13.33	77.15	77.150	0.87	120	0.28	13.33	0.798	0.918	0.798	76.5	88.0	76.5	7,386	129	1,762	88.0	0.792	2.121	2.120	2.120	2.120	2.280	1.25	91.1	1.89	171.8	0.551	0.969	0.2190	---	---	---	---
163	13.41	80.03	80.030	0.87	120	0.28	13.41	0.803	0.923	0.803	76.9	88.4	76.9	7,018	142	2,043	83.6	0.810	2.181	2.180	2.180	2.180	2.340	1.25	86.6	2.09	180.5	0.627	0.969	0.2192	---	---	---	---
164	13.49	82.92	82.920	0.87	120	0.28	13.49	0.808	0.928	0.808	77.4	88.9	77.4	6,425	144	2,266	76.5	0.828	2.240	2.239	2.239	2.239	2.399	1.25	79.2	2.31	183.1	0.651	0.969	0.2193	---	---	---	---
165	13.63	83.93	83.930	1.48	120	0.28	13.57	0.813	0.933	0.813	77.9	89.4	77.9	6,054	143	2,391	71.9	0.838	2.275	2.275	2.275	2.275	2.435	1.25	74.5	2.46	183.3	0.653	0.968	0.2194	---	---	---	---
166	13.66	84.18	84.180	1.48	120	0.28	13.66	0.818	0.938	0.818	78.3	89.8	78.3	5,928	146	2,461	71.1	0.842	2.288	2.287	2.287	2.287	2.447	1.24	73.6	2.52	185.2	0.671	0.968	0.2195	---	---	---	---
167	13.70	85.53	85.530	1.48	120	0.28	13.74	0.823	0.943	0.823	78.8	90.3	78.8	6,275	144	2,331	73.8	0.834	2.259	2.259	2.259	2.259	2.419	1.23	76.4	2.39	182.6	0.646	0.968	0.2197	---	---	---	---
168	13.82	86.28	86.280	1.48	120	0.28	13.82	0.828	0.948	0.828	79.3	90.8	79.3	6,570	137	2,105	78.7	0.821	2.216	2.216	2.216	2.216	2.376	1.22	79.3	2.22	175.7	0.595	0.968	0.2198	---	---	---	---
169	13.90	81.19	81.190	1.48	120	0.28	13.90	0.833	0.953	0.833	79.8	91.3	79.8	6,914	127	1,884	79.0	0.808	2.173	2.173	2.173	2.173	2.333	1.21	81.8	2.05	166.0	0.521	0.968	0.2199	---	---	---	---
170	13.98	77.65	77.650	1.23	120	0.28	13.98	0.838	0.958	0.838	80.2	91.7	80.2	7,433	118	1,603	85.5	0.786	2.101	2.100	2.100	2.100	2.260	1.20	88.1	1.83	161.0	0.468	0.967	0.2200	---	---	---	---
171	14.07	81.49	81.490	1.23	120	0.28	14.07	0.843	0.963	0.843	80.7	92.2	80.7	7,614	118	1,528	89.4	0.777	2.072	2.072	2.072	2.072	2.232	1.19	92.0	1.75	160.8	0.467	0.967	0.2202	---	---	---	---
172	14.15	90.13	90.130	1.23	120	0.28	14.15	0.848	0.968	0.848	81.2	92.7	81.2	8,535	133	1,574	97.3	0.772	2.054	2.054	2.054	2.054	2.214	1.19	100.0	1.70	170.0	0.537	0.967	0.2203	---	---	---	---
173	14.23	98.76	98.760	1.23	120	0.28	14.23	0.853	0.973	0.853	81.6	93.1	81.6	8,888	150	1,701	101.0	0.776	2.066	2.065	2.065	2.065	2.225	1.18	103.7	1.73	179.5	0.618	0.967	0.2204	---	---	---	---
174	14.31	98.08	98.080	1.23	120	0.28	14.31	0.858	0.978	0.858	82.1	93.6	82.1	9,390	158	1,699	106.2	0.771	2.050	2.049	2.049	2.049	2.209	1.18	109.0	1.69	184.1	0.660	0.967	0.2205	---	---	---	---
175	14.39	99.46	99.460	1.23	120	0.28	14.39	0.862	0.982	0.862	82.6	94.1	82.6	9,342	172	1,855	105.5	0.780	2.079	2.079	2.079	2.079	2.239	1.17	108.1	1.77	191.0	0.728	0.967	0.2206	---	---	---	---
176	14.48	102.79	102.790	0.87	120	0.28	14.48	0.867	0.987	0.867	83.1	94.5	83.1	9,381	188	1,989	105.9	0.785	2.100	2.100	2.100	2.100	2.260	1.17	108.2	1.83	197.7	0.798	0.966	0.2207	---	---	---	---
177	14.56	90.25	90.250	0.87	120	0.28	14.56	0.872	0.992	0.872	83.5	95.0	83.5	8,931	194	2,188	100.3	0.800	2.145	2.145	2.145	2.145	2.305	1.17	102.8	1.96	202.1	0.848	0.966	0.2208	---	---	---	---
178	14.64	87.27	87.270	0.87	120	0.28	14.64	0.877	0.997	0.877	84.0	95.5	84.0	8,337	238	2,888	93.8	0.832	2.254	2.253	2.253	2.253	2.413	1.17	96.2	2.37	227.7	1.178	0.966	0.2209	---	---	---	---
179	14.72	98.02	98.020	0.87	120	0.28	14.72	0.882	1.002	0.882	84.5	96.0	84.5	7,562	253	3,388	85.0	0.856	2.334	2.334	2.334	2.334	2.494	1.17	87.2	2.74	236.8	1.346	0.966	0.2210	---	---	---	---
180	14.80	99.34	99.340	0.87	120	0.28	14.80	0.887	1.007	0.887	84.9	96.4	84.9	7,077	267	3,824	79.3	0.874	2.393	2.393	2.393	2.393	2.553	1.17	81.5	3.05	246.6	1.509	0.966	0.2211	---	---	---	---
181	14.89	89.92	89.920	1.012	120	0.28	14.89	0.892	1.012	0.892	85.4	96.9	85.4	7,227	272	3,803	80.7	0.872	2.387	2.386	2.386	2.386	2.546	1.16	82.8	3.01	249.5	1.524	0.966	0.2212	---	---	---	---
182	14.97	85.97	85.970	1.017	120	0.28	14.97	0.897	1.017	0.897	85.9	97.4	85.9	6,533	267	4,144	72.7	0.889	2.444	2.444	2.444	2.444	2.604	1.16	74.7	3.35	250.3	1.539	0.965	0.2213	---	---	---	---
183	15.05	90.62	90.620	1.022	120	0.28	15.05	0.902	1.022	0.902	86.4	97.8	86.4	6,487	265	4,134	71.9	0.890	2.447	2.446	2.447	2.447	2.607	1.15	73.8	3.37	248.5	1.507	0.965	0.2214	---	---	---	---
184	15.13	90.07	90.070	1.027	120	0.28	15.13	0.907	1.027	0.907	86.8	98.3	86.8	6,960	262	3,816	76.7	0.877	2.402	2.402	2.402	2.402	2.562	1.15	78.6	3.10	243.8	1.428	0.965	0.2215	---	---	---	---
185	15.21	91.02	91.020	1.032	120	0.28	15.21	0.912	1.032	0.912	87.3	98.8	87.3	7,428	232	3,163	81.3	0.853	2.324	2.324	2.324	2.324	2.484	1.14	83.2	2.69	223.8	1.123	0.965	0.2216	---	---	---	---
186	15.30	93.37	93.370	1.037	120	0.28	15.30	0.917	1.037	0.917	87.8	99.3	87.8	7,763	219	2,845	84.5

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	σ'_{vo} tsf *	σ'_{vo} tsf **	σ_{vo} kPa	σ'_{vo} kPa *	σ'_{vo} kPa **	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration: Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. correction q_{c1N}	Kc	clean sand correction $(q_{c1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
238	19.52	151.07	151.067	1.73	120	0.08	19.56	1.172	1.292	1.172	112.3	123.8	112.3	14,466	166	1.153	133.7	0.713	1.856	1.856	1.856	1.856	2.016	0.93	132.7	1.32	175.3	0.581	0.954	0.2251	---			
239	19.60	137.13	137.13	1.72	120	0.08	19.64	1.177	1.297	1.177	112.7	124.2	112.7	13,132	165	1.267	120.7	0.731	1.916	1.916	1.916	1.916	2.076	0.93	119.9	1.41	169.3	0.531	0.954	0.2252	---			
240	19.68	119.32	119.317	1.75	120	0.08	19.73	1.182	1.302	1.182	113.2	124.7	113.2	11,426	168	1.483	104.2	0.759	2.009	2.009	2.009	2.009	2.169	0.92	103.7	1.59	165.2	0.500	0.954	0.2252	---			
241	19.77	105.77	105.772	1.62	120	0.08	19.81	1.187	1.307	1.187	113.7	125.2	113.7	10,129	155	1.544	91.8	0.774	2.061	2.061	2.061	2.061	2.221	0.91	91.4	1.72	157.2	0.441	0.954	0.2252	---			
242	19.85	90.58	90.5994	1.52	120	0.08	19.89	1.192	1.312	1.192	114.2	125.7	114.2	8,674	146	1.705	78.0	0.799	2.142	2.142	2.142	2.142	2.302	0.91	77.8	1.96	152.1	0.408	0.954	0.2253	---			
243	19.93	67.81	67.8102	1.52	120	0.08	19.97	1.197	1.317	1.197	114.6	126.1	114.6	6,493	146	2.282	57.6	0.853	2.325	2.325	2.325	2.325	2.485	0.90	57.7	2.69	155.3	0.429	0.954	0.2253	---			
244	20.01	62.67	62.6618	1.53	120	0.08	20.05	1.202	1.322	1.202	115.1	126.6	115.1	6,001	146	2.483	52.8	0.869	2.377	2.377	2.377	2.377	2.537	0.90	53.0	2.96	157.1	0.440	0.953	0.2254	---			
245	20.09	60.24	60.2773	1.37	120	0.08	20.14	1.207	1.327	1.207	115.6	127.1	115.6	5,769	131	2.312	50.6	0.867	2.370	2.370	2.370	2.370	2.530	0.89	50.8	2.92	148.6	0.385	0.953	0.2254	---			
246	20.18	59.7	59.7023	0.85	120	0.08	20.22	1.212	1.332	1.212	116.0	127.5	116.0	5,717	81	1.455	50.3	0.829	2.243	2.243	2.243	2.243	2.403	0.89	50.4	2.32	117.2	0.230	0.953	0.2254	---			0.001
247	20.26	58.55	58.5489	0.77	120	0.08	20.30	1.217	1.337	1.217	116.5	128.0	116.5	5,607	74	1.347	49.1	0.825	2.230	2.230	2.230	2.230	2.390	0.89	49.3	2.27	112.0	0.211	0.953	0.2255	---			0.001
248	20.34	55.58	55.5812	0.72	120	0.08	20.38	1.222	1.342	1.222	117.0	128.5	117.0	5,322	69	1.317	46.4	0.829	2.244	2.244	2.244	2.244	2.404	0.89	46.6	2.33	108.5	0.199	0.953	0.2255	---			0.001
249	20.42	53.02	53.0252	0.71	120	0.08	20.46	1.227	1.347	1.227	117.5	129.0	117.5	5,077	68	1.367	44.0	0.837	2.272	2.272	2.272	2.272	2.432	0.88	44.3	2.45	108.3	0.198	0.952	0.2256	---			0.001
250	20.51	55.56	55.5626	0.71	120	0.08	20.55	1.232	1.352	1.232	117.9	129.4	117.9	5,320	68	1.301	46.1	0.829	2.243	2.243	2.243	2.243	2.403	0.88	46.3	2.32	107.6	0.196	0.952	0.2256	---			0.001
251	20.59	61.13	61.1336	0.74	120	0.08	20.63	1.236	1.356	1.236	118.4	129.9	118.4	5,854	71	1.237	50.8	0.815	2.196	2.196	2.196	2.196	2.356	0.88	50.9	2.14	108.9	0.200	0.952	0.2256	---			0.001
252	20.67	72.39	72.3919	0.89	120	0.08	20.71	1.241	1.361	1.241	118.9	130.4	118.9	6,932	85	1.244	60.4	0.797	2.138	2.138	2.138	2.138	2.298	0.88	60.2	1.94	116.9	0.229	0.952	0.2257	---			0.001
253	20.75	83.69	83.6933	0.78	120	0.08	20.79	1.246	1.366	1.246	119.3	130.8	119.3	8,014	75	0.949	70.2	0.760	2.014	2.014	2.014	2.014	2.174	0.88	69.8	1.61	112.1	0.211	0.952	0.2257	---			0.001
254	20.83	99.26	99.2671	1.38	120	0.08	20.87	1.251	1.371	1.251	119.8	131.3	119.8	9,505	132	1.407	83.1	0.776	2.066	2.065	2.065	2.065	2.225	0.88	82.4	1.73	142.6	0.349	0.951	0.2257	---			
255	20.92	105.82	105.84	1.56	120	0.08	20.96	1.256	1.376	1.256	120.3	131.8	120.3	10,133	150	1.496	88.4	0.775	2.063	2.063	2.063	2.063	2.223	0.88	87.6	1.72	151.0	0.400	0.951	0.2258	---			
256	21.00	114.71	114.732	1.70	120	0.08	21.04	1.261	1.381	1.261	120.8	132.3	120.8	10,985	163	1.502	95.8	0.768	2.039	2.038	2.038	2.038	2.198	0.87	94.7	1.66	157.6	0.444	0.951	0.2258	---			
257	21.08	126.01	126.023	1.68	120	0.08	21.12	1.266	1.386	1.266	121.2	132.7	121.2	12,067	161	1.349	105.4	0.749	1.977	1.976	1.976	1.976	2.136	0.87	104.1	1.52	158.7	0.452	0.951	0.2258	---			
258	21.16	135.36	135.409	2.22	120	0.08	21.20	1.271	1.391	1.271	121.7	133.2	121.7	12,962	212	1.655	112.8	0.761	2.018	2.017	2.017	2.017	2.177	0.87	111.3	1.61	179.4	0.617	0.951	0.2258	---			
259	21.24	150.14	150.208	2.33	120	0.08	21.28	1.276	1.396	1.276	122.2	133.7	122.2	14,377	223	1.566	125.2	0.746	1.968	1.968	1.968	1.968	2.128	0.87	123.4	1.51	186.1	0.679	0.950	0.2259	---			
260	21.33	162.79	162.836	2.66	120	0.08	21.37	1.281	1.401	1.281	122.6	134.1	122.6	15,589	254	1.644	135.6	0.744	1.960	1.960	1.960	1.960	2.120	0.87	133.5	1.49	199.0	0.813	0.950	0.2259	---			
261	21.41	168.87	168.921	2.90	120	0.08	21.45	1.286	1.406	1.286	123.1	134.6	123.1	16,171	278	1.732	140.3	0.746	1.967	1.966	1.966	1.966	2.126	0.86	138.0	1.50	207.6	0.912	0.950	0.2259	---			
262	21.49	122.05	122.062	2.69	120	0.08	21.53	1.291	1.411	1.291	123.6	135.1	123.6	11,688	257	2.227	99.7	0.800	2.147	2.147	2.147	2.147	2.307	0.85	98.4	1.97	194.0	0.759	0.950	0.2260	---			
263	21.57	99.08	99.0753	2.55	120	0.08	21.61	1.296	1.416	1.296	124.1	135.5	124.1	9,488	244	2.609	79.9	0.835	2.263	2.263	2.263	2.263	2.423	0.84	79.1	2.41	190.4	0.722	0.950	0.2260	---			
264	21.65	62.25	62.3607	2.18	120	0.08	21.69	1.300	1.420	1.300	124.5	136.0	124.5	5,961	208	3.569	48.9	0.909	2.510	2.509	2.509	2.509	2.669	0.83	48.8	3.78	184.3	0.662	0.950	0.2260	---			
265	21.74	49.16	49.3752	2.02	120	0.08	21.78	1.305	1.425	1.305	125.0	136.5	125.0	4,708	194	4.227	37.9	0.948	2.640	2.639	2.639	2.639	2.799	0.82	38.1	4.78	182.0	0.640	0.949	0.2260	---			
266	21.82	39.16	39.3012	1.60	120	0.08	21.86	1.310	1.430	1.310	125.5	137.0	125.5	3,750	153	4.217	29.7	0.970	2.715	2.715	2.715	2.715	2.875	0.81	30.1	5.46	164.1	0.491	0.949	0.2261	---			
267	21.90	38.46	38.5761	1.33	120	0.08	21.94	1.315	1.435	1.315	125.9	137.4	125.9	3,683	127	3.578	29.2	0.958	2.674	2.673	2.673	2.673	2.833	0.81	29.5	5.07	149.7	0.392	0.949	0.2261	---			
268	21.98	32.38	32.5079	1.07	120	0.08	22.02	1.320	1.440	1.320	126.4	137.9	126.4	3,101	103	3.455	24.2	0.973	2.724	2.724	2.724	2.724	2.884	0.81	24.7	5.54	136.8	0.318	0.949	0.2261	---			
269	22.06	27.99	28.0632	0.97	120	0.08	22.10	1.325	1.445	1.325	126.9	138.4	126.9	2,680	93	3.649	20.6	0.994	2.793	2.793	2.793	2.793	2.953	0.80	21.2	6.23	131.9	0.293	0.949	0.2261	---			
270	22.15	26.41	26.4777	0.89	120	0.08	22.19	1.330	1.450	1.330	127.4	138.8	127.4	2,529	85	3.537	19.3	0.998	2.807	2.806	2.806	2.806	2.966	0.80	19.9	6.38	126.7	0.269	0.948	0.2262	---			
271	22.23	30.14	30.2145	0.96	120	0.08	22.27	1.335	1.455	1.335	127.8	139.3	127.8	2,886	91	3.315	22.2	0.978	2.742	2.741	2.741	2.741	2.901	0.80	22.7	5.71	129.6	0.282	0.948	0.2262	---			
272	22.31	37.91	37.9471	1.04	120	0.08	22.35	1.340	1.460	1.340	128.3	139.8	128.3	3,630	99	2.841	28.4	0.941	2.617	2.617	2.617	2.617	2.777	0.80	28.7	4.59	131.7	0.292	0.948	0.2262	---			
273	22.39	48.23	48.2792	1.10	120	0.08	22.43	1.345	1.465	1.345	128.8	140.3	128.8	4,619	105	2.335	36.7	0.899	2.477	2.477	2.477	2.477	2.637	0.81	36.7	3.56	130.8	0.288	0.948	0.2262	---			
274	22.47	48.59	48.6282	1.15	120	0.08	22.51	1.350	1.470	1.350	129.2	140.7	129.2	4,653	110	2.436	36.8	0.902	2.488	2.487	2.487	2.487	2.647	0.80	36.9	3.63	133.8	0.303	0.948	0.2263	---			
275	22.56	49.62	49.6573	1.25	120	0.08	22.60	1.355	1.475	1.355	129.7	141.2	129.7	4,752	120	2.586	37.5	0.905	2.499	2.498	2.498	2.498	2.658	0.80	37.5	3.70	138.8	0.329	0.947	0.2263	---			
276	22.64	48.44	48.4766	1.45	120	0.08	22.68	1.359	1.479	1.359	130.2	141.7	130.2	4,639	139	3.082	36.3	0.924	2.559	2.559	2.559	2.559	2.719	0.79	36.3	4.14	150.2	0.395	0.947	0.2263	---			
277	22.72	51.46	51.4833	1.54	120	0.08	22.76	1.364	1.484	1.364	130.7	142.1	130.7	4,928	147	3.074	38.6	0.916	2.539	2.539	2.539	2.539	2.699	0.79	38.5	3.99	153.5	0.416	0.947	0.2263	---			
278	22.80	54.48	54.489	1.64	120	0.08	22.84	1.369	1.489	1.369	131.1	142.6	131.1	5,217	157	3.080	40.8	0.912	2.521	2.521	2.521	2.521	2.681	0.79	40.7	3.86	157.1	0.440	0.947	0.2263	---			
279	22.88	53.08	53.0855	1.62	120	0.08	22.92	1.374	1.494	1.374	131.6	143.1	131.6	5,083	155	3.139	39.6	0.917	2.537	2.536	2.536	2.536	2.696	0.79	39.5	3.97	156.7	0.438	0.947	0.2264	---			
280	22.97	52.11	52.1237	1.57	120	0.08	23.01	1.379	1.499	1.379	132.1	143.6	132.1	4,990	150	3.091	38.7	0.918	2.539	2.539	2.539	2.539	2.699	0.78	38.6	3.99	154.0	0.420	0.946	0.2264	---			
281	23.05	55.77	55.7882	1.58	120	0.08	23.09	1.384	1.504	1.384	132.5	144.0	132.5	5,341	151	2.898	41.5	0.905	2.498	2.497	2.497	2.497	2.657	0.78	41.3	3.70	152.8	0.412	0.946	0.2264	---			
282	23.13	65.23	65.2669	1.62	120	0.08	23.17	1.389	1.509	1.389	133.0	144.5	133.0	6,246	155	2.538	49.0	0.878	2.406	2.405	2.405	2.405	2.565	0.79	48.5	3.12	151.6	0.404	0.946	0.2264	---			
283	23.21	69.88	69.9028	1.62	120	0.08	23.25	1.394	1.514	1.394	133.5	145.0	133.5	6,692	155	2.363	52.6	0.864	2.362	2.362	2.362	2.362	2.522	0.79	52.0	2.88	149.9	0.393	0.946	0.2264	---			
284	23.29	73.97	73.9807	1.60	120	0.08	23.33	1.399	1.519	1.399	134.0	145.4	134.0	7,083	153	2.202	55.8	0.853	2.323	2.322	2.322	2.322	2.482	0.79	55.1	2.68	147.6	0.379	0.946	0.2265	---			
285	23.38	71.91	71.9173	1.60	120	0.08	23.42	1.404	1.524	1.404	134.4	145.9	134.4	6,886	153	2.266	53.9	0.858	2.342	2.341	2.341	2.341	2.501	0.78	53.3	2.77	147.9	0.381	0.945	0.2265	---			
286	23.46	70.56	70.5681	1.73	120	0.08	23.50	1.409	1.529	1.409	134.9	146.4	134.9	6,757	166	2.503	52.6	0.870	2.379	2.378	2.378	2.378	2.538	0.78	52.0	2.97	154.4	0.423	0.945	0.2265	---			
287	23.54	68.82	68.8305	1.99	120	0.08	23.58	1.414	1.534	1.414	135.4	146.9	135.4	6,590	191	2.958	50.9	0.888	2.440	2.439	2.439	2.439	2.599	0.77	50.3	3.32	167.0	0.513	0.945	0.2265	---			
288	23.62	67.61	67.6228	1.96	120	0.08	23.66	1.419	1.539	1.419	135.8	147.3	135.8	6,474	188	2.960	49.8	0.890	2.446	2.446	2.446	2.446	2.606	0.77	49.2	3.36	165.5	0.501	0.945	0.2265	---			
289	23.70	67.94	67.9535	2.01	120	0.08	23.74	1.423	1.543	1.423	136.3	147.8	136.3	6,506	193	3.023	49.8	0.891	2.452	2.452	2.452	2.452	2.612	0.77	49.3	3.40	167.5	0.517	0.945	0.2265	---			
290	23.79	67.73	67.7422	2.02	120	0.08	23.83	1.428	1.548	1.428	136.8	148.3	136.8	6,486	193	3.047	49.5	0.893	2.457	2.456	2.456	2.456	2.616	0.77	49.0	3.42	167.7	0.519	0.945	0.2265	---			
291	23.87	67.2	67.2136	2.13	120	0.08	23.91	1.433	1.553	1.433	137.3	148.7	137.3	6,435	204	3.234	48.9	0.899	2.479	2.478	2.478	2.478	2.638	0.76	48.3	3.57	172.4	0.556	0.944	0.2266	---			
292	23.95	65.65	65.6604	2.23	120	0.08	23.99	1.438	1.558	1.438	137.7	149.2	137.7	6,287	214	3.479	47.5	0.909	2.510	2.509	2.509	2.509	2.669	0.76	46.9	3.78	177.3	0.599	0.944	0.2266	---			
293	24.03	60.5	60.5093	2.21	120	0.08	24.07	1.443	1.563	1.443	138.2	149.7	138.2	5,793	212	3.740	43.3	0.924	2.560	2.559	2.559	2.559	2.719	0.75	42.9	4.14	177.7	0.602	0.944	0.2266	---			
294	24.11	57.18	57.1894	2.13	120	0.08	24.15	1.448	1.568	1.448	138.7	150.2	138.7	5,476	204	3.825	40.7	0.932	2.587	2.586	2.586	2.586	2.746	0.75	40.3	4.34	175.2	0.580	0.944	0.2266	---			
295	24.20	60.98	61.0075	2.21	120	0.08	24.24	1.453	1.573	1.453	139.1	150.6	139.1	5,839	212	3.711	43.4	0.923	2.557	2.556	2.556	2.556	2.716	0.75	43.0	4.11	177.0	0.595	0.944	0.2266	---			
296	24.28	67.56	67.6074	2.28	120	0.08	24.32	1.458	1.578	1.458	139.6	151.1	139.6	6,470	218	3.443	48.4	0.906	2.501	2.500	2.500	2.500	2.660	0.75	47.8	3.71	177.4	0.599	0.943	0.2266	---			
297	24.36	69.85	69.8867	2.30	120	0.08	24.40	1.463	1.583	1.463	140.1	151.6	140.1	6,689	220	3.360	50.0	0.901	2.483	2.482	2.482	2.482	2.642	0.75	49.3	3.60	177.3	0.598	0.943	0.2266	---			
298	24.44	67.16	67.189	2.23	120	0.08	24.48	1.468	1.588	1.468	140.6	152.0	140.6	6,431	213	3.393	47.8	0.906	2.500	2.499	2.499	2.499	2.659	0.74	47.2	3.71	175.0	0.578	0.943	0.2267	---			
299	24.52	71	71.0357	2.19	120	0.08	24.56	1.473	1.593	1.473	141.0	152.5	141.0	6,799	210	3.151	50.7	0.894	2.459	2.458	2.458	2.458	2.618	0.74	49.9	3.44	171.8	0.552	0.943	0.2267	---			
300	24.61	94.96	95.0127	2.06	120	0.08	24.65	1.478	1.598	1.478	141.5	153.0	141.5	9,093	198	2.208	69.4	0.832	2.254	2.253	2.253	2.253	2.413	0.76	68.0	2.36	160.7	0.466	0.943	0.2267	---			
301	24.69	128.47	128.534	2.13	120	0.08	24.73	1.483	1.603	1.483	142.0	153.5	142.0	12,302	204	1.674	95.9	0.776	2.069	2.068	2.068	2.068	2.228	0.77	93.4	1.74	162.4	0.479	0.942	0.2267	---			
302	24.77	167.8	167.848	1.96	120	0.08	24.81	1.487	1.607	1.487	142.4	153.9	142.4	16,069	188	1.179	128.0	0.718	1.874	1.872	1.872	1.872	2.032	0.78	124.2	1.34	167.0	0.513	0.942	0.2267	---			
303	24.85	195.74	195.785	1.83	120	0.08	24.89	1.492	1.612	1.492	142.9	154.4	142.9	18,744	176	0.944	151.1	0.682	1.755	1.754	1.754	1.754	1.914	0.79	146.3	1.20	175.8	0.586	0.942	0.2267	---			
304	24.93	204.96	204.994	1.97	120	0.08	24.98	1.497	1.617	1.497	143.4	154.9	143.4	19,627	189	0.970	158.1	0.680	1.749	1.747	1.747	1.747	1.907	0.79	152.9	1.20	182.9	0.649	0.942	0.2267	---			
305	25.02	194.79	194.862	2.26	120	0.08	25.06	1.502	1.622	1.502	143.9	155.3	143.9	18,653	216	1.168	148.7	0.703	1.824	1.823	1.823	1.823	1.983	0.78	143.9	1.28	183.9	0.658	0.942	0.2267	---			
306	25.10	165.21	165.291	2.60	120	0.08	25.14	1.507	1.627	1.507	144.3	155.8	144.3	15,821	249	1.586	123.6	0.748	1.975	1.974	1.974	1.974	2.134	0.77	119.8	1.52	182.0	0.641	0.941	0.2267	---			
307	25.18	129.39	129.44	2.60	120	0.08	25.22	1.512	1.632	1.512	144.8	156.3	144.8	12,390	249	2.031	94.7	0.795	2.133	2.131	2.131	2.131	2.291	0.75	92.1	1.92	176.8	0.594	0.941	0.2267	---			
308	25.26	113.77	113.815	2.52	120	0.08	25.30	1.517	1.637	1.517	145.3	156.8	145.3	10,895	241	2.246	82.2	0.818	2.207	2.205	2.205	2.205	2.365	0.75	80.1	2.18	174.3	0.572	0.941	0.2267	---			
309	25.34	96.92	96.9646	2.16	120	0.08	25.39	1.522	1.642	1.522	145.7	157.2	145.7	9,281	207	2.264	69.3	0.834	2.262	2.260	2.260	2.260	2.420	0.74	67.6	2.40	162.2	0.477	0.941	0.2268	---			
310	25.43	70.08	70.118	2.08	120	0.08	25.47	1.527	1.647	1.527	146.2	157.7	146.2	6,711	199	3.027	48.6	0.894	2.460	2.459	2.459	2.459	2.619	0.72	47.7	3.45	164.4	0.493	0.941	0.2268	---			
311	25.51	64.73	64.7853	1.99	120	0.08	25.55	1.532	1.652	1.532	146.7	158.2	146.7	6,199	189	3.144	44.5	0.905	2.499	2.498	2.498	2.498	2.658	0.72	43.8	3.70	162.0	0.475	0.941	0.2268	---			
312	25.59	61.84	61.9017	1.97	120	0.08	25.63	1.537	1.657	1.537	147.1	158.6	147.1	5,922	190	3.270	42.2	0.914	2.528	2.527	2.526	2.526	2.686	0.71	41.6	3.90	162.0	0.476	0.940	0.2268	---			
313	25.67	64.33	64.3608	1.97	120	0.08	25.71	1.542	1.662	1.542	147.6	159.1	147.6	6,160	188	3.134	43.9	0.906	2.502	2.501	2.501	2.501	2.661	0.71	43.2	3.72	160.8	0.467	0.940	0.2268	---			
314	25.75	66.82	66.8514	2.07	120	0.08	25.80	1.546	1.666	1.546	148.1	159.6	148.1	6,399	198	3.170	45.6	0.904	2.494	2.493	2.493	2.493	2.653	0.71	44.8	3.66	164.2	0.492	0.940	0.2268	---			
315	25.84	70.75	70.7777	2.18	120	0.08	25.88	1.551	1.671	1.551	148.6	160.1	148.6	6,775	209	3.156	48.3	0.898	2.474	2.473	2.473	2.473	2.633	0.71	47.4	3.53	167.6	0.518	0.940	0.2268	---			
316	25.92	67.43	67.4589	2.27	120	0.08	25.96	1.556	1.676	1.556	149.0	160.5	149.0	6,457	218	3.449	45.6	0.911	2.519	2.518	2.518	2.518	2.678	0.70	44.8	3.84	172.0	0.553	0.940	0.2268	---			
317	26.00	65.31	65.343	2.25	120	0.08	26.04	1.561	1.681	1.561	149.5	161.0	149.5	6,254	216	3.536	43.9	0.917	2.538	2.537	2.537	2.537	2.697	0.70	43.2	3.97	171.6	0.550	0.939	0.2268	---			
318	26.08	65.88	65.9161	2.28	120	0.08	26.12	1.566	1.686	1.566	150.0	161.5	150.0	6,309	219	3.551	44.2	0.917	2.537	2.536	2.536	2.536	2.696	0.70	43.5	3.97	172.4	0.557	0.939	0.2268	---			
319	26.16	67.56	67.5918	2.26	120	0.08	26.21	1.571	1.691	1.571	150.4	161.9	150.4	6,470	217	3.428	45.4	0.911	2.519	2.517	2.517	2.517	2.677	0.70	44.5	3.83	170.8	0.543	0.939	0.2268	---			
320	26.25	66.4	66.4377	2.18	120	0.08	26.29	1.576	1.696	1.576	150.9	162.4	150.9	6,358	208	3.358	44.5	0.911	2.519	2.518	2.518	2.518	2.677	0.70	43.6	3.84	167.4	0.516	0.939	0.2268	---			
321	26.33	55.93	55.9758	1.91	120	0.08	26.37	1.581	1.701	1.581	151.4	162.9	151.4	5,356	183	3.511	36.8	0.933	2.591	2.590	2.590	2.590	2.750	0.69	36.3	4.37	159.0	0.454	0.939	0.2268	---			
322	26.41	50.39	50.4375	1.86	120	0.08	26.45	1.586	1.706	1.586	151.9	163.4	151.9	4,825	178	3.801	32.7	0.951	2.652	2.651	2.651	2.651	2.811	0.68	32.4	4.88	158.1	0.447	0.938	0.2268	---			
323	26.49	47.99	48.0485	1.76	120	0.08	26.53	1.591	1.711	1.591	152.3	163.8	152.3	4,596	169	3.802	31.0	0.957	2.670	2.669	2.669	2.669	2.829	0.68	30.7	5.03	154.5	0.423	0.938	0.2268	---			
324	26.57	50.03	50.0881	1.56	120	0.08	26.62	1.596	1.716	1.596	152.8	164.3	152.8	4,791	149	3.223	32.5	0.937	2.606	2.605	2.605	2.605	2.765	0.68	32.2	4.49	144.6	0.361	0.938	0.2268	---			
325	26.66	52.98	53.0218	1.46	120	0.08	26.70	1.601	1.721	1.601	153.3	164.8	153.3	5,073	140	2.844	34.7	0.920	2.550	2.548	2.548	2.548	2.708	0.68	34.2	4.06	138.7	0.328	0.938	0.2268	---			
326	26.74	54.46	54.4985	1.35	120	0.08	26.78	1.606	1.726	1.606	153.7	165.2	153.7	5,215	129	2.545	35.8	0.908	2.508	2.506	2.506	2.506	2.666	0.69	35.2	3.76	132.5	0.296	0.938	0.2268	---			
327	26.82	57.18	57.2148	1.44	120	0.08	26.86	1.610	1.730	1.610	154.2	165.7	154.2	5,476	138	2.593	37.6	0.905	2.497	2.496	2.496	2.496	2.656	0.68	37.0	3.68	136.1	0.315	0.937	0.2268	---			
328	26.90	60.61	60.6426	1.90	120	0.08	26.94	1.615	1.735	1.615	154.7	166.2	154.7	5,804	181	3.212	39.5	0.918	2.542	2.541	2.541	2.541	2.701	0.68	38.8	4.00	155.5	0.429	0.937	0.2268	---			
329	26.98	64.5	64.5301	2.31	120	0.08	27.03	1.620	1.740	1.620	155.2	166.7	155.2	6,177	221	3.667	41.9	0.925	2.563	2.562	2.562	2.562	2.722	0.67	41.1	4.16	171.0	0.545	0.937	0.2268	---			
330	27.07	68.77	68.8074	2.65	120	0.08	27.11	1.625	1.745	1.625	155.6	167.1	155.6	6,585	254	3.951	44.6	0.926	2.567	2.565	2.565	2.565	2.725	0.67	43.7	4.18	182.8	0.648	0.937	0.2268	---			
331	27.15	67.69	67.7501	3.25	120	0.08	27.19	1.630	1.750	1.630	156.1	167.6	156.1	6,482	311	4.914	43.4	0.949	2.643	2.642	2.642	2.642	2.802	0.66	42.5	4.80	203.8	0.867	0.937	0.2268	---			
332	27.23	94.77	94.7885	3.65	120	0.08	27.27	1.635	1.755	1.635	156.6	168.1	156.6	9,075	349	3.914	62.5	0.894	2.463	2.461	2.461	2.461	2.621	0.68	60.7	3.46	209.9	0.941	0.937	0.2268	---			
333	27.31	124.16	124.158	4.05	120	0.08	27.35	1.640	1.760	1.640	157.0	168.5	157.0	11,890	388	3.306	83.5	0.853	2.324	2.322	2.322	2.322	2.482	0.69	80.8	2.68	216.5	1.023	0.936	0.2268	---			
334	27.39	128.58	128.618	4.54	120	0.08	27.44	1.645	1.765	1.645	157.5	169.0	157.5	12,313	435	3.577	86.1	0.858	2.341	2.339	2.339	2.339	2.499	0.69	83.2	2.76	230.1	1.212	0.936	0.2268	---			
335	27.48	140.95	140.996	5.03	120	0.08	27.52	1.650	1.770	1.650	158.0	169.5	158.0	13,497	482	3.610	94.6	0.851	2.317	2.316	2.316	2.316	2.476	0.69	91.3	2.65	241.8	1.395	0.936	0.2268	---			
336	27.56	171.33	171.477	7.29	120	0.08	27.60	1.655	1.775	1.655	158.5	170.0	158.5	16,407	698	4.293	114.9	0.853	2.324	2.322	2.322	2.322	2.482	0.68	110.6	2.68	296.4	2.502	0.936	0.2268	---			
337	27.64	271.19	271.352	6.28	120	0.08	27.68	1.660	1.780	1.660	158.9	170.4	158.9	25,969	601	2.329	191.1	0.749	1.979	1.977	1.977	1.977	2.137	0.71	182.9	1.53	279.2	2.104	0.936	0.2268	---			
338	27.72	324.48	324.606	6.07	120	0.08	27.76	1.665	1.785	1.665	159.4	170.9	159.4	31,072	581	1.880	232.4	0.712	1.854	1.852	1.852	1.852	2.012	0.72	222.1	1.32	292.3	2.402	0.935	0.2268	---			
339	27.80	350.85	351.299	6.70	120	0.08	27.85	1.670	1.790	1.670	159.9	171.4	159.9	33,597	642	1.919	251.4	0.708	1.841	1.839	1.839	1.839	1.999	0.72	240.1	1.30	311.9	2.901	0.935	0.2268	---			
340	27.89	390.47	390.651	3.93	120	0.08	27.93	1.674	1.794	1.674	160.3	171.8	160.3	37,391	377	1.012	289.8	0.631	1.583	1.582	1.582	1.582	1.742	0.75	276.2	1.07	294.6	2.458	0.935	0.2268	---			
341	27.97	391.64	391.761	3.01	120	0.08	28.01	1.679	1.799	1.679	160.8	172.3	160.8	37,503	288	0.771	293.9	0.604	1.493	1.493	1.493	1.493	1.653	0.76	280.0	1.01	281.5	2.154	0.935	0.2268	---			
342	28.05	355	355.124	2.97	120	0.08	28.09	1.684	1.804	1.684	161.3	172.8	161.3	33,995	284	0.840	263.8	0.621	1.549	1.549	1.549	1.549	1.709	0.75	251.4	1.04	262.5	1.762	0.935	0.2268	---			
343	28.13	347.04	347.138	4.44	120	0.08	28.17	1.689	1.809	1.689	161.8	173.2	161.8	33,233	425	1.286	251.9	0.666	1.702	1.699	1.699	1.699	1.859	0.73	240.2	1.15	276.9	2.054	0.934	0.2268	---			
344	28.21	339.23	339.271	5.43	120	0.08	28.26	1.694	1.814	1.694	162.2	173.7	162.2	32,485	520	1.610	242.7	0.692	1.788	1.786	1.786	1.786	1.946	0.72	231.5	1.24	286.0	2.256	0.934	0.2268	---			
345	28.30	357.2	357.424	5.22	120	0.08	28.34	1.699	1.819	1.699	162.7	174.2	162.7	34,205	500	1.469	257.0	0.678	1.742	1.740	1.740	1.740	1.900	0.73	244.9	1.19	291.0	2.372	0.934	0.2268	---			
346	28.38	344.24	344.42	5.03	120	0.08	28.42	1.704	1.824	1.704	163.2	174.7	163.2	32,964	481	1.468	246.8	0.681	1.752	1.750	1.750	1.750	1.910	0.72	235.2	1.20	281.8	2.161	0.934	0.2268	---			
347	28.46	359.18	359.281	4.91	120	0.08	28.50	1.709	1.829	1.709	163.6	175.1	163.6	34,395	470	1.374	258.5	0.671	1.718	1.715	1.715	1.715	1.875	0.73	246.1	1.17	287.0	2.279	0.934	0.2268	---			
348	28.54	360	360.073	4.80	120	0.08	28.58	1.714	1.834	1.714	164.1	175.6	164.1	34,474	460	1.339	259.0	0.668	1.708	1.706	1.706	1.706	1.866	0.72	246.5	1.16	285.5	2.245	0.933	0.2268	---			
349	28.62	341.99	342.11	3.97	120	0.08	28.67	1.719	1.839	1.719	164.6	176.1	164.6	32,749	380	1.166	246.8	0.657	1.675	1.672	1.672	1.672	1.832	0.73	234.9	1.13	265.6	1.822	0.933	0.2268	---			
350	28.71	335.7	335.819	3.54	120	0.08	28.75	1.724	1.844	1.724	165.1	176.5	165.1	32,147	339	1.060	242.9	0.649	1.648	1.645	1.645	1.644	1.804	0.73	231.1	1.11	256.5	1.649	0.933	0.2268	---			
351	28.79	374.37	374.595	3.48	120	0.08	28.83	1.729	1.849	1.729	165.5	177.0	165.5	35,850	333	0.933	273.5	0.628	1.572	1.572	1.572	1.572	1.732	0.74	260.0	1.06	275.4	2.023	0.933	0.2268	---			
352	28.87	356.91	357.059	2.81	120	0.08	28.91	1.733	1.853	1.733	166.0	177.5	166.0	34,178	269	0.791	261.9	0.616	1.533	1.533	1.533	1.533	1.693	0.74	248.9	1.03	257.0	1.659	0.933	0.2268	---			
353	28.95	347.91	348.056	2.47	120	0.08	28.99	1.738	1.858	1.738	166.5	178.0	166.5	33,316	237	0.714	255.8	0.609	1.509	1.509	1.509	1.509	1.669	0.74	243.0	1.02	247.1	1.483	0.932	0.2268	---			
354	29.04	331.58	331.68	2.60	120	0.08	29.08	1.743	1.863	1.743	166.9	178.4	166.9	31,752	249	0.787	241.7	0.622	1.554	1.554	1.554	1.554	1.714	0.73	229.6	1.05	240.6	1.375	0.932	0.2268	---			
355	29.12	298.8	298.846	1.68	120	0.08	29.16	1.748	1.868	1.748	167.4	178.9	167.4	28,613	161	0.567	219.5	0.603	1.490	1.490	1.490	1.490	1.650	0.74	208.6	1.00	209.3	0.932	0.932	0.2268	---			
356	29.20	284.42	284.469	1.69	120	0.08	29.24	1.753	1.873	1.753	167.9	179.4	167.9	27,236	162	0.598	207.6	0.613	1.522	1.522	1.522	1.522	1.682	0.73	197.3	1.03	202.3	0.850	0.932	0.2268	---			
357	29.28	263.34	263.385	1.74	120	0.08	29.32	1.758	1.878	1.758	168.4	179.8	168.4	25,217	167	0.665	190.1	0.629	1.579	1.578	1.578	1.578	1.738	0.73	180.8	1.06	192.3	0.741	0.932	0.2268	---			
358	29.36	256.59	256.621	1.55	120	0.08	29.40	1.763	1.883	1.763	168.8	180.3	168.8	24,571	148	0.607	185.4	0.624	1.562	1.561	1.561	1.561	1.721	0.73	176.3	1.05	185.5	0.674	0.932	0.2268	---			
359	29.45	222.34	222.365	1.31	120	0.08	29.49	1.768	1.888	1.768	169.3	180.8	169.3	21,291	126	0.595	159.2	0.637	1.608	1.605	1.605	1.605	1.765	0.72	151.5	1.08	163.9	0.489	0.931	0.2268	---			
360	29.53	187.11	187.19	1.54	120	0.08	29.57	1.773	1.893	1.773	169.8	181.3	169.8	17,918	148	0.831	130.2	0.685	1.767	1.763	1.762	1.762	1.922	0.70	124.2	1.21	150.3	0.396	0.931	0.2268	---			
361	29.61	168.09	168.205	1.72	120	0.08	29.65	1.778	1.898	1.778	170.2	181.7	170.2	16,096	165	1.033	114.8	0.716	1.870	1.866	1.866	1.866	2.026	0.69	109.6	1.33	146.3	0.371	0.931	0.2267	---			
362	29.69	150.48	150.619	1.88	120	0.08	29.73	1.783	1.903	1.783	170.7	182.2	170.7	14,410	180	1.262	100.8	0.746	1.969	1.966	1.966	1.966	2.126	0.68	96.4	1.50	144.9	0.363	0.931	0.2267	---			
363	29.77	141.15	141.213	1.77	120	0.08	29.81	1.788	1.908	1.788	171.2	182.7	171.2	13,517	170	1.272	93.9	0.753	1.994	1.991	1.990	1.990	2.150	0.67	89.9	1.55	139.6	0.333	0.931	0.2267	---			
364	29.86	122.29	122.458	1.95	120	0.08	29.90	1.793	1.913	1.793	171.7	183.1	171.7	11,710	187	1.617	79.5	0.790	2.118	2.115	2.114	2.114	2.274	0.66	76.2	1.87	142.4	0.349	0.930	0.2267	---			
365	29.94	104.94	104.993	1.89	120	0.08	29.98	1.797	1.917	1.797	172.1	183.6	172.1	10,049	181	1.830	66.9	0.818	2.209	2.206	2.206	2.206	2.366	0.65	64.3	2.18	140.1	0.336	0.930	0.2267	---			
366	30.02	92.91	92.9885	1.83	120	0.08	30.06	1.802	1.922	1.802	172.6	184.1	172.6	8,897	175	2.006	58.3	0.839	2.280	2.277	2.277	2.277	2.437	0.64	56.2	2.47	138.7	0.328	0.930	0.2267	---			
367	30.101	89.66	89.7221	1.80	120	0.08	30.14	1.807	1.927	1.807	173.1	184.6	173.1	8,586	172	2.045	55.9	0.845	2.299	2.296	2.296	2.296	2.456	0.64	53.9	2.56	137.7	0.323	0.929	0.2265	---			
368	30.183	85.7	85.7531	1.44	120	0.08	30.22	1.812	1.932	1.812	173.5	185.0	173.5	8,207	138	1.714	53.6	0.834	2.263	2.260	2.259	2.259	2.419	0.64	51.7	2.39	123.8	0.256	0.928	0.2264	---			0.001

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ'_{v0} tsf	* σ'_{vc} tsf	** σ'_{vc} tsf	σ_{vc} kPa	σ'_{vc} kPa	* σ_{vc} kPa	** σ_{vc} kPa	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration: Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. correction q_{1N}	K_c	clean sand correction $(q_{1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches) Y&I	T&S	Pradel
369	30.265	2.017	2.235	1.756	120	0.28	30.31	1.817	1.817	174.0	165.5	174.0	7.936	126	1.879	51.6	0.836	2.626	2.286	2.286	2.286	2.286	2.426	0.94	49.8	2.42	120.7	0.244	0.928	0.2283	---			0.001
370	30.347	1.925	2.142	1.622	120	0.28	30.39	1.822	1.822	174.5	166.0	174.5	7.303	126	1.768	47.0	0.850	2.315	2.312	2.312	2.312	2.472	0.93	48.4	2.63	119.5	0.239	0.927	0.2261	---			0.001
371	30.429	1.927	2.144	1.627	120	0.28	30.47	1.827	1.947	175.0	166.4	175.0	6.747	126	1.970	42.8	0.866	2.369	2.366	2.366	2.366	2.526	0.92	47.5	2.90	120.4	0.242	0.926	0.2260	---			0.001
372	30.511	1.932	2.149	1.632	120	0.28	30.55	1.832	1.832	175.4	166.9	175.4	6.179	126	1.820	38.9	0.871	2.386	2.383	2.383	2.383	2.543	0.92	47.0	3.00	113.3	0.215	0.926	0.2158	---			0.001
373	30.593	1.937	2.154	1.637	120	0.28	30.63	1.837	1.837	175.9	167.4	175.9	6.007	105	1.793	37.7	0.873	2.393	2.391	2.390	2.390	2.550	0.92	46.6	3.04	111.2	0.208	0.925	0.2058	---			0.001
374	30.675	1.942	2.159	1.642	120	0.28	30.72	1.842	1.842	176.4	167.9	176.4	5.530	98	1.808	34.3	0.884	2.431	2.428	2.428	2.428	2.588	0.91	45.4	3.25	106.7	0.199	0.924	0.2258	---			0.001
375	30.758	1.947	2.164	1.647	120	0.28	30.80	1.847	1.967	176.8	168.3	176.8	5.280	88	1.701	33.3	0.882	2.422	2.419	2.419	2.419	2.579	0.91	32.5	3.20	103.9	0.184	0.924	0.2255	---			0.001
376	30.840	1.952	2.169	1.652	120	0.28	30.88	1.852	1.972	177.3	168.8	177.3	5.971	85	1.466	37.5	0.858	2.342	2.339	2.339	2.339	2.499	0.92	36.5	2.76	100.7	0.175	0.923	0.2254	---			0.001
377	30.922	1.957	2.174	1.657	120	0.28	30.96	1.857	1.857	177.8	169.3	177.8	5.977	92	1.415	37.6	0.855	2.333	2.329	2.329	2.329	2.489	0.92	36.5	2.71	99.0	0.170	0.922	0.2253	---			0.001
378	31.004	1.961	2.179	1.661	120	0.28	31.04	1.861	1.981	178.2	169.7	178.2	5.889	75	1.311	37.0	0.851	2.318	2.315	2.315	2.315	2.475	0.92	35.9	2.65	95.1	0.160	0.922	0.2251	---			0.001
379	31.086	1.966	2.184	1.666	120	0.28	31.12	1.866	1.866	178.7	170.2	178.7	5.752	79	1.393	35.9	0.858	2.345	2.342	2.341	2.341	2.501	0.91	34.9	2.78	96.8	0.164	0.921	0.2250	---			0.001
380	31.168	1.971	2.189	1.671	120	0.28	31.21	1.871	1.991	179.2	170.7	179.2	5.682	76	1.387	35.3	0.860	2.349	2.346	2.346	2.346	2.506	0.91	34.4	2.80	96.1	0.162	0.920	0.2249	---			0.001
381	31.250	1.976	2.194	1.676	120	0.28	31.29	1.876	1.896	179.7	171.2	179.7	5.860	72	1.314	35.2	0.856	2.337	2.334	2.333	2.333	2.493	0.91	34.2	2.74	93.5	0.156	0.920	0.2247	---			0.001
382	31.332	1.981	2.200	1.681	120	0.28	31.37	1.881	2.001	180.1	171.6	180.1	6.036	77	1.380	30.6	0.885	2.433	2.429	2.429	2.429	2.589	0.90	33.9	3.26	97.4	0.165	0.919	0.2246	---			0.001
383	31.414	1.986	2.206	1.686	120	0.28	31.45	1.886	2.006	180.6	172.1	180.6	5.177	78	1.524	31.5	0.879	2.413	2.410	2.410	2.410	2.570	0.90	33.7	3.15	96.7	0.164	0.918	0.2245	---			0.001
384	31.496	1.991	2.211	1.691	120	0.28	31.54	1.891	2.011	181.1	172.6	181.1	5.892	72	1.314	35.2	0.856	2.337	2.334	2.333	2.333	2.493	0.91	34.2	2.74	93.5	0.156	0.918	0.2244	---			0.001
385	31.578	1.996	2.216	1.696	120	0.28	31.62	1.896	2.016	181.6	173.0	181.6	6.153	68	1.137	38.5	0.836	2.270	2.266	2.265	2.265	2.425	0.91	37.3	2.42	90.2	0.148	0.917	0.2242	---			0.001
386	31.660	2.001	2.221	1.701	120	0.28	31.70	1.901	2.021	182.0	173.5	182.0	6.222	67	1.107	39.0	0.832	2.259	2.255	2.255	2.255	2.415	0.91	37.7	2.37	89.5	0.147	0.916	0.2241	---			0.001
387	31.742	2.006	2.226	1.706	120	0.28	31.78	1.906	2.026	182.5	174.0	182.5	5.965	69	1.194	37.0	0.844	2.296	2.292	2.292	2.292	2.452	0.91	35.8	2.54	90.9	0.150	0.916	0.2240	---			0.001
388	31.824	2.011	2.231	1.711	120	0.28	31.86	1.911	2.031	183.0	174.5	183.0	5.653	74	1.357	34.6	0.860	2.352	2.348	2.348	2.348	2.508	0.90	33.6	2.81	94.2	0.158	0.915	0.2238	---			0.001
389	31.906	2.016	2.236	1.716	120	0.28	31.90	1.916	2.036	183.4	174.9	183.4	5.656	82	1.501	34.3	0.869	2.379	2.376	2.376	2.376	2.536	0.90	33.3	2.95	98.3	0.169	0.914	0.2237	---			0.001
390	31.988	2.021	2.241	1.721	120	0.28	32.03	1.920	2.040	1.920	183.9	195.4	183.9	5.738	95	1.717	34.6	0.878	2.411	2.408	2.408	2.568	0.90	33.5	3.14	105.2	0.188	0.914	0.2236	---			0.001
391	32.070	2.026	2.246	1.726	120	0.28	32.11	1.925	2.045	1.925	184.4	195.9	184.4	5.424	101	1.901	32.2	0.894	2.465	2.462	2.462	2.622	0.89	31.3	3.46	108.5	0.199	0.913	0.2235	---			
392	32.152	2.031	2.251	1.731	120	0.28	32.19	1.930	2.050	1.930	184.8	196.3	184.8	5.354	105	2.032	31.8	0.901	2.487	2.483	2.483	2.643	0.88	30.7	3.60	110.7	0.206	0.912	0.2233	---			
393	32.234	2.036	2.256	1.736	120	0.28	32.27	1.935	2.055	1.935	185.3	196.8	185.3	5.218	110	2.190	30.5	0.911	2.518	2.515	2.515	2.515	0.87	29.7	3.82	113.5	0.216	0.912	0.2232	---			
394	32.316	2.040	2.260	1.740	120	0.28	32.36	1.940	2.060	1.940	185.8	197.3	185.8	5.158	119	2.396	29.9	0.920	2.549	2.546	2.546	2.546	0.87	29.1	4.04	117.8	0.232	0.911	0.2231	---			
395	32.398	2.045	2.265	1.745	120	0.28	32.44	1.945	2.065	1.945	186.3	197.8	186.3	5.235	126	2.500	30.3	0.922	2.557	2.554	2.554	2.554	0.87	29.5	4.10	120.8	0.244	0.910	0.2229	---			
396	32.480	2.050	2.270	1.750	120	0.28	32.52	1.950	2.070	1.950	186.7	198.2	186.7	5.037	133	2.706	26.8	0.935	2.596	2.592	2.592	2.592	0.86	28.1	4.42	124.0	0.257	0.909	0.2228	---			
397	32.562	2.055	2.275	1.755	120	0.28	32.60	1.955	2.075	1.955	187.2	198.7	187.2	4.719	138	3.049	26.6	0.952	2.655	2.652	2.652	2.652	0.86	26.0	4.89	127.0	0.271	0.909	0.2227	---			
398	32.644	2.060	2.280	1.760	120	0.28	32.68	1.960	2.080	1.960	187.7	199.2	187.7	4.347	140	3.359	24.1	0.970	2.715	2.713	2.713	2.713	0.85	23.6	5.43	128.2	0.276	0.908	0.2225	---			
399	32.726	2.065	2.285	1.765	120	0.28	32.77	1.965	2.085	1.965	188.1	199.6	188.1	4.099	137	3.491	22.4	0.980	2.749	2.747	2.747	2.747	0.85	22.1	5.76	127.1	0.271	0.908	0.2224	---			
400	32.808	2.070	2.290	1.770	120	0.28	32.85	1.970	2.090	1.970	188.6	200.1	188.6	4.015	136	3.556	21.8	0.984	2.763	2.761	2.761	2.761	0.84	21.5	5.90	126.8	0.270	0.907	0.2223	---			
401	32.890	2.075	2.295	1.775	120	0.28	32.93	1.975	2.095	1.975	189.0	200.6	189.0	4.355	137	3.284	23.9	0.968	2.710	2.708	2.708	2.708	0.85	23.5	5.39	126.5	0.268	0.906	0.2221	---			
402	32.972	2.080	2.300	1.780	120	0.28	33.01	1.980	2.100	1.980	189.6	201.1	189.6	4.684	134	2.985	26.1	0.952	2.655	2.653	2.653	2.653	0.85	25.5	4.89	124.6	0.260	0.906	0.2220	---			
403	33.054	2.084	2.304	1.784	120	0.28	33.10	1.984	2.104	1.984	190.0	201.5	190.0	4.978	128	2.913	25.4	0.952	2.655	2.655	2.655	2.655	0.85	24.8	4.91	121.8	0.249	0.905	0.2219	---			
404	33.136	2.089	2.309	1.789	120	0.28	33.18	1.989	2.109	1.989	190.5	202.0	190.5	5.383	134	3.200	24.0	0.966	2.702	2.699	2.699	2.699	0.84	23.5	5.31	125.0	0.262	0.904	0.2218	---			
405	33.218	2.094	2.314	1.794	120	0.28	33.26	1.994	2.114	1.994	191.0	202.5	191.0	4.217	140	3.487	22.8	0.978	2.743	2.740	2.740	2.740	0.84	22.4	5.70	127.7	0.273	0.904	0.2216	---			
406	33.300	2.099	2.319	1.799	120	0.28	33.34	1.999	2.119	1.999	191.4	203.0	191.4	3.905	137	3.698	20.8	0.992	2.789	2.787	2.787	2.787	0.83	20.5	6.18	126.0	0.263	0.903	0.2215	---			
407	33.382	2.104	2.324	1.804	120	0.28	33.42	2.004	2.124	2.004	191.9	203.4	191.9	3.371	124	3.889	17.9	1.014	2.861	2.859	2.859	2.859	0.83	17.4	6.95	121.1	0.245	0.902	0.2214	---			
408	33.464	2.109	2.329	1.809	120	0.28	33.51	2.009	2.129	2.009	192.4	203.9	192.4	3.263	111	3.579	17.6	1.010	2.847	2.846	2.846	2.846	0.83	17.0	6.80	115.4	0.233	0.902	0.2212	---			
409	33.546	2.114	2.334	1.814	120	0.28	33.59	2.014	2.134	2.014	192.9	204.4	192.9	3.466	98	2.990	18.3	0.988	2.778	2.774	2.774	2.774	0.83	18.1	6.03	104.3	0.201	0.902	0.2211	---			
410	33.628	2.119	2.339	1.819	120	0.28	33.67	2.019	2.139	2.019	193.3	204.8	193.3	3.752	96	2.538	20.1	0.965	2.700	2.697	2.697	2.697	0.84	19.8	5.29	105.0	0.188	0.900	0.2210	---			
411	33.710	2.124	2.344	1.824	120	0.28	33.75	2.024	2.144	2.024	193.8	205.3	193.8	4.048	82	2.119	22.1	0.941	2.621	2.618	2.618	2.618	0.84	21.7	4.60	95.7	0.172	0.900	0.2208	---			
412	33.792	2.129	2.349	1.829	120	0.28	33.83	2.029	2.149	2.029	194.3	205.8	194.3	4.158	82	2.075	22.7	0.937	2.605	2.602	2.602	2.602	0.84	22.3	4.47	94.7	0.172	0.899	0.2207	---			
413	33.874	2.134	2.354	1.834	120	0.28	33.92	2.034	2.154	2.034	194.7	206.2	194.7	4.467	95	2.219	24.1	0.920	2.553	2.550	2.550	2.550	0.84	24.1	4.37	105.5	0.189	0.899	0.2206	---			
414	33.956	2.139	2.359	1.839	120	0.28	34.00	2.039	2.159	2.039	195.2	206.7	195.2	4.485	106	2.469	24.4	0.943	2.626	2.623	2.623	2.623	0.84	23.9	4.64	110.7	0.206	0.898	0.2204	---			
415	34.038	2.144	2.364	1.844	120	0.28	34.08	2.044	2.164	2.044	195.7	207.2	195.7	4.072	112	2.883	21.6	0.988	2.708	2.705	2.705	2.705	0.85	21.3	5.37	114.1	0.218	0.897	0.2203	---			
416	34.120	2.149	2.369	1.849	120	0.28	34.16	2.049	2.169	2.049	196.2	207.7	196.2	3.778	112	3.126	19.7	0.993	2.721	2.718	2.718	2.718	0.52	19.5	5.88	114.5	0.220	0.896	0.2201	---			
417	34.202	2.154	2.374	1.854	120	0.28	34.24	2.053	2.173	2.053	196.6	208.1	196.6	3.185	113	3.784	16.0	1.020	2.883	2.881	2.881	2.881	0.41	16.0	7.21	115.2	0.222	0.896	0.2200	---			
418	34.284	2.159	2.379	1.859	120	0.28	34.33	2.058	2.178	2.058	197.1	208.6	197.1	2.808	108	4.134	13.8	1.043	2.958	2.957	2.956	2.956	0.50	13.8	8.13	112.6	0.213	0.895	0.2198	---			
419	34.366	2.164	2.384	1.864	120	0.28	34.41	2.063	2.183	2.063	197.6	209.1	197.6	2.520	99	4.242	12.1	1.058	3.009	3.008	3.008	3.008	0.48	12.3	8.80	106.0	0.198	0.894	0.2197	---			
420	34.448	2.169	2.389	1.869	120	0.28	34.49	2.068	2.188	2.068	198.0	209.5	198.0	2.495	96	3.899	12.0	1.053	2.990	2.989	2.989	2.989	0.49	12.2	8.55	104.0	0.195	0.894	0.2196	---			
421	34.530	2.174	2.394	1.874	120	0.28	34.57	2.073	2.193	2.073	198.5	210.0	198.5	2.179	77	3.881	10.2	1.089	3.045	3.044	3.044	3.044	0.49	10.5	9.30	97.4	0.186	0.893	0.2195	---			
422	34.612	2.179	2.399	1.879	120	0.28	34.65	2.078	2.198	2.078	199.0	210.5	199.0	1.996	72	3.992	9.1	1.083	3.090	3.089	3.089	3.089	0.49	9.5	9.95	94.4	0.158	0.892	0.2193	---			
423	34.694	2.184	2.404	1.884	120	0.28	34.74	2.083	2.203	2.083	199.5	210.9	199.5	1.924	65	3.972	9.2	1.084	3.117	3.117	3.117	3.117	0.47	9.6	10.51	90.2	0.148	0.892	0.2192	---			
424	34.776	2.189	2.409	1.889	120	0.28	34.82	2.088	2.208	2.088	199.9	211.4	199.9	1.693	60	3.996	7.4	1.100	3.162	3.161	3.161	3.161	0.47	7.9	11.05	87.4	0.142	0.891	0.2191	---			
425	34.858	2.194	2.414	1.894	120	0.28	34.90	2.093	2.213	2.093	200.4	211.9	200.4	1.541	46	3.465	6.7	1.100	3.167	3.166	3.166	3.166	0.47	7.2	11.12	79.8	0.127	0.890	0.2188	---			
426	34.940	2.199	2.419	1.899	120	0.28	34.98	2.098	2.218	2.098	200.8	212.4	200.8	1.569	41	3.032	6.8	1.093	3.125	3.125	3.124	3.124	0.47	7.3	10.48	76.8	0.122	0.890	0.2188	---			
427	35.024	2.203	2.423	1.903	120	0.28	35.06	2.103	2.223	2.103	201.3	212.8	201.3	1.782	42	2.884	8.0	1.067	3.038	3.037	3.037	3.037	0.48	8.5	9.21	77.8	0.124	0.889	0.2187	---			
428	35.106	2.208	2.428	1.908	120	0.28	35.15	2.108	2.228	2.108	201.8	213.3	201.8	1.674	62	4.188	7.2	1.100	3.184	3.183	3.183	3.183	0.47	7.7	11.38	88.2	0.144	0.888	0.2185	---			
429	35.187	2.213	2.433	1.913	120	0.28	35.23	2.112	2.232	2.112	202.3	213.8	202.3	1.747	56	3.840	7.7	1.094	3.128	3.128	3.127	3.127	0.47	8.1	10.52	85.1	0.137	0.888	0.2184	---			
430	35.269	2.217	2.437	1.917	120	0.28	35.31	2.117	2.237	2.117	202.8	214.2	202.8	1.746	55	3.550	7.9	1.093	3.123	3.122	3.122	3.122	0.47	8.1	10.44	84.3	0.136	0.887	0.2182	---			
431	35.351	2.222	2.442	1.922	120	0.28	35.39	2.122	2.242	2.122	203.2	214.7	203.2	1.762	51	4.163	5.9	1.100	3.254	3.254	3.254	3.254	0.47	6.0	12.06	82.5	0.132	0.886	0.2181	---			
432	35.433	2.227	2.447	1.927	120	0.28	35.47	2.127	2.247	2.127	203.7	215.2	203.7	1.214	48	4.795	4.7	1.100	3.363	3.363	3.363	3.363	0.46	5.6	14.52	80.7	0.129	0.886	0.2180	---			
433	35.515	2.232	2.452	1.932	120	0.28	35.55	2.132	2.252	2.132	204.2	215.7	204.2	1.262	50	4.775	5.0	1.100	3.344	3.344	3.344	3.344	0.46	5.8	14.16	81.8	0.131	0.885	0.2179	---			
434	35.597	2.237	2.457	1.937	120	0.28	35.64	2.137	2.257	2.137	204.6	216.1	204.6	1.416	47	3.865	5.8	1.100	3.242	3.242	3.242	3.242	0.46	6.5	12.36	79.7	0.127	0.884	0.2177	---			
435	35.679	2.242	2.462	1.942	120	0.28	35.72	2.142	2.262	2.142	205.1	216.6	205.1	1.746	45	2.897	7.6	1.078	3.075	3.074	3.074	3.074	0.47	8.1	9.72	78.3	0.125	0.884	0.2176	---			
436	35.761	2.247	2.467	1.947	120	0.28	35.80	2.147	2.267	2.147	205.6	217.1	205.6	2.069	51	2.739	9.4	1.051	2.987	2.985	2.985	2.985	0.48	9.7	8.50	82.5	0.132	0.883	0.2174	---			
437	35.843	2.251	2.471	1.951	120	0.28	35.88	2.152	2.272	2.152	206.1	217.5	206.1	2.339	63	2.976	10.8	1.043	2.957	2.955	2.955	2.955	0.48	11.0	8.12	89.4	0.147	0.882	0.2173	---			
438	35.925	2.256	2.476	1.956	120	0.28	35.97	2.157	2.277	2.157	206.5	218.0	206.5	2.513	70	3.023	11.7	1.035	2.933	2.931	2.930	2.930	0.48	11.9	7.81	92.6	0.154	0.882	0.2171	---			
439	36.007	2.261	2.481	1.961	120	0.28	36.05	2.162	2.282	2.162	207.0	218.5	207.0	2.757	74	2.902	13.1	1.020	2.882	2.880	2.880	2.880	0.49	13.2	7.20	94.9	0.159	0.881	0.2170	---			
440	36.089	2.266	2.486	1.966	120	0.28	36.13	2.167	2.287	2.167	207.5	219.0	207.5	2.865	80	2.898	13.8	1.019	2.878	2.876	2.875	2.875	0.49	13.8	7.15	97.4	0.166	0.880	0.2169	---			
441	36.171	2.271	2.491	1.971	120	0.28	36.21	2.171	2.291	2.171	207.9	219.4	207.9	2.743	84	3.317	12.8	1.033	2.923	2.922	2.922	2.922	0.49	12.9	7.71	99.3	0.171	0.880	0.2167	---			
442	36.253	2.276	2.496	1.976	120	0.28	36.29	2.176	2.296	2.176	208.4	219.9	208.4	2.604	85	3.538	12.0	1.045	2.963	2.963	2.963	2.963	0.49	12.1	8.21	99.3	0.171	0.879	0.2166	---			
443	36.335	2.281	2.501	1.981	120	0.28	36.38	2.181	2.301	2.181	208.8	220.4	208.8	2.938	98	3.990	13.7	1.032	2.921	2.919	2.919	2.919	0.49	13.7	7.66	105.3	0.189	0.878	0.2165	---			
444	36.417	2.286	2.506	1.986	120	0.28	36.46	2.186	2.306	2.186	209.2	220.8	209.2	3.028	102	3.815	14.2	1.029	2.912	2.909	2.909	2.909	0.49	14.2	7.55	106.0	0.194	0.878	0.2163	---			
445	36.499	2.291	2.511	1.991	120	0.28	36.54	2.191	2.311	2.191	209.8	221.3	209.8	3.433	83	2.576	16.7	0.985	2.767	2.764	2.764	2.764	0.49	16.5	5.93	98.1	0.168	0.877	0.2162	---			
446	36.581	2.296	2.516	1.996	120	0.28	36.62	2.196	2.316	2.196	210.3	221.8	210.3	3.743	82	2.326	18.6	0.966	2.705	2.701	2.701	2.701	0.49	18.2	5.33	97.2	0.165	0.876	0.2160	---			
447	36.663	2.301	2.521	2.001	120	0.28	36.70	2.201	2.321	2.201	210.8	222.3	210.8	3.794	91	2.526	18.7	0.972	2.723	2.720	2.720	2.720	0.49	18.4	5.50	101.1	0.176	0.876	0.2159	---			
448	36.745	2.306	2.526	2.006	120	0.28	36.79	2.206	2.326	2.206	211.2	222.7	211.2	3.707	97	2.824	16.1	0.978	2.744	2.741	2.740	2.740	0.49	17.8	5.70	101.7	0.178	0.875	0.2158	---			
449	36.827	2.311	2.531	2.011	120	0.28	36.87	2.211	2.331	2.211	211.7	223.2	211.7	3.993	96	2.548	19.7	0.961	2.707	2.703	2.703	2.703	0.49	19.3	5.34	103.3	0.183	0.874	0.2156	---			
450	36.909	2.316	2.536	2.016	120	0.28	36.95	2.216	2.336	2.216	212.2	223.7	212.2	3.995	92	2.468	19.7	0.964	2.698	2.695	2.695	2.695	0.49	19.3	5.27	101.8	0.178	0.874	0.2155	---			
451	36.991	2.321	2.541	2.021	120	0.28	37.03	2.221	2.341	2.221	212.7	224.1	212.7	3.941	94	2.517	19.4	0.968	2.710	2.707	2.706	2.706	0.49	19.0	5.38	102.0	0.179	0.873	0.2153	---			
452	37.073	2.326	2.546	2.026	120	0.28	37.11	2.226	2.346	2.226	213.1	224.6	213.1	4.008	97	2.569	19.1	0.968	2.710	2.706	2.706	2.706	0.49	19.3	5.37	103.5	0.183	0.872	0.2152	---			
453	37.155	2.331	2.551	2.031	120	0.28	37.20	2.231	2.351	2.231

APPENDIX E – TRAFFIC STUDY

HALES ENGINEERING
innovative transportation solutions

Welfare Complex

Traffic Impact Study

Saratoga Springs, Utah

July 2, 2020

UT19-1451

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EXECUTIVE SUMMARY

This study addresses the traffic impacts associated with the proposed Welfare Complex development located in Saratoga Springs, Utah. The Welfare Complex project is located on the west side of Redwood Road (SR-68), just north of 1140 North.

Included within the analyses for this study are the traffic operations and recommended mitigation measures for existing conditions and plus project conditions (conditions after development of the proposed project) at key intersections and roadways near the site. Future 2025 and 2040 conditions were also analyzed.

The evening peak hour level of service (LOS) was computed for each study intersection. The results of this analysis are shown in Table ES-1. Recommended storage lengths are shown in Table ES-2.

TABLE ES-1
LOS Analysis - Evening Peak Hour
Saratoga Springs - Welfare Complex TIS Update

Intersection	Level of Service (Sec/Veh)[1]			
	Existing (2020)		Future (2025)	
	Background	Plus Project	Background	Plus Project
Medical Drive (1140 North) / Redwood Road (SR-68)	B (11.4)	B (14.8)	B (17.1)	C (27.1)
Market Street / Redwood Road (SR-68)	A (8.0)	A (8.7)	B (10.9)	B (18.7)
Market Street / Pioneer Crossing (SR-145)	B (14.8)	B (14.8)	B (18.5)	B (14.6)
Commerce Drive / Redwood Road (SR-68)	f (>50) / WBL	f (>50) / WBL	B (12.7)	B (11.6)
Medical Drive / Exchange Drive	-	-	a (6.4) / EBT	a (6.5) / EBT
Access 1 / Redwood Road (SR-68)[2]	-	f (>50) / EBL	-	f (>50) / EBL
Access 2 / Medical Drive[2]	-	a (4.6) / SBL	-	a (6.1) / SBL
Access 3 / Medical Drive[2]	-	a (4.0) / SBL	-	a (6.2) / SBL

1. Intersection LOS and delay (seconds/vehicle) values represent the overall intersection average for roundabout, signalized, all-way stop-controlled intersections and the worst movement for all other unsignalized intersections. Uppercase LOS used for signalized, roundabout, and all-way stop-controlled intersections. Lowercase LOS used for one-way & two-way stop-controlled intersections.
2. This intersection is a project access and was only analyzed in "plus project" scenarios.

Source: Hales Engineering, July 2020

TABLE ES-2
Recommended Storage Lengths
Saratoga Springs - Welfare Complex TIS Update

Intersection	Storage Length (feet)							
	Northbound		Southbound		Eastbound		Westbound	
	LT	RT	LT	RT	LT	RT	LT	RT
Medical Drive (1140 North) / Redwood Road (SR-68)	325	-	100	200	200	-	-	-
Market Street / Redwood Road (SR-68)	130 / 200	-	-	-	155 / 200	160 / 175	-	-
Market Street / Pioneer Crossing (SR-145)	-	100	-	-	-	-	-	-
Commerce Drive / Redwood Road (SR-68)	-	-	90 / 100	-	-	-	-	150
Access 1 / Redwood Road (SR-68)	100	-	-	100	-	50	-	-
Access 2 / Medical Drive	-	-	-	50	50	-	-	-
Access 3 / Medical Drive	-	-	-	50	50	-	-	-

Current storage length (if applicable) / Recommended storage length
Source: Hales Engineering, July 2020

SUMMARY OF KEY FINDINGS/RECOMMENDATIONS

The following is a summary of key findings and recommendations:

- The Commerce Drive / Redwood Road (SR-68) intersection is anticipated to operate at LOS F during the evening peak hour in existing (2020) background conditions. All other study intersections are currently operating at an acceptable LOS.
    - Commerce Drive / Redwood Road (SR-68) is anticipated to be signalized by the year 2025 with the completion of the Foothill Boulevard project as per UDOT agreement.
- The development will consist of welfare facilities, including a Deseret Industries thrift store and a Bishop's Storehouse/LDS Family Services facility.
- The Access 1 / Redwood Road (SR-68) intersection is anticipated to operate at LOS F during the evening peak hour with project traffic added. All other study intersections are anticipated to operate at an acceptable LOS.
    - It is anticipated that traffic will reroute to avoid left-turn movement delays onto Redwood Road. There is excess capacity at the accesses on Medical Drive that will accommodate these volumes. It is recommended that safety and operations be evaluated at this access and left-turn movements restricted if future problems are observed.
- All study intersections are anticipated to operate at an acceptable LOS during the evening peak hour in future (2025) background and plus project conditions.
- While no operational problems were observed between the offset of the western Costco access and the Access 2 / Medical Drive intersection, it is recommended that this access be evaluated for safety and restricted to right-in right-out (RIRO) access only if safety concerns are present.

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I. INTRODUCTION

A. Purpose

This study addresses the traffic impacts associated with the proposed Welfare Complex development located in Saratoga Springs, Utah. The proposed project is located on the west side of Redwood Road (SR-68), just north of 1140 North. Figure 1 shows a vicinity map of the proposed development.

Included within the analyses for this study are the traffic operations and recommended mitigation measures for existing conditions and plus project conditions (conditions after development of the proposed project) at key intersections and roadways near the site. Future 2025 and 2040 conditions were also analyzed.

Figure 1: Vicinity map showing the project location in Saratoga Springs, Utah

B. Scope

The study area was defined based on conversations with the development team. This study was scoped to evaluate the traffic operational performance impacts of the project on the following intersections:

- 1140 North (Medical Drive) / Redwood Road (SR-68)
- Market Street / Redwood Road (SR-68)
- Market Street / Pioneer Crossing (SR-145)
- Commerce Drive / Redwood Road (SR-68)
- Medical Drive / Exchange Drive (completed by 2025)
- Project Access / Redwood Road (SR-68)
- Project Accesses (2) / Medical Drive

C. Analysis Methodology

Level of service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst. Table 1 provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for both signalized and unsignalized intersections. Figure 2 provides a visual representation of each LOS letter designation.

The *Highway Capacity Manual* (HCM), 6th Edition, 2016 methodology was used in this study to remain consistent with "state-of-the-practice" professional standards. This methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized and all-way stop intersections, the LOS is provided for the overall intersection (weighted average of all approach delays). For all other unsignalized intersections, LOS is reported based on the worst movement.

Using Synchro/SimTraffic software, which follow the HCM methodology, the peak hour LOS was computed for each study intersection. Multiple runs of SimTraffic were used to provide a statistical evaluation of the interaction between the intersections. The detailed LOS reports are provided in Appendix B. Hales Engineering also calculated the 95th percentile queue lengths for the study intersections using SimTraffic. The detailed queue length reports are provided in Appendix D.

D. Level of Service Standards

For the purposes of this study, a minimum acceptable intersection performance for each of the study intersections was set at LOS D. If levels of service E or F conditions exist, an explanation and/or mitigation measures will be presented. A LOS D threshold is consistent with "state-of-the-practice" traffic engineering principles for urbanized areas.

Table 1: Level of Service Description

Level of Service	Description of Traffic Conditions	Average Delay (seconds/vehicle)
	Signalized Intersections	**Overall Intersection**
A	Extremely favorable progression and an extremely low level of control delay. Individual users are virtually unaffected by others in the traffic stream.	0 ≤ 10.0
B	Good progression and a low level of control delay. The presence of other users in the traffic stream becomes noticeable.	> 10.0 and ≤ 20.0
C	Fair progression and a moderate level of control delay. The operation of individual users becomes somewhat affected by interactions with others in the traffic stream.	>20.0 and ≤ 35.0
D	Marginal progression with relatively elevated levels of control delay. Operating conditions are noticeably more constrained.	> 35.0 and ≤ 55.0
E	Poor progression with unacceptably elevated levels of control delay. Operating conditions are at or near capacity.	> 55.0 and ≤ 80.0
F	Unacceptable progression with forced or breakdown operating conditions.	> 80.0
	Unsignalized Intersections	**Worst Approach**
A	Free Flow / Insignificant Delay	0 ≤ 10.0
B	Stable Operations / Minimum Delays	>10.0 and ≤ 15.0
C	Stable Operations / Acceptable Delays	>15.0 and ≤ 25.0
D	Approaching Unstable Flows / Tolerable Delays	>25.0 and ≤ 35.0
E	Unstable Operations / Significant Delays Can Occur	>35.0 and ≤ 50.0
F	Forced Flows / Unpredictable Flows / Excessive Delays Occur	> 50.0

Source: Hales Engineering Descriptions, based on the *Highway Capacity Manual* (HCM), 6th Edition, 2016 Methodology (Transportation Research Board)

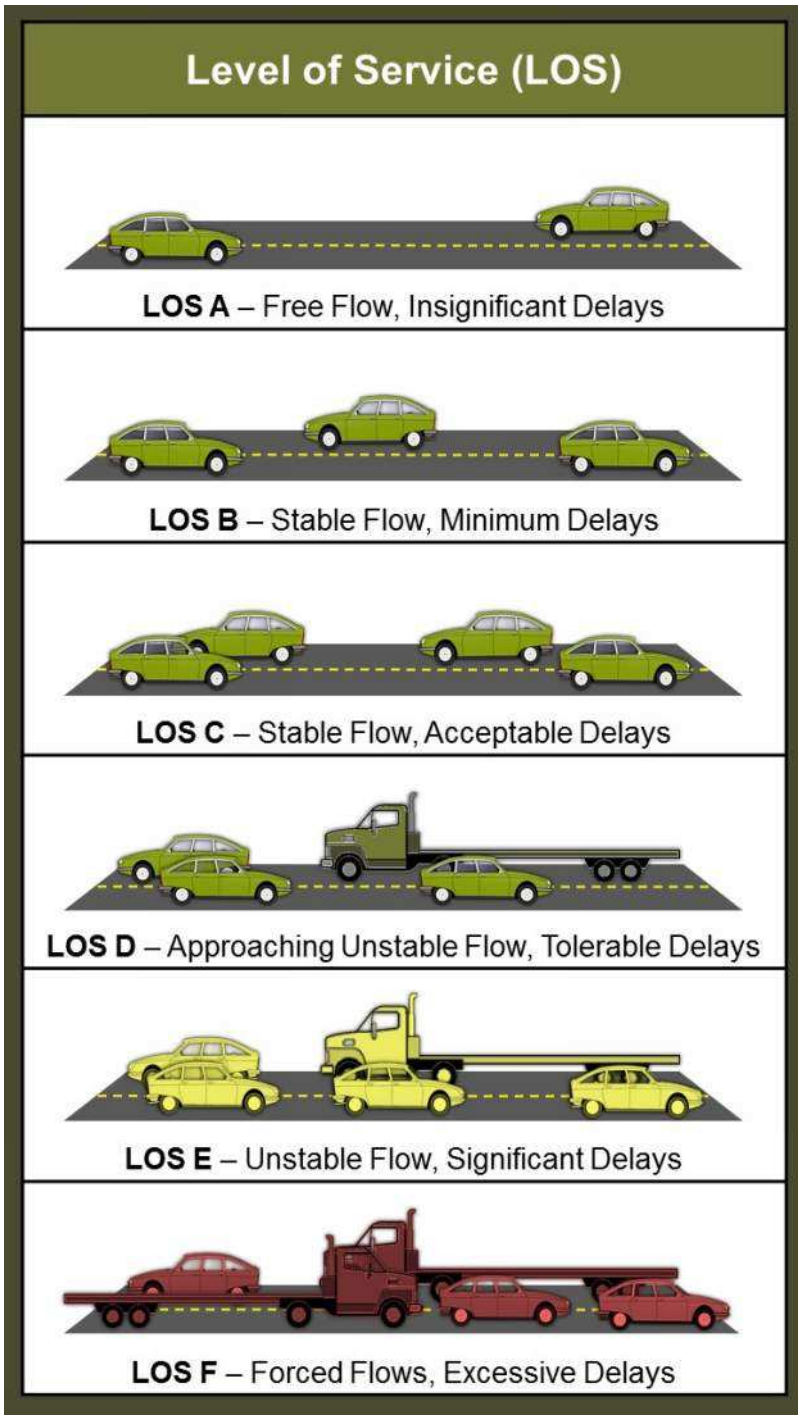

Figure 2: Visual representation of the LOS letter designations

II. EXISTING (2020) BACKGROUND CONDITIONS

A. Purpose

The purpose of the background analysis is to study the intersections and roadways during the peak travel periods of the day with background traffic and geometric conditions. Through this analysis, background traffic operational deficiencies can be identified, and potential mitigation measures recommended. This analysis provides a baseline condition that may be compared to the build conditions to identify the impacts of the development.

B. Roadway System

The primary roadways that will provide access to the project site are described below:

Redwood Road (SR-68) – is a state-maintained roadway (classified by UDOT access management standards as a "Regional – Priority Urban Importance" facility, or access category 5 roadway). Redwood Road (SR-68) has two travel lanes in each direction separated by a two-way left-turn lane (TWLTL). As identified and controlled by UDOT, a "Regional – Priority Urban Importance" access classification identifies minimum signalized intersection spacing of one-half mile (2,640 feet), minimum unsignalized street spacing of 660 feet, and minimum driveway spacing of 350 feet. The posted speed limit on Redwood Road (SR-68) is 45 mph.

Medical Drive – is a future city-maintained roadway which is classified by the Saratoga Springs Transportation Master Plan (January 2019) as a local road. It was assumed that the roadway will have one lane in each direction separated by a TWLTL. The posted speed limit was assumed to be 30 mph in the study area.

C. Traffic Volumes

Weekday morning (7:00 to 9:00 a.m.) and evening (4:00 to 6:00 p.m.) peak period traffic counts were performed at the following intersections:

- Commerce Drive / Redwood Road (SR-68)

The counts were performed on Wednesday, June 24, 2020. The morning peak hour was determined to be between 7:45 and 8:45 a.m., and the evening peak hour was determined to be between 5:00 and 6:00 p.m. The evening peak hour volumes were approximately 70% higher than the morning peak hour volumes. Therefore, the evening peak hour volumes were used in the analysis to represent the worst-case conditions. Detailed count data are included in Appendix A.

These traffic counts were collected during the COVID-19 pandemic when traffic volumes were slightly reduced due to social distancing measures. According to the UDOT Automatic Traffic Signal Performance Measures (ATSPM) website, the traffic volumes on March 10 (pre-social

distancing) were approximately 15% higher than those on June 14. Therefore, the collected data were increased by 15% to represent normal conditions.

In addition to the counts conducted at the Commerce Drive / Redwood Road (SR-68) intersection, volumes from the previously conducted Kittelson & Associates Saratoga Springs Costco and Hales Engineering Osmond Development traffic impact studies were used for the evening peak hour background volumes at the following intersections:

- 1140 North (Medical Drive) / Redwood Road (SR-68)
- Market Street / Redwood Road (SR-68)
- Market Street / Pioneer Crossing (SR-145)

Figure 3 shows the existing evening peak hour volumes as well as intersection geometry at the study intersections.

The Saratoga Springs Transportation Master Plan (January 2019) indicates planned signals at both Commerce Drive / Redwood Road (SR-68) and Market Street / Pioneer Crossing (SR-145) intersections. The projected 2020 traffic volumes from previous traffic studies in the area suggest that these signals will be warranted with the completion of the nearby Costco development; however, the signal at Commerce Drive is not anticipated to be completed until the completion of the Foothill Boulevard project by 2025 as per UDOT agreement.

In addition to the two planned signals, the previously completed Kittelson & Associates TIS for the Costco development recommends a signal at the Medical Drive (1140 South) / Redwood Road (SR-68) intersection, which is also warranted by the projected volumes. While this signal does not meet current spacing requirements with the planned signal at Commerce Drive, it is anticipated that the necessary administrative decisions will be made to allow a signal at this location. Thus, for the 2020 background conditions analysis, it is assumed that the Market Street / Pioneer Crossing (SR-145), Commercial Drive / Redwood Road (SR-68), and Market Street (1140 North) / Redwood Road (SR-68) signals have been installed with the completion of the Costco development.

D. Level of Service Analysis

Hales Engineering determined that the Commerce Drive / Redwood Road (SR-68) intersection is currently operating at LOS F. All other study intersections are currently operating at acceptable levels of service during the evening peak hour, as shown in Table 2. These results serve as a baseline condition for the impact analysis of the proposed development during existing (2020) conditions.

E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Queuing of up to 800 feet was present on the westbound leg of the Commerce Drive / Redwood

Road (SR-68) intersection. No other significant queueing was observed during the evening peak hour.

F. Mitigation Measures

No mitigation measures are recommended. The Commerce Drive / Redwood Road (SR-68) intersection is planned to be signalized with the completion of the Foothill Boulevard project as per UDOT agreement. Until then, traffic will reroute to adjacent signals if heavy delays are present.

Saratoga Springs - Welfare Complex TIS Update
Existing (2020) Background

Evening Peak Hour
Figure 3

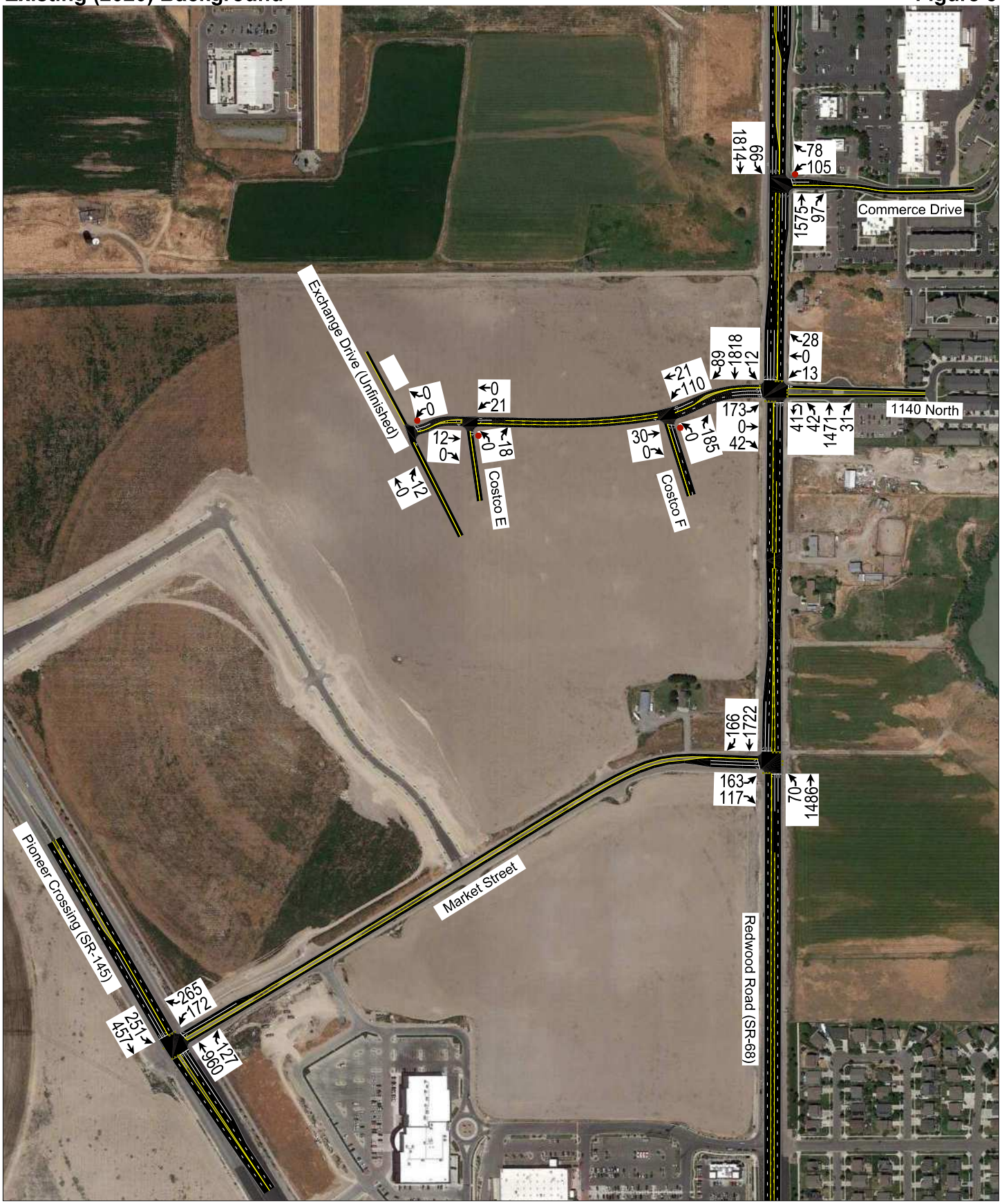

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Table 2: Existing (2020) Background Evening Peak Hour LOS

Intersection		Level of Service		
Description	Control	Movement[1]	Aver. Delay (Sec/Veh)	LOS[2]
Medical Drive (1140 North) / Redwood Road (SR-68)	Signal	-	11.4	B
Market Street / Redwood Road (SR-68)	Signal	-	8.0	A
Market Street / Pioneer Crossing (SR-145)	Signal	-	14.8	B
Commerce Drive / Redwood Road (SR-68)	WB Stop	WBL	>50	f

1. Movement indicated for unsignalized intersections where delay and LOS represents worst movement. SBL = Southbound left movement, etc.
2. Uppercase LOS used for signalized, roundabout, and AWSC intersections. Lowercase LOS used for non-AWSC intersections.

Source: Hales Engineering, July 2020

III. PROJECT CONDITIONS

A. Purpose

The project conditions discussion explains the type and intensity of development. This provides the basis for trip generation, distribution, and assignment of project trips to the surrounding study intersections defined in Chapter I.

B. Project Description

The proposed Welfare Complex development is located on the west side of Redwood Road (SR-68), just north of 1140 North. The development will consist of welfare facilities owned and operated by The Church of Jesus Christ of Latter-day Saints including a Deseret Industries store, a Bishop's Storehouse, and a Family Services office. A concept plan for the proposed development is provided in Appendix C.

The proposed land use for the development has been identified as follows:

- Deseret Industries ~60,000 square feet
- Bishop's Storehouse / Family Services ~20,000 square feet

C. Trip Generation

Trip generation for the development is normally calculated using trip generation rates published in the Institute of Transportation Engineers (ITE), *Trip Generation*, 10th Edition, 2017. However, due to the unique land use of this development, Hales Engineering used trip generation data provided by the developer. Data were collected at the Welfare Complex in Springville, Utah in April 2019 for an entire week. According to the developer, the proposed facility will be practically identical to the Springville facility in size and operations. Detailed trip generation data is provided in Appendix E.

The peak days for trip generation were observed to be Friday and Saturday. However, it is anticipated that the highest combined volumes will be observed on a standard weekday when the background traffic volumes are highest. The Thursday trip generation was observed to be the highest of Tuesday, Wednesday, and Thursday. Therefore, the Thursday trip generation was applied as the proposed project's trip generation.

Trip generation for the proposed project is included in Table 3 and is as follows.

- Daily Trips: 3,014
- Morning Peak Hour Trips: 31
- Evening Peak Hour Trips: 266

Table 3: Trip Generation

Saratoga Springs - Welfare Complex TIS Trip Generation					
Weekday Daily Land Use	# of Units	Unit Type	Trips Entering	Trips Exiting	Total Daily Trips
Deseret Industries	60	1,000 sq. ft.	1,356	1,356	**2,712**
Bishop's Storehouse	20	1,000 sq. ft.	108	108	**216**
Family Services			43	43	**86**
Total	**80**	**1,000 sq. ft.**	**1,507**	**1,507**	**3,014**
Morning Peak Ho Land Use	# of Units	Unit Type	Trips Entering	Trips Exiting	Total a.m. Trips
Deseret Industries	60	1,000 sq. ft.	17	9	**26**
Bishop's Storehouse	20	1,000 sq. ft.	2	0	**2**
Family Services			3	0	**3**
Total	**80**	**1,000 sq. ft.**	**22**	**9**	**31**
Evening Peak Ho Land Use	# of Units	Unit Type	Trips Entering	Trips Exiting	Total p.m. Trips
Deseret Industries	60	1,000 sq. ft.	109	119	**228**
Bishop's Storehouse	20	1,000 sq. ft.	15	15	**30**
Family Services			3	5	**8**
Total	**80**	**1,000 sq. ft.**	**127**	**139**	**266**

1. Trip generation based on data collection completed at the Springville Welfare Complex in April 2019.

SOURCE: Hales Engineering, July 2020

D. Trip Distribution and Assignment

Project traffic is assigned to the roadway network based on the type of trip and the proximity of project access points to major streets, high population densities, and regional trip attractions. Existing travel patterns observed during data collection also provide helpful guidance to establishing these distribution percentages, especially near the site. The resulting distribution of project generated trips during the evening peak hour is as follows:

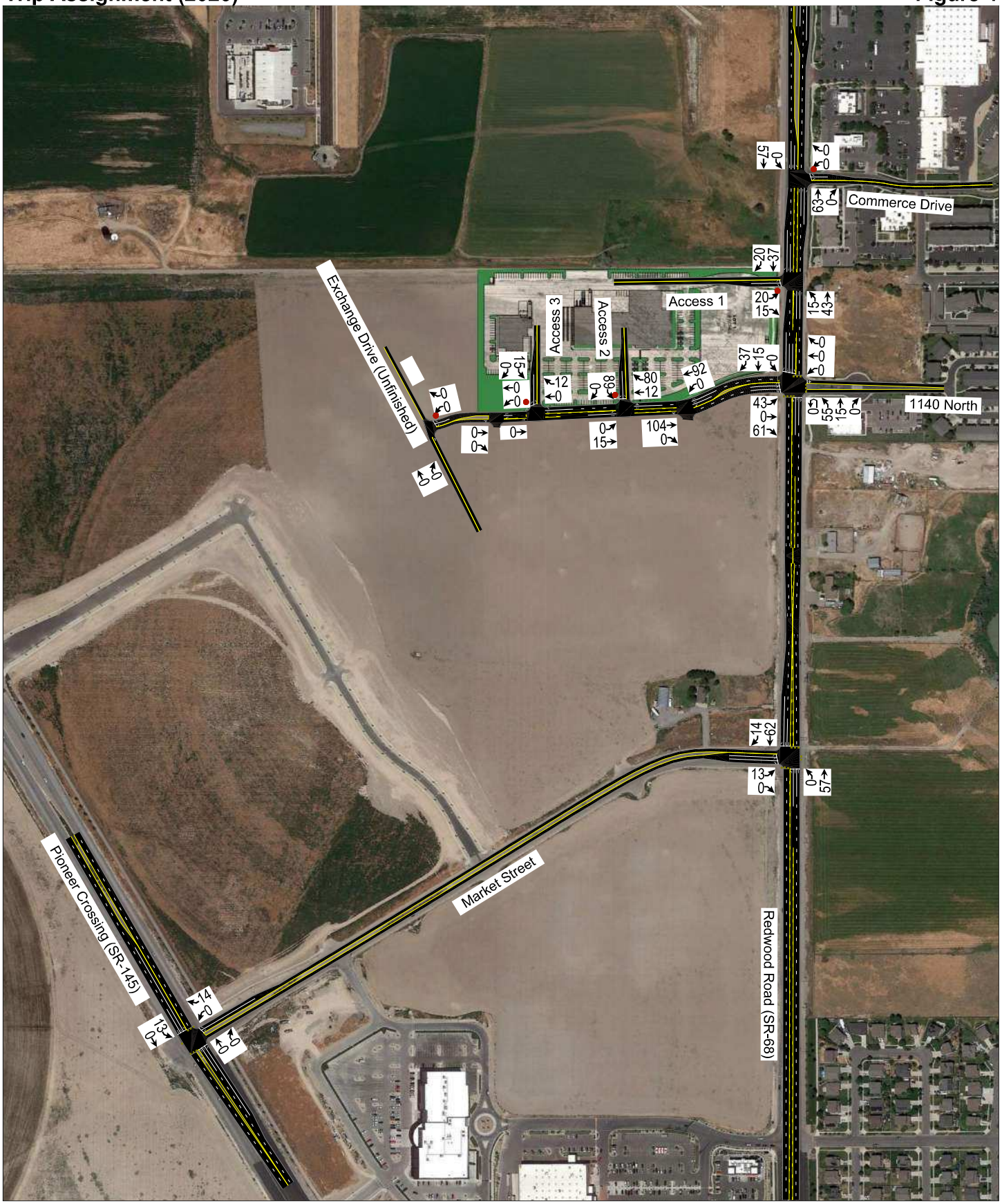
<u>To/From Project:</u>

- 45% North
- 45% South
- 10% West

These trip distribution assumptions were used to assign the evening peak hour generated traffic at the study intersections to create trip assignment for the proposed development. Trip assignment for the development in 2020 conditions is shown in Figure 4. Considering future roadway connections via Exchange Drive to the north, south, and west, the trip assignment for the development in 2025 conditions is shown in Figure 5.

Saratoga Springs - Welfare Complex TIS Update
Trip Assignment (2020)

Evening Peak Hour
Figure 4



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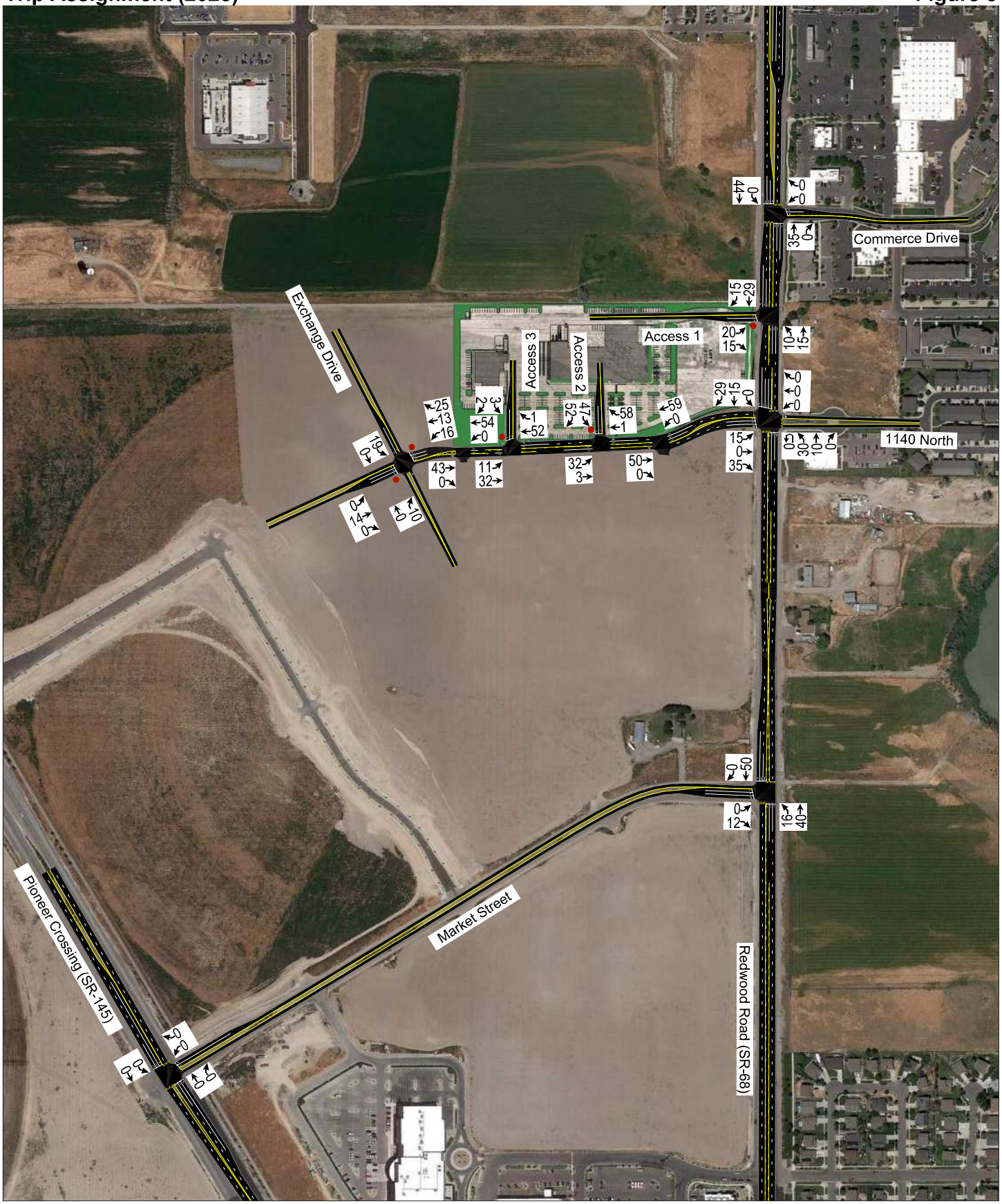
Saratoga Springs - Welfare Complex TIS Update **Evening Peak Hour**
Trip Assignment (2025) **Figure 5**



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E. Access

The proposed access for the site will be gained at the following locations (see also concept plan in Appendix C):

Redwood Road (SR-68):

- Access 1 will be located approximately 320 feet south of the Commerce Drive / Redwood Drive (SR-68) intersection and approximately 350 north of the Medical Drive (1140 North) / Redwood Drive (SR-68) intersection. It will access the project on the west side of Redwood Road (SR-68). *It is anticipated that a variance will be needed for this access because it does not meet driveway spacing (350 feet) to the north*. It was assumed that this would be a full-movement access.
- The primary access road to the project will be Medical Drive. Medical Drive will be located on the west side of Redwood Road (SR-68), directly across from the existing 1140 North alignment. Medical Drive will eventually be a through road to Pioneer Crossing with other development in the area.

Medical Drive:

- Access 2 will be located approximately 675 feet west of the Medical Drive (1140 North) / Redwood Drive (SR-68) intersection and will be stop-controlled.
- Access 3 will be located approximately 925 feet west of the Medical Drive (1140 North) / Redwood Drive (SR-68) intersection and will be stop-controlled.

It is recommended that separate egress left- and right-turn lanes be provided at all project accesses.

F. Auxiliary Lane Requirements

Based on Administrative Rule R930-6, the following auxiliary lanes may be required for the proposed accesses onto Redwood Road (SR-68) (UDOT Access Category 5 roadway):

Left-turn Deceleration Lane:

Required when the projected peak hour left-turn ingress volume is greater than 10 vph:

- With 15 northbound left-turns assumed, a left-turn lane may be required at Access 1. A center TWLTL currently exists and will serve as a left-turn lane for this access.
- With 55 northbound left-turns assumed, a left-turn lane may be required at Medical Drive. A center TWLTL currently exists and will serve as a left-turn lane at Medical Drive.

Right-turn Deceleration Lane:

Required when the projected peak hour right-turn ingress volume is greater than 25 vph:

- With 20 southbound right-turns assumed, a southbound right-turn deceleration lane may not be required at Access 1. Therefore, a right-turn deceleration lane was not assumed for this access.
- With 37 southbound right-turns assumed, a southbound right-turn deceleration lane may be required at Medical Drive. It is recommended that a southbound right-turn lane be installed at this location.

Right-turn Acceleration Lane:

Required when the projected peak hour right-turn egress volume is greater than 50 vph when the posted speed limit on the highway is greater than 40 mph.

- With 15 eastbound right-turns assumed, an eastbound-to-southbound right-turn acceleration lane may not be required at Access 1. Therefore, a right-turn acceleration lane was not assumed for this access.
- With 61 eastbound right-turns assumed, an eastbound-to-southbound right-turn acceleration lane may be required at Medical Drive. However, a right-turn acceleration lane was not assumed for this access.

Left-turn Acceleration Lane:

May be required if such a design will be a benefit to the safety and operation of the roadway.

- A left-turn acceleration lane is not recommended at either access to Redwood Road (SR-68) due to the greater need for left-turn deceleration lane space in the TWLTL.

IV. EXISTING (2020) PLUS PROJECT CONDITIONS

A. Purpose

The purpose of the existing (2020) plus project analysis is to study the intersections and roadways during the peak travel periods of the day for existing background traffic and geometric conditions plus the net trips generated by the proposed development. This scenario provides valuable insight into the potential impacts of the proposed project on background traffic conditions.

B. Traffic Volumes

Hales Engineering added the project trips discussed in Chapter III to the existing (2020) background traffic volumes to predict turning movement volumes for existing (2020) plus project conditions. Existing (2020) plus project evening peak hour turning movement volumes are shown in Figure 6.

C. Level of Service Analysis

Hales Engineering determined that the Commerce Drive / Redwood Road (SR-68) and Access 1 / Redwood Road (SR-68) intersections are anticipated to operate at LOS F during the evening peak hour with project traffic added. All other intersections are anticipated to operate at acceptable levels of service, as shown in Table 4.

D. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. No significant queuing is anticipated during the evening peak hour.

E. Mitigation Measures

The delay at the Access 1 / Redwood Road (SR-68) intersection is due to the difficulty in turning left onto Redwood Road during peak hours. Drivers at this access will learn to reroute to the accesses onto Medical Drive to avoid delays. Additional connections in the future with the construction of Exchange Drive and other roadways to the southwest of the development will provide other connection options. Drivers will continue to reroute at the Commerce Drive / Redwood Road (SR-68) intersection to avoid delays.

Saratoga Springs - Welfare Complex TIS Update
Existing (2020) Plus Project

Evening Peak Hour
Figure 6

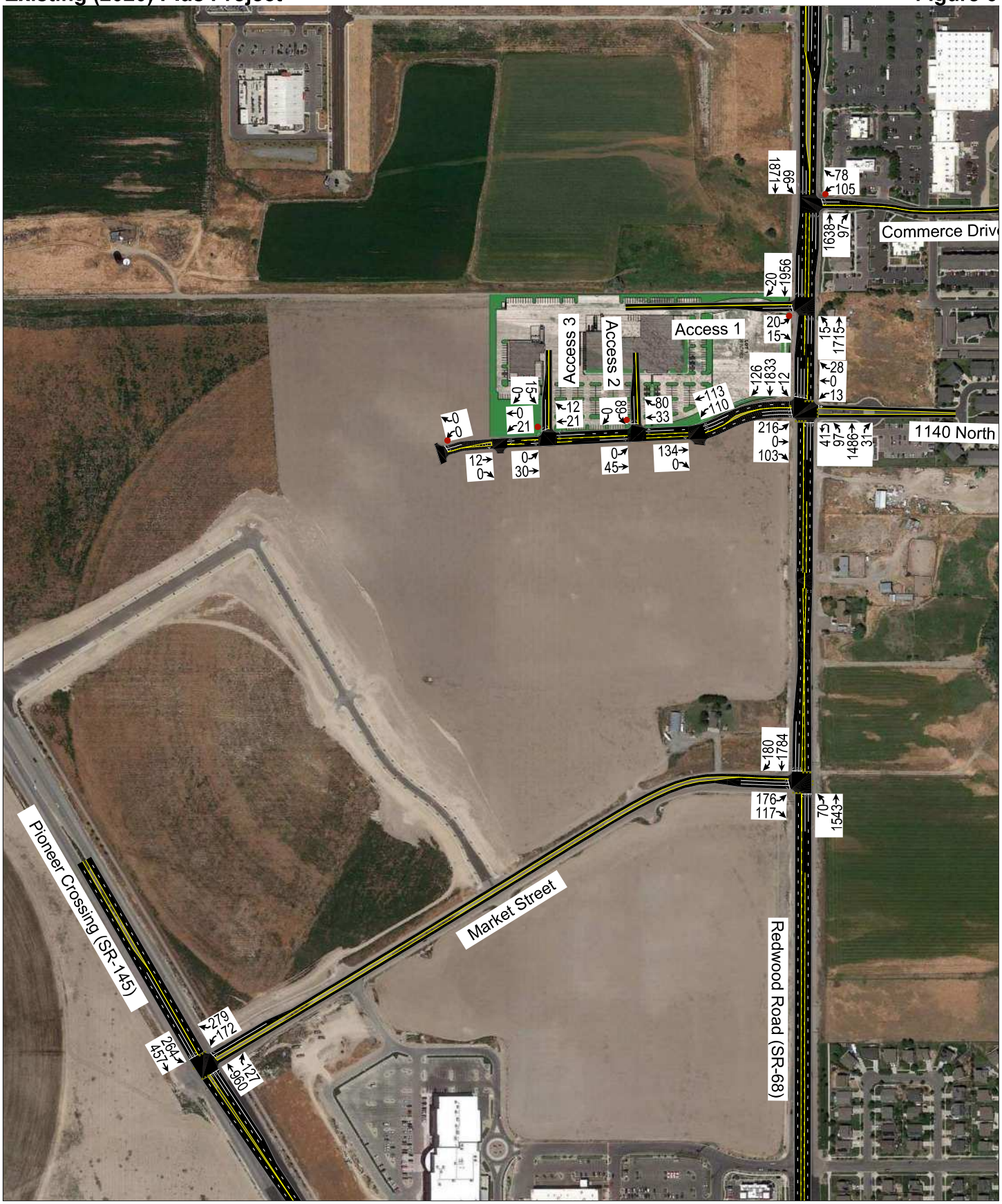

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Table 4: Existing (2020) Plus Project Evening Peak Hour LOS

Intersection		Level of Service		
Description	Control	Movement[1]	Aver. Delay (Sec/Veh)	LOS[2]
Medical Drive (1140 North) / Redwood Road (SR-68)	Signal	-	14.8	B
Market Street / Redwood Road (SR-68)	Signal	-	8.7	A
Market Street / Pioneer Crossing (SR-145)	Signal	-	14.8	B
Commerce Drive / Redwood Road (SR-68)	WB Stop	WBL	>50	f
Access 1 / Redwood Road (SR-68)	EB Stop	EBL	>50	f
Access 2 / Medical Drive	SB Stop	SBL	4.6	a
Access 3 / Medical Drive	SB Stop	SBL	4.0	a

1. Movement indicated for unsignalized intersections where delay and LOS represents worst movement. SBL = Southbound left movement, etc.
2. Uppercase LOS used for signalized, roundabout, and AWSC intersections. Lowercase LOS used for non-AWSC intersections.

Source: Hales Engineering, July 2020

V. FUTURE (2025) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future (2025) background analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions. Through this analysis, future background traffic operational deficiencies can be identified, and potential mitigation measures recommended.

B. Roadway Network

According to the Wasatch Front Regional Council (WFRC) Regional Transportation Plan, there are no projects planned before 2025 in the study area. Therefore, no changes were made to the roadway network for the future (2025) analysis.

The Saratoga Springs Transportation Master Plan (January 2019) indicates planned signals at both Commerce Drive / Redwood Road (SR-68) and Market Street / Pioneer Crossing (SR-145) intersections. The projected 2020 traffic volumes from previous traffic studies in the area suggest that these signals will be warranted with the completion of the nearby Costco development; however, the signal at Commerce Drive is not anticipated to be completed until the completion of the Foothill Boulevard project by 2025 as per UDOT agreement; therefore, the signal has been included within this analysis.

C. Traffic Volumes

Hales Engineering obtained future (2025) forecasted volumes from the previously completed Saratoga Springs Costco TIS conducted by Kittelson & Associates in July 2019. This was done to maintain uniformity with other projects in the area and to layer these project volumes with those of previous studies. The Kittelson & Associates study assumed an annual growth rate of 2%, based on historic trends. In addition to the projected future background and Costco traffic, trip assignment from the nearby Osmond Development was also added into the background. Future (2025) evening peak hour turning movement volumes are shown in Figure 7.

D. Level of Service Analysis

Hales Engineering determined that all study intersections are anticipated to operate at acceptable levels of service during the evening peak hour in future (2025) background conditions, as shown in Table 5. These results serve as a baseline condition for the impact analysis of the proposed development for future (2025) conditions.

E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. No significant queuing is anticipated during the evening peak hour.

F. Mitigation Measures

No mitigation measures are recommended.

Saratoga Springs - Welfare Complex TIS Update
Future (2025) Background

Evening Peak Hour
Figure 7

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Table 5: Future (2025) Background Evening Peak Hour LOS

Intersection		Level of Service		
Description	Control	Movement[1]	Aver. Delay (Sec/Veh)	LOS[2]
Medical Drive (1140 North) / Redwood Road (SR-68)	Signal	-	17.1	B
Market Street / Redwood Road (SR-68)	Signal	-	10.9	B
Market Street / Pioneer Crossing (SR-145)	Signal	-	18.5	B
Commerce Drive / Redwood Road (SR-68)	Signal	-	12.7	B
Medical Drive / Exchange Drive	EB/WB Stop	EBT	6.4	a

1. Movement indicated for unsignalized intersections where delay and LOS represents worst movement. SBL = Southbound left movement, etc.
2. Uppercase LOS used for signalized, roundabout, and AWSC intersections. Lowercase LOS used for non-AWSC intersections.

Source: Hales Engineering, July 2020

VI. FUTURE (2025) PLUS PROJECT CONDITIONS

A. Purpose

The purpose of the future (2025) plus project analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions plus the net trips generated by the proposed development. This scenario provides valuable insight into the potential impacts of the proposed project on future background traffic conditions.

B. Traffic Volumes

Hales Engineering added the project trips discussed in Chapter III to the future (2025) background traffic volumes to predict turning movement volumes for future (2025) plus project conditions. Future (2025) plus project evening peak hour turning movement volumes are shown in Figure 8.

C. Level of Service Analysis

Hales Engineering determined that all intersections are anticipated to operate at acceptable levels of service during the evening peak hour in future (2025) plus project conditions, as shown in Table 6.

D. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. No significant queuing is anticipated during the evening peak hour.

E. Mitigation Measures

No mitigation measures are recommended.

F. Recommended Storage Lengths

Hales Engineering determined recommended storage lengths based on the 95th percentile queue lengths given in the future (2040) plus project scenario. These storage lengths do not include the taper length. Recommended storage lengths for the study intersections are shown in Table 7. Intersections shown in Table 7 include new intersections and existing intersections that have recommended storage length changes.

Saratoga Springs - Welfare Complex TIS Update **Evening Peak Hour**
Future (2025) Plus Project **Figure 8**

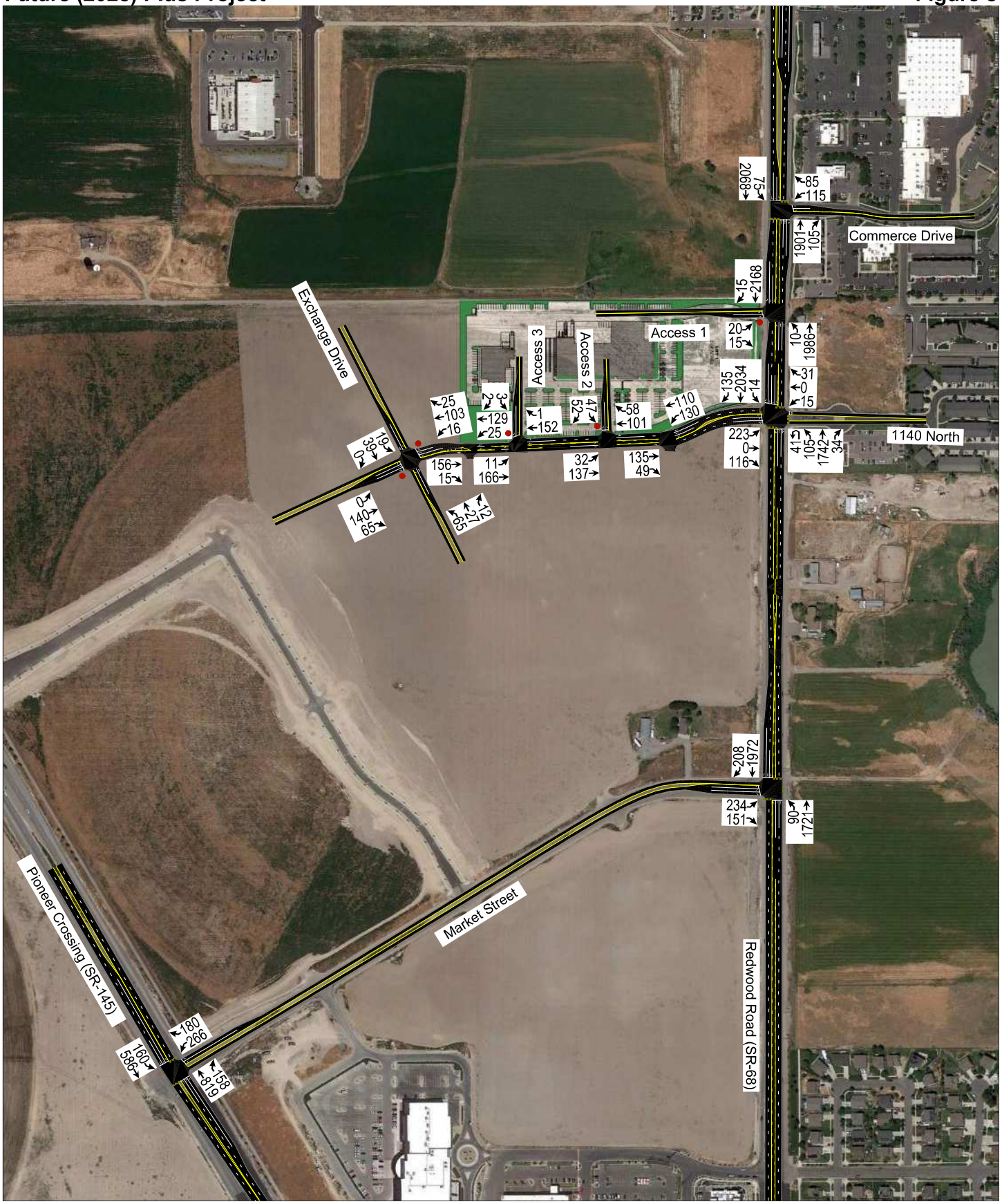

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Table 6: Future (2025) Plus Project Evening Peak Hour LOS

Intersection		Level of Service		
Description	Control	Movement[1]	Aver. Delay (Sec/Veh)	LOS[2]
Medical Drive (1140 North) / Redwood Road (SR-68)	Signal	-	27.1	C
Market Street / Redwood Road (SR-68)	Signal	-	18.7	B
Market Street / Pioneer Crossing (SR-145)	Signal	-	14.6	B
Commerce Drive / Redwood Road (SR-68)	Signal	-	11.6	B
Medical Drive / Exchange Drive	EB/WB Stop	EBT	6.5	a
Access 1 / Redwood Road (SR-68)	EB Stop	EBL	>50	f
Access 2 / Medical Drive	SB Stop	SBL	6.1	a
Access 3 / Medical Drive	SB Stop	SBL	6.2	a

1. Movement indicated for unsignalized intersections where delay and LOS represents worst movement. SBL = Southbound left movement, etc.
2. Uppercase LOS used for signalized, roundabout, and AWSC intersections. Lowercase LOS used for non-AWSC intersections.

Source: Hales Engineering, July 2020

Table 7: Recommended Storage Lengths

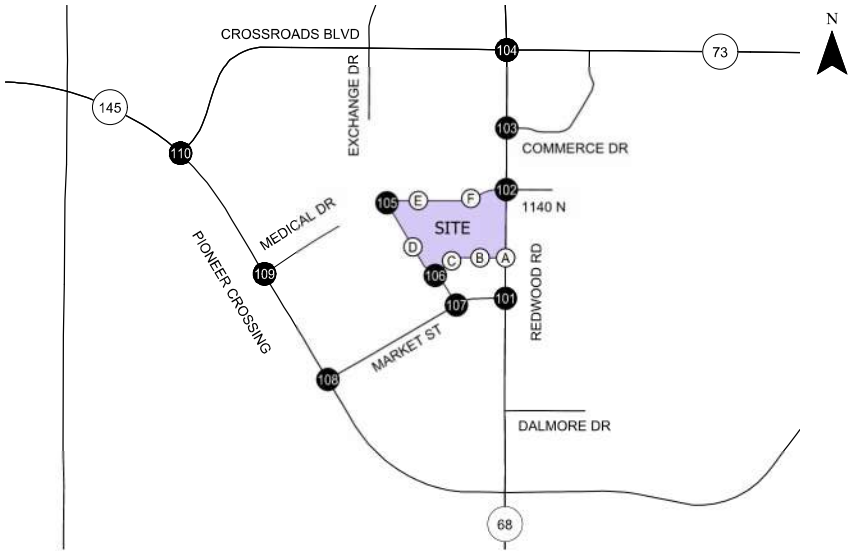
Recommended Storage Lengths Saratoga Springs - Welfare Complex TIS Update								
Intersection	Storage Length (feet)							
	Northbound		Southbound		Eastbound		Westbound	
	LT	RT	LT	RT	LT	RT	LT	RT
Medical Drive (1140 North) / Redwood Road (SR-68)	325	-	100	200	200	-	-	-
Market Street / Redwood Road (SR-68)	130 / 200	-	-	-	155 / 200	160 / 175	-	-
Market Street / Pioneer Crossing (SR-145)	-	100	-	-	-	-	-	-
Commerce Drive / Redwood Road (SR-68)	-	-	90 / 100	-	-	-	-	150
Access 1 / Redwood Road (SR-68)	100	-	-	100	-	50	-	-
Access 2 / Medical Drive	-	-	-	50	50	-	-	-
Access 3 / Medical Drive	-	-	-	50	50	-	-	-

Current storage length (if applicable) / Recommended storage length

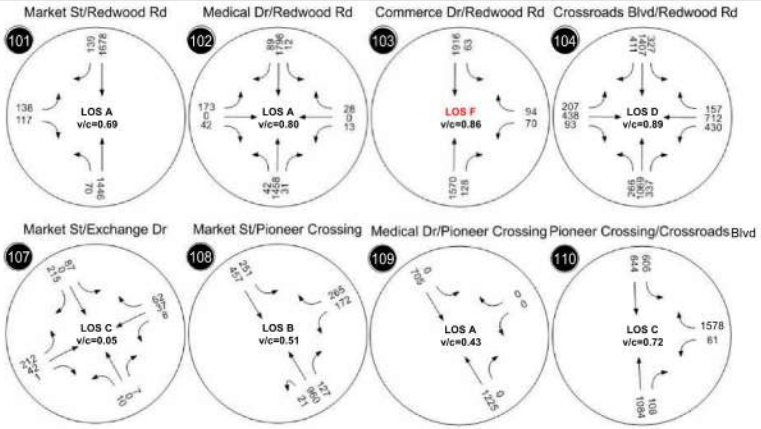
Source: Hales Engineering, July 2020

APPENDIX A

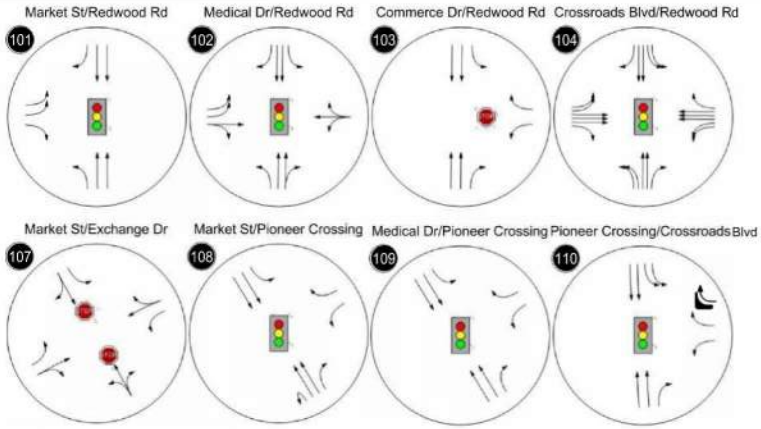
Turning Movement Counts



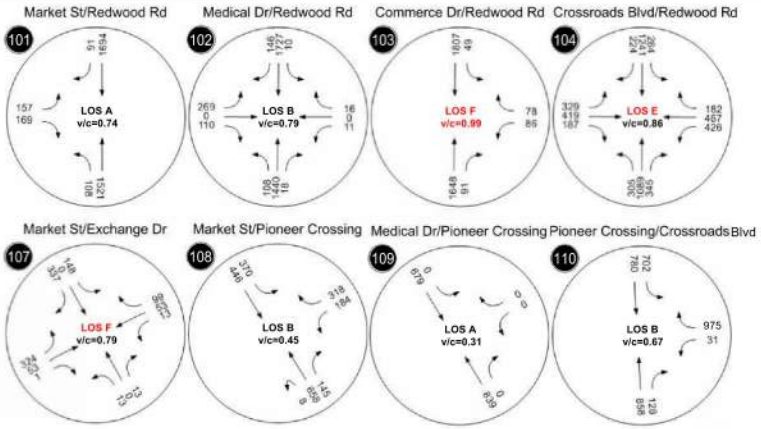
Weekday PM Peak Hour



Lane Configurations



Saturday Midday Peak Hour



- Stop Sign
- Traffic Signal

LOS = Intersection Level of Service (Signalized/AWSC) / Critical movement Level of Service (TWSC)
V/C = Critical volume-to-capacity ratio

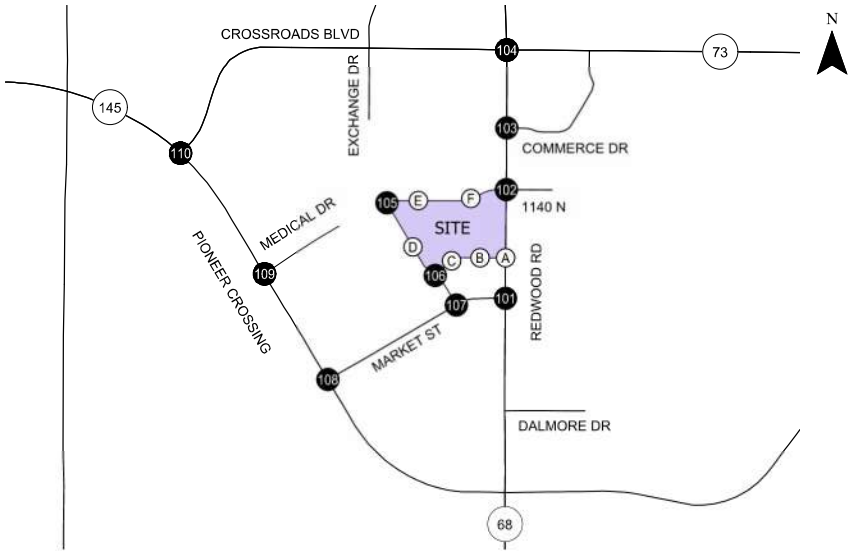
TWSC = Two-way stop control
AWSC = All-way stop control

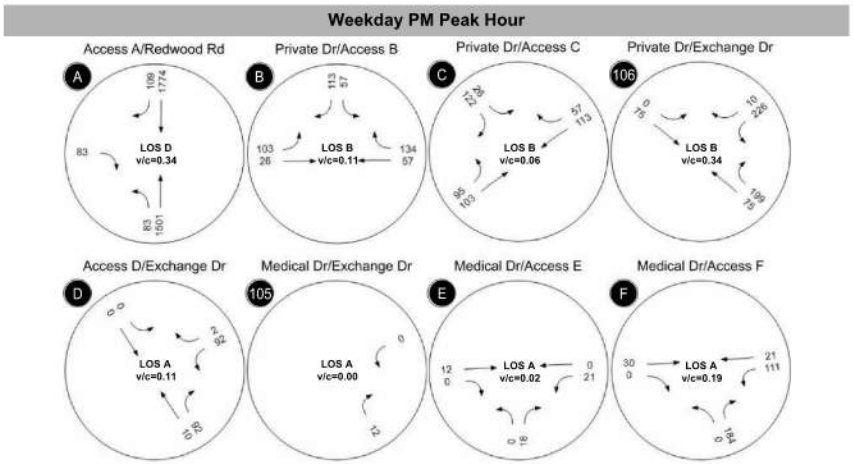
Note: Red text represents intersections that do not meet Level of Service (LOS) standards.

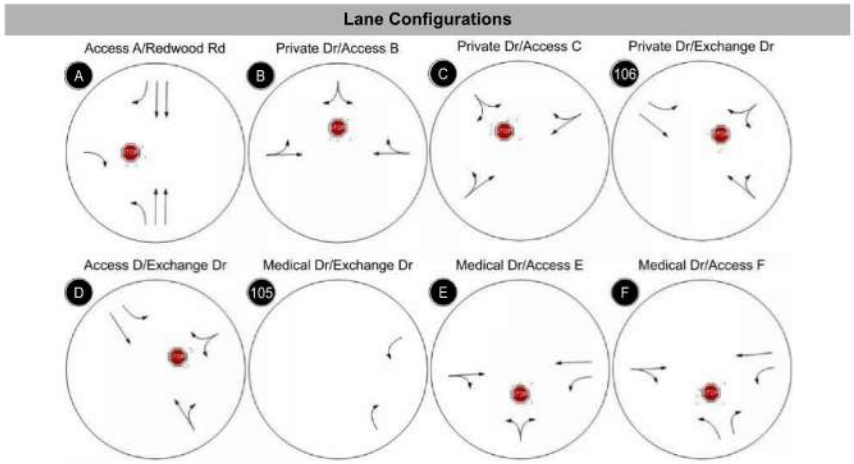
Year 2020 Total Traffic Conditions (Offsite Intersections)
Weekday PM and Saturday Midday Peak Hour
Saratoga Springs, Utah

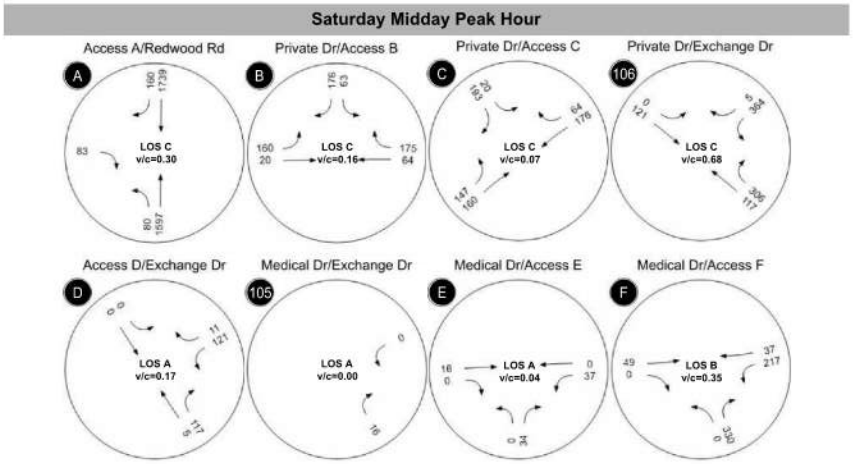
Figure
9A

KITTELSON & ASSOCIATES









- Stop Sign
- Traffic Signal

LOS = Intersection Level of Service (Signalized/AWSC) / Critical movement Level of Service (TWSC)
V/C = Critical volume-to-capacity ratio

TWSC = Two-way stop control
AWSC = All-way stop control

Note: Red text represents intersections that do not meet Level of Service (LOS) standards.

Year 2020 Total Traffic Conditions (Onsite Intersections)
Weekday PM and Saturday Midday Peak Hour
Saratoga Springs, Utah

Figure
9B

KITTELSON & ASSOCIATES

Saratoga Springs - Osmond TIS
Trip Assignment

Evening Peak Hour
Figure 4

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APPENDIX B

LOS Results

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Background*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Redwood Road (SR-68) & Medical Drive/1140 North
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	42	43	102	56.6	*E*
	T	1,472	1,476	100	6.2	*A*
	R	31	33	106	3.7	*A*
	Subtotal	1,545	1,552	100	7.5	*A*
SB	L	12	12	100	22.6	*C*
	T	1,818	1,814	100	7.0	*A*
	R	89	88	99	3.0	*A*
	Subtotal	1,919	1,914	100	6.9	*A*
EB	L	173	172	99	73.2	*E*
	T	1	1	133	0.4	*A*
	R	42	44	104	32.8	*C*
	Subtotal	216	217	100	64.7	*E*
WB	L	13	12	92	67.9	*E*
	R	28	30	106	21.2	*C*
	Subtotal	41	42	102	34.5	*C*
Total		3,763	3,767	100	11.4	*B*

Intersection: Redwood Road (SR-68) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	70	68	97	45.9	*D*
	T	1,486	1,502	101	4.8	*A*
	Subtotal	1,556	1,570	101	6.6	*A*
SB	T	1,723	1,719	100	2.2	*A*
	R	166	165	99	1.4	*A*
	Subtotal	1,889	1,884	100	2.1	*A*
EB	L	163	156	96	79.9	*E*
	T	98	103	105	1.9	*A*
	R	117	116	99	30.1	*C*
	Subtotal	378	375	99	43.1	*D*
Total		3,823	3,829	100	8.0	*A*

HALES ENGINEERING
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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Background*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Pioneer Crossing (SR-145) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	960	971	101	11.4	*B*
	R	127	129	102	4.6	*A*
	Subtotal	1,087	1,100	101	10.6	*B*
SB	L	251	248	99	27.5	*C*
	T	457	457	100	4.1	*A*
	Subtotal	708	705	100	12.3	*B*
WB	L	172	175	102	52.9	*D*
	R	265	263	99	13.2	*B*
	Subtotal	437	438	100	29.1	*C*
Total		2,232	2,243	101	14.8	*B*

Intersection: Redwood Road (SR-68) & Commerce Drive
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	1,576	1,576	100	2.8	*A*
	R	97	98	101	2.4	*A*
	Subtotal	1,673	1,674	100	2.8	*A*
SB	L	66	64	97	31.3	*D*
	T	1,814	1,825	101	7.8	*A*
	Subtotal	1,880	1,889	100	8.6	*A*
WB	***L***	***105***	***88***	***84***	***412.9***	***F***
	R	78	68	87	258.9	*F*
	Subtotal	183	156	85	345.8	*F*
Total		3,736	3,719	100	22.2	*C*

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Background*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Exchange Drive/Exchange Drive (Unfinished) & Medical Drive
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	***R***	***12***	***12***	***100***	***0.0***	***A***
	Subtotal	12	12	100	0.0	*A*
Total		12	12	100	0.0	*A*

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	EBL	EBT	EBR	WBL	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	3.6	0.0	0.4	0.2	0.2	0.7	0.7	2.6	0.0	0.1	3.5	0.1
Total Del/Veh (s)	73.2	0.4	32.8	67.9	21.2	56.8	56.6	6.2	3.7	22.6	7.0	3.0
Vehicles Entered	172	1	44	12	30	41	43	1475	33	12	1813	88
Vehicles Exited	172	1	44	12	30	42	43	1476	33	12	1814	88
Hourly Exit Rate	172	1	44	12	30	42	43	1476	33	12	1814	88
Input Volume	173	1	42	13	28	41	42	1472	31	12	1818	89
% of Volume	99	133	104	92	106	102	102	100	106	100	100	99

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	12.0
Total Del/Veh (s)	11.4
Vehicles Entered	3764
Vehicles Exited	3767
Hourly Exit Rate	3767
Input Volume	3763
% of Volume	100

2: Redwood Road (SR-68) & Market Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
Denied Del/Veh (s)	0.0	0.0	0.0	2.0	0.4	0.0	0.0	0.2
Total Delay (hr)	3.5	0.1	1.0	0.9	2.0	1.0	0.1	8.6
Total Del/Veh (s)	79.9	1.9	30.1	45.9	4.8	2.2	1.4	8.0
Vehicles Entered	157	104	116	68	1505	1718	164	3832
Vehicles Exited	156	103	116	68	1502	1719	165	3829
Hourly Exit Rate	156	103	116	68	1502	1719	165	3829
Input Volume	163	98	117	70	1486	1723	166	3823
% of Volume	96	105	99	97	101	100	99	100

3: Pioneer Crossing (SR-145) & Market Street Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.1	0.1	0.2	0.0	0.5
Denied Del/Veh (s)	0.4	1.7	0.3	2.5	3.1	0.2	0.9
Total Delay (hr)	2.6	1.0	3.1	0.2	1.9	0.5	9.3
Total Del/Veh (s)	52.9	13.2	11.4	4.6	27.5	4.1	14.8
Vehicles Entered	174	264	973	129	248	457	2245
Vehicles Exited	175	263	971	129	248	457	2243
Hourly Exit Rate	175	263	971	129	248	457	2243
Input Volume	172	265	960	127	251	457	2232
% of Volume	102	99	101	102	99	100	101

4: Redwood Road (SR-68) & Commerce Drive Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	2.0	1.2	0.0	0.0	0.0	0.0	3.2
Denied Del/Veh (s)	68.3	58.3	0.0	0.0	0.0	0.0	3.1
Total Delay (hr)	12.0	5.3	1.2	0.1	0.6	4.0	23.2
Total Del/Veh (s)	412.9	258.9	2.8	2.4	31.3	7.8	22.2
Vehicles Entered	98	74	1580	98	65	1826	3741
Vehicles Exited	88	68	1576	98	64	1825	3719
Hourly Exit Rate	88	68	1576	98	64	1825	3719
Input Volume	105	78	1576	97	66	1814	3736
% of Volume	84	87	100	101	97	101	100

8: Exchange Drive/Exchange Drive (Unfinished) & Medical Drive Performance by movement

Movement	NBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.1	0.1
Total Delay (hr)	0.0	0.0
Total Del/Veh (s)	0.0	0.0
Vehicles Entered	12	12
Vehicles Exited	12	12
Hourly Exit Rate	12	12
Input Volume	12	12
% of Volume	100	100

Total Zone Performance

Denied Delay (hr)	4.0
Denied Del/Veh (s)	3.7
Total Delay (hr)	58.9
Total Del/Veh (s)	25.1
Vehicles Entered	3813
Vehicles Exited	8271
Hourly Exit Rate	8271
Input Volume	21708
% of Volume	38

Intersection: 1: Redwood Road (SR-68) & Medical Drive/1140 North

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	UL	T	TR	L	T	T	R
Maximum Queue (ft)	146	173	77	90	136	243	274	38	284	308	118
Average Queue (ft)	71	97	25	33	67	103	104	10	106	126	17
95th Queue (ft)	130	157	59	74	117	209	218	32	227	257	81
Link Distance (ft)		316	316	494		542	542		675	675	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	100				135			180			180
Storage Blk Time (%)	4	14			1	4			2	4	
Queuing Penalty (veh)	3	12			8	3			0	4	

Intersection: 2: Redwood Road (SR-68) & Market Street

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	136	162	150	118	214	197	134	127	59
Average Queue (ft)	71	79	58	50	71	56	35	35	13
95th Queue (ft)	124	136	116	97	172	150	99	95	39
Link Distance (ft)		2341			1554	1554	408	408	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	165		165	135					180
Storage Blk Time (%)	0	0	0	0	1			0	
Queuing Penalty (veh)	0	0	1	2	1			0	

Intersection: 3: Pioneer Crossing (SR-145) & Market Street

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (ft)	243	189	360	299	99	236	120	98
Average Queue (ft)	133	72	180	127	36	113	50	36
95th Queue (ft)	213	140	318	264	79	196	105	84
Link Distance (ft)	2341		586	586			811	811
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200			300	350		
Storage Blk Time (%)	2	0		0				
Queuing Penalty (veh)	4	0		0				

Intersection: 4: Redwood Road (SR-68) & Commerce Drive

Movement	WB	WB	NB	SB	SB	SB
Directions Served	L	R	R	L	T	T
Maximum Queue (ft)	671	150	23	101	122	8
Average Queue (ft)	443	103	2	42	6	0
95th Queue (ft)	785	208	13	84	51	8
Link Distance (ft)	658				865	865
Upstream Blk Time (%)	25					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		50	130	85		
Storage Blk Time (%)	98	11		2	0	
Queuing Penalty (veh)	76	11		15	0	

Intersection: 8: Exchange Drive/Exchange Drive (Unfinished) & Medical Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Zone Summary

Zone wide Queuing Penalty: 142

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Redwood Road (SR-68) & Medical Drive/1140 North
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	97	96	99	65.6	*E*
	T	1,487	1,492	100	7.9	*A*
	R	31	31	99	5.6	*A*
	Subtotal	1,615	1,619	100	11.3	*B*
SB	L	12	12	100	34.0	*C*
	T	1,833	1,792	98	9.0	*A*
	R	126	123	98	2.1	*A*
	Subtotal	1,971	1,927	98	8.7	*A*
EB	L	216	218	101	69.0	*E*
	T	1	1	100	0.5	*A*
	R	103	104	101	38.0	*D*
	Subtotal	320	323	101	58.8	*E*
WB	L	13	11	85	72.8	*E*
	R	28	32	113	25.1	*C*
	Subtotal	41	43	105	37.3	*D*
Total		3,988	3,952	99	14.8	*B*

Intersection: Redwood Road (SR-68) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	70	68	97	44.3	*D*
	T	1,543	1,541	100	5.4	*A*
	Subtotal	1,613	1,609	100	7.0	*A*
SB	T	1,784	1,752	98	2.9	*A*
	R	180	178	99	1.6	*A*
	Subtotal	1,964	1,930	98	2.8	*A*
EB	L	176	175	99	76.3	*E*
	T	98	103	105	2.0	*A*
	R	117	113	97	30.8	*C*
	Subtotal	391	391	100	43.6	*D*
Total		3,968	3,930	99	8.7	*A*

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Pioneer Crossing (SR-145) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	960	942	98	10.8	*B*
	R	127	132	104	4.5	*A*
	Subtotal	1,087	1,074	99	10.0	*A*
SB	L	264	258	98	27.2	*C*
	T	457	451	99	4.3	*A*
	Subtotal	721	709	98	12.6	*B*
WB	L	172	170	99	55.6	*E*
	R	279	275	99	13.3	*B*
	Subtotal	451	445	99	29.5	*C*
Total		2,259	2,228	99	14.8	*B*

Intersection: Redwood Road (SR-68) & Commerce Drive
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	1,639	1,642	100	1.2	*A*
	R	97	102	105	0.5	*A*
	Subtotal	1,736	1,744	100	1.2	*A*
SB	L	66	70	106	41.0	*E*
	T	1,872	1,856	99	8.6	*A*
	Subtotal	1,938	1,926	99	9.8	*A*
WB	***L***	***105***	***79***	***75***	***535.8***	***F***
	R	78	58	75	339.5	*F*
	Subtotal	183	137	75	452.7	*F*
Total		3,856	3,807	99	25.2	*D*

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Exchange Drive/Exchange Drive (Unfinished) & Medical Drive
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	***R***	***12***	***11***	***92***	***0.0***	***A***
	Subtotal	12	11	92	0.0	*A*
Total		12	11	92	0.0	*A*

Intersection: Redwood Road (SR-68) & Access 1
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	15	15	100	76.3	*F*
	T	1,716	1,725	101	2.0	*A*
	Subtotal	1,731	1,740	101	2.6	*A*
SB	T	1,956	1,914	98	2.0	*A*
	R	20	20	100	0.4	*A*
	Subtotal	1,976	1,934	98	2.0	*A*
EB	***L***	***20***	***19***	***95***	***189.8***	***F***
	R	15	16	107	45.2	*E*
	Subtotal	35	35	100	123.7	*F*
Total		3,742	3,709	99	3.5	*A*

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Existing (2020) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Medical Drive & Access 2
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
SB	***L***	***89***	***90***	***101***	***4.6***	***A***
	Subtotal	89	90	101	4.6	*A*
EB	T	45	47	104	0.3	*A*
	Subtotal	45	47	104	0.3	*A*
WB	T	34	33	97	0.3	*A*
	R	80	79	99	0.2	*A*
	Subtotal	114	112	98	0.2	*A*
Total		248	249	101	1.8	*A*

Intersection: Medical Drive & Access 3
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
SB	***L***	***15***	***17***	***113***	***4.0***	***A***
	Subtotal	15	17	113	4.0	*A*
EB	T	31	31	100	0.2	*A*
	Subtotal	31	31	100	0.2	*A*
WB	T	22	20	91	0.1	*A*
	R	12	12	100	0.2	*A*
	Subtotal	34	32	94	0.1	*A*
Total		80	80	100	1.0	*A*

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	EBL	EBT	EBR	WBL	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	4.2	0.0	1.1	0.2	0.2	0.8	1.7	3.3	0.0	0.1	4.5	0.1
Total Del/Veh (s)	69.0	0.5	38.0	72.8	25.1	68.1	65.6	7.9	5.6	34.0	9.0	2.1
Vehicles Entered	217	1	104	11	32	40	96	1495	31	12	1795	123
Vehicles Exited	218	1	104	11	32	40	96	1492	31	12	1792	123
Hourly Exit Rate	218	1	104	11	32	40	96	1492	31	12	1792	123
Input Volume	216	1	103	13	28	41	97	1487	31	12	1833	126
% of Volume	101	100	101	85	113	97	99	100	99	100	98	98

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	16.3
Total Del/Veh (s)	14.8
Vehicles Entered	3957
Vehicles Exited	3952
Hourly Exit Rate	3952
Input Volume	3988
% of Volume	99

2: Redwood Road (SR-68) & Market Street Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
Denied Del/Veh (s)	0.0	0.0	0.0	2.0	0.4	0.0	0.0	0.2
Total Delay (hr)	3.8	0.1	1.0	0.8	2.3	1.4	0.1	9.5
Total Del/Veh (s)	76.3	2.0	30.8	44.3	5.4	2.9	1.6	8.7
Vehicles Entered	175	103	113	68	1541	1751	178	3929
Vehicles Exited	175	103	113	68	1541	1752	178	3930
Hourly Exit Rate	175	103	113	68	1541	1752	178	3930
Input Volume	176	98	117	70	1543	1784	180	3968
% of Volume	99	105	97	97	100	98	99	99

3: Pioneer Crossing (SR-145) & Market Street Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.1	0.1	0.2	0.0	0.5
Denied Del/Veh (s)	0.3	1.6	0.2	2.6	3.0	0.2	0.9
Total Delay (hr)	2.7	1.0	2.9	0.2	2.0	0.5	9.3
Total Del/Veh (s)	55.6	13.3	10.8	4.5	27.2	4.3	14.8
Vehicles Entered	170	274	943	132	259	451	2229
Vehicles Exited	170	275	942	132	258	451	2228
Hourly Exit Rate	170	275	942	132	258	451	2228
Input Volume	172	279	960	127	264	457	2259
% of Volume	99	99	98	104	98	99	99

4: Redwood Road (SR-68) & Commerce Drive Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	6.2	4.5	0.0	0.0	0.0	0.0	10.7
Denied Del/Veh (s)	210.3	211.4	0.0	0.0	0.0	0.0	10.0
Total Delay (hr)	14.7	6.4	0.5	0.0	0.8	4.4	26.9
Total Del/Veh (s)	535.8	339.5	1.2	0.5	41.0	8.6	25.2
Vehicles Entered	90	64	1642	102	69	1858	3825
Vehicles Exited	79	58	1642	102	70	1856	3807
Hourly Exit Rate	79	58	1642	102	70	1856	3807
Input Volume	105	78	1639	97	66	1872	3856
% of Volume	75	75	100	105	106	99	99

8: Exchange Drive/Exchange Drive (Unfinished) & Medical Drive Performance by movement

Movement	NBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.1	0.1
Total Delay (hr)	0.0	0.0
Total Del/Veh (s)	0.0	0.0
Vehicles Entered	11	11
Vehicles Exited	11	11
Hourly Exit Rate	11	11
Input Volume	12	12
% of Volume	92	92

22: Redwood Road (SR-68) & Access 1 Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	4.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	1.1	0.2	0.3	1.0	1.0	0.0	3.6
Total Del/Veh (s)	189.8	45.2	76.3	2.0	2.0	0.4	3.5
Vehicles Entered	19	16	15	1727	1916	20	3713
Vehicles Exited	19	16	15	1725	1914	20	3709
Hourly Exit Rate	19	16	15	1725	1914	20	3709
Input Volume	20	15	15	1716	1956	20	3742
% of Volume	95	107	100	101	98	100	99

24: Medical Drive & Access 2 Performance by movement

Movement	EBT	WBT	WBR	SBL	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1
Total Delay (hr)	0.0	0.0	0.0	0.1	0.1
Total Del/Veh (s)	0.3	0.3	0.2	4.6	1.8
Vehicles Entered	47	32	79	90	248
Vehicles Exited	47	33	79	90	249
Hourly Exit Rate	47	33	79	90	249
Input Volume	45	34	80	89	248
% of Volume	104	97	99	101	101

27: Medical Drive & Access 3 Performance by movement

Movement	EBT	WBT	WBR	SBL	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.2	0.1	0.2	4.0	1.0
Vehicles Entered	31	20	12	17	80
Vehicles Exited	31	20	12	17	80
Hourly Exit Rate	31	20	12	17	80
Input Volume	31	22	12	15	80
% of Volume	100	91	100	113	100

Total Zone Performance

Denied Delay (hr)	11.5
Denied Del/Veh (s)	10.4
Total Delay (hr)	71.8
Total Del/Veh (s)	29.8
Vehicles Entered	3947
Vehicles Exited	8447
Hourly Exit Rate	8447
Input Volume	26562
% of Volume	32

Intersection: 1: Redwood Road (SR-68) & Medical Drive/1140 North

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	UL	T	TR	L	T	T	R
Maximum Queue (ft)	171	195	148	97	220	271	268	67	272	294	130
Average Queue (ft)	88	114	63	34	111	132	133	9	142	154	22
95th Queue (ft)	153	175	124	75	193	242	239	37	257	277	77
Link Distance (ft)		316	316	494		542	542		291	291	
Upstream Blk Time (%)									0	1	0
Queuing Penalty (veh)									4	5	0
Storage Bay Dist (ft)	100				135			100			150
Storage Blk Time (%)	8	21			11	6			15	11	
Queuing Penalty (veh)	8	22			85	8			2	14	

Intersection: 2: Redwood Road (SR-68) & Market Street

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	165	169	145	104	207	193	166	167	61
Average Queue (ft)	82	90	56	49	77	64	57	63	18
95th Queue (ft)	137	147	116	90	184	164	137	146	48
Link Distance (ft)		2341			1554	1554	408	408	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	165		165	135					180
Storage Blk Time (%)	0	0	0		2			0	
Queuing Penalty (veh)	0	1	0		1			0	

Intersection: 3: Pioneer Crossing (SR-145) & Market Street

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (ft)	238	171	335	306	89	227	115	94
Average Queue (ft)	131	73	168	121	37	118	51	35
95th Queue (ft)	211	137	297	261	72	199	107	81
Link Distance (ft)	2341		586	586			811	811
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200			300	350		
Storage Blk Time (%)	2	0		0				
Queuing Penalty (veh)	5	0		0				

Intersection: 4: Redwood Road (SR-68) & Commerce Drive

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	R	L	T	T
Maximum Queue (ft)	679	150	4	32	114	122	47
Average Queue (ft)	506	92	0	3	49	11	2
95th Queue (ft)	844	203	4	19	97	67	25
Link Distance (ft)	658		303			865	865
Upstream Blk Time (%)	44						
Queuing Penalty (veh)	0						
Storage Bay Dist (ft)		50		130	85		
Storage Blk Time (%)	97	8			3	0	
Queuing Penalty (veh)	75	8			32	0	

Intersection: 8: Exchange Drive/Exchange Drive (Unfinished) & Medical Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 22: Redwood Road (SR-68) & Access 1

Movement	EB	EB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	96	48	63	40	55	2
Average Queue (ft)	31	12	17	3	4	0
95th Queue (ft)	84	35	50	29	35	2
Link Distance (ft)	595			303	303	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	100			150
Storage Blk Time (%)	3		1		0	
Queuing Penalty (veh)	0		5		0	

Intersection: 24: Medical Drive & Access 2

Movement	SB
Directions Served	L
Maximum Queue (ft)	67
Average Queue (ft)	35
95th Queue (ft)	56
Link Distance (ft)	256
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 27: Medical Drive & Access 3

Movement	SB
Directions Served	L
Maximum Queue (ft)	28
Average Queue (ft)	10
95th Queue (ft)	29
Link Distance (ft)	278
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 278

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Background*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Redwood Road (SR-68) & Medical Drive/1140 North
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	75	75	100	79.2	*E*
	T	1,732	1,728	100	9.6	*A*
	R	34	34	99	7.4	*A*
	Subtotal	1,841	1,837	100	12.4	*B*
SB	L	14	14	100	54.7	*D*
	T	2,134	2,079	97	13.3	*B*
	R	106	102	96	6.7	*A*
	Subtotal	2,254	2,195	97	13.3	*B*
EB	L	208	209	100	71.3	*E*
	R	81	79	98	40.6	*D*
	Subtotal	289	288	100	62.9	*E*
WB	L	15	14	93	71.4	*E*
	R	31	36	115	31.9	*C*
	Subtotal	46	50	109	43.0	*D*
Total		4,472	4,407	99	17.1	*B*

Intersection: Redwood Road (SR-68) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	74	73	99	57.0	*E*
	T	1,681	1,670	99	7.6	*A*
	Subtotal	1,755	1,743	99	9.7	*A*
SB	T	1,922	1,864	97	3.2	*A*
	R	208	204	98	1.8	*A*
	Subtotal	2,130	2,068	97	3.1	*A*
EB	L	234	239	102	68.5	*E*
	R	139	141	101	39.0	*D*
	Subtotal	373	380	102	57.6	*E*
Total		4,258	4,191	98	10.9	*B*

HALES ENGINEERING
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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Background*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Pioneer Crossing (SR-145) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	819	822	100	7.2	*A*
	R	158	159	101	3.8	*A*
	Subtotal	977	981	100	6.6	*A*
SB	L	160	165	103	22.5	*C*
	T	586	578	99	4.5	*A*
	Subtotal	746	743	100	8.5	*A*
WB	L	266	256	96	91.1	*F*
	R	180	177	98	18.8	*B*
	Subtotal	446	433	97	61.5	*E*
Total		2,169	2,157	99	18.5	*B*

Intersection: Redwood Road (SR-68) & Commerce Drive
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	1,866	1,866	100	6.5	*A*
	R	105	107	102	4.3	*A*
	Subtotal	1,971	1,973	100	6.4	*A*
SB	L	75	69	92	61.8	*E*
	T	2,140	2,083	97	12.4	*B*
	Subtotal	2,215	2,152	97	14.0	*B*
WB	L	115	116	101	76.6	*E*
	R	85	84	99	40.1	*D*
	Subtotal	200	200	100	61.3	*E*
Total		4,385	4,325	99	12.7	*B*

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Background*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Exchange Drive & Medical Drive
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	65	65	100	1.7	*A*
	T	27	26	95	0.1	*A*
	R	2	2	100	0.1	*A*
	Subtotal	94	93	99	1.2	*A*
SB	T	39	37	94	0.1	*A*
	Subtotal	39	37	95	0.1	*A*
EB	***T***	***126***	***126***	***100***	***6.4***	***A***
	R	65	65	100	3.1	*A*
	Subtotal	191	191	100	5.3	*A*
WB	T	90	86	95	5.2	*A*
	Subtotal	90	86	96	5.2	*A*
Total		416	407	98	3.9	*A*

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	EBL	EBR	WBL	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	4.2	0.9	0.3	0.3	0.8	1.7	4.7	0.1	0.2	7.8	0.2	21.1
Total Del/Veh (s)	71.3	40.6	71.4	31.9	76.9	79.2	9.6	7.4	54.7	13.3	6.7	17.1
Vehicles Entered	208	79	13	36	37	76	1726	33	14	2082	102	4406
Vehicles Exited	209	79	14	36	37	75	1728	34	14	2079	102	4407
Hourly Exit Rate	209	79	14	36	37	75	1728	34	14	2079	102	4407
Input Volume	208	81	15	31	41	75	1732	34	14	2134	106	4472
% of Volume	100	98	93	115	90	100	100	99	100	97	96	99

2: Redwood Road (SR-68) & Market Street Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.2	0.0	0.0	0.3
Denied Del/Veh (s)	0.2	0.5	1.9	0.4	0.0	0.0	0.2
Total Delay (hr)	4.6	1.6	1.2	3.6	1.7	0.1	12.8
Total Del/Veh (s)	68.5	39.0	57.0	7.6	3.2	1.8	10.9
Vehicles Entered	238	141	73	1673	1864	204	4193
Vehicles Exited	239	141	73	1670	1864	204	4191
Hourly Exit Rate	239	141	73	1670	1864	204	4191
Input Volume	234	139	74	1681	1922	208	4258
% of Volume	102	101	99	99	97	98	98

3: Pioneer Crossing (SR-145) & Market Street Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.1	0.1	0.1	0.0	0.4
Denied Del/Veh (s)	0.2	1.4	0.2	2.7	3.0	0.2	0.7
Total Delay (hr)	6.7	0.9	1.7	0.2	1.0	0.7	11.2
Total Del/Veh (s)	91.1	18.8	7.2	3.8	22.5	4.5	18.5
Vehicles Entered	257	178	822	159	165	579	2160
Vehicles Exited	256	177	822	159	165	578	2157
Hourly Exit Rate	256	177	822	159	165	578	2157
Input Volume	266	180	819	158	160	586	2169
% of Volume	96	98	100	101	103	99	99

4: Redwood Road (SR-68) & Commerce Drive Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.4	3.9	0.0	0.0	0.0	0.0	0.1
Total Delay (hr)	2.5	0.9	3.4	0.1	1.2	7.2	15.4
Total Del/Veh (s)	76.6	40.1	6.5	4.3	61.8	12.4	12.7
Vehicles Entered	117	84	1865	107	69	2082	4324
Vehicles Exited	116	84	1866	107	69	2083	4325
Hourly Exit Rate	116	84	1866	107	69	2083	4325
Input Volume	115	85	1866	105	75	2140	4385
% of Volume	101	99	100	102	92	97	99

8: Exchange Drive & Medical Drive Performance by movement

Movement	EBT	EBR	WBT	NBL	NBT	NBR	SBT	All
Denied Delay (hr)	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	0.4	3.8	0.0	4.0	0.3	0.2	0.1	1.4
Total Delay (hr)	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.4
Total Del/Veh (s)	6.4	3.1	5.2	1.7	0.1	0.1	0.1	3.9
Vehicles Entered	126	65	86	65	26	2	37	407
Vehicles Exited	126	65	86	65	26	2	37	407
Hourly Exit Rate	126	65	86	65	26	2	37	407
Input Volume	126	65	90	65	27	2	39	416
% of Volume	100	100	95	100	95	100	94	98

Total Zone Performance

Denied Delay (hr)	1.0
Denied Del/Veh (s)	0.8
Total Delay (hr)	67.5
Total Del/Veh (s)	26.4
Vehicles Entered	4257
Vehicles Exited	8999
Hourly Exit Rate	8999
Input Volume	24695
% of Volume	36

Intersection: 1: Redwood Road (SR-68) & Medical Drive/1140 North

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	UL	T	TR	L	T	T	R
Maximum Queue (ft)	176	200	125	101	236	338	354	81	379	398	248
Average Queue (ft)	86	113	50	40	106	170	169	16	193	212	35
95th Queue (ft)	152	175	103	84	191	306	309	53	335	351	146
Link Distance (ft)		316	316	494		542	542		675	675	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	100				135			100			150
Storage Blk Time (%)	8	20			9	9			20	15	
Queuing Penalty (veh)	8	20			77	10			3	16	

Intersection: 2: Redwood Road (SR-68) & Market Street

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	174	238	206	150	282	282	180	188	63
Average Queue (ft)	94	113	83	60	134	112	70	66	20
95th Queue (ft)	150	186	163	115	237	225	140	141	53
Link Distance (ft)		2341			1554	1554	408	408	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	165		165	135					180
Storage Blk Time (%)	1	2	1	1	4			0	
Queuing Penalty (veh)	2	6	2	6	3			1	

Intersection: 3: Pioneer Crossing (SR-145) & Market Street

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (ft)	495	279	263	216	95	150	147	124
Average Queue (ft)	260	110	139	77	40	76	70	47
95th Queue (ft)	498	292	227	174	78	129	128	102
Link Distance (ft)	2341		586	586			811	811
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200			300	350		
Storage Blk Time (%)	29	0		0				
Queuing Penalty (veh)	53	0		0				

Intersection: 4: Redwood Road (SR-68) & Commerce Drive

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (ft)	281	150	188	179	74	129	179	202
Average Queue (ft)	119	63	80	83	12	56	78	94
95th Queue (ft)	220	136	162	168	46	108	161	185
Link Distance (ft)	658		675	675			865	865
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		50			130	85		
Storage Blk Time (%)	57	14		2		6	5	
Queuing Penalty (veh)	48	16		2		64	4	

Intersection: 8: Exchange Drive & Medical Drive

Movement	EB	EB	WB	NB	SB
Directions Served	T	R	T	L	TR
Maximum Queue (ft)	80	45	62	30	2
Average Queue (ft)	38	27	25	3	0
95th Queue (ft)	66	44	46	19	3
Link Distance (ft)	501		151		492
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100		100	
Storage Blk Time (%)	0		0		
Queuing Penalty (veh)	0		0		

Zone Summary

Zone wide Queuing Penalty: 341

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Redwood Road (SR-68) & Medical Drive/1140 North
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	105	98	94	219.6	F
	T	1,743	1,689	97	20.2	C
	R	34	34	99	13.3	B
	Subtotal	1,882	1,821	97	30.8	C
SB	L	14	13	93	54.4	D
	T	2,034	2,037	100	14.0	B
	R	135	133	99	3.3	A
	Subtotal	2,183	2,183	100	13.6	B
EB	L	223	223	100	67.8	E
	T	1	1	133	0.6	A
	R	116	118	102	48.3	D
	Subtotal	340	342	101	60.9	E
WB	L	15	16	107	73.3	E
	R	31	30	96	39.3	D
	Subtotal	46	46	100	51.1	D
Total		4,492	4,432	99	27.1	C

Intersection: Redwood Road (SR-68) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	90	91	101	70.3	E
	T	1,721	1,682	98	24.5	C
	Subtotal	1,811	1,773	98	26.9	C
SB	T	1,972	1,967	100	4.6	A
	R	208	214	103	2.6	A
	Subtotal	2,180	2,181	100	4.4	A
EB	L	234	246	105	68.6	E
	R	151	153	101	44.7	D
	Subtotal	385	399	104	59.4	E
Total		4,376	4,353	99	18.7	B

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Pioneer Crossing (SR-145) & Market Street
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	819	824	101	10.5	*B*
	R	158	165	104	3.7	*A*
	Subtotal	977	989	101	9.4	*A*
SB	L	160	167	104	23.2	*C*
	T	586	578	99	6.0	*A*
	Subtotal	746	745	100	9.9	*A*
WB	L	266	273	103	48.1	*D*
	R	180	184	102	10.3	*B*
	Subtotal	446	457	102	32.9	*C*
Total		2,169	2,191	101	14.6	*B*

Intersection: Redwood Road (SR-68) & Commerce Drive
Type: Signalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	T	1,902	1,844	97	5.2	*A*
	R	105	106	101	2.0	*A*
	Subtotal	2,007	1,950	97	5.0	*A*
SB	L	75	74	99	60.7	*E*
	T	2,069	2,075	100	11.2	*B*
	Subtotal	2,144	2,149	100	12.9	*B*
WB	L	115	113	98	79.8	*E*
	R	85	82	97	41.8	*D*
	Subtotal	200	195	98	63.8	*E*
Total		4,350	4,294	99	11.6	*B*

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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Exchange Drive & Medical Drive
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	65	61	93	1.6	*A*
	T	27	26	95	0.2	*A*
	R	12	12	100	0.2	*A*
	Subtotal	104	99	95	1.1	*A*
SB	L	19	19	100	1.6	*A*
	T	39	38	97	0.1	*A*
	Subtotal	58	57	98	0.6	*A*
EB	***T***	***140***	***136***	***97***	***6.5***	***A***
	R	65	68	104	3.3	*A*
	Subtotal	205	204	100	5.4	*A*
WB	L	16	15	94	5.1	*A*
	T	103	101	98	5.7	*A*
	R	25	28	111	2.4	*A*
	Subtotal	144	144	100	5.0	*A*
Total		512	504	98	3.9	*A*

Intersection: Redwood Road (SR-68) & Access 1
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
NB	L	10	8	80	71.8	*F*
	T	1,987	1,933	97	3.7	*A*
	Subtotal	1,997	1,941	97	4.0	*A*
SB	T	2,168	2,172	100	4.0	*A*
	R	15	15	100	1.0	*A*
	Subtotal	2,183	2,187	100	4.0	*A*
EB	***L***	***20***	***19***	***95***	***296.9***	***F***
	R	15	15	100	75.7	*F*
	Subtotal	35	34	97	199.3	*F*
Total		4,214	4,162	99	5.7	*A*

HALES ENGINEERING
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SimTraffic LOS Report

Project: Saratoga Springs - Welfare Complex TIS Update
Analysis Period: *Future (2025) Plus Project*
Time Period: *Evening Peak Hour* **Project #:** *UT19-1451*

Intersection: Medical Drive & Access 2
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
SB	***L***	***47***	***47***	***99***	***6.1***	***A***
	R	52	53	101	3.0	*A*
	Subtotal	99	100	101	4.5	*A*
EB	L	32	28	87	2.2	*A*
	T	138	140	102	0.1	*A*
	Subtotal	170	168	99	0.5	*A*
WB	T	101	99	98	0.3	*A*
	R	58	59	101	0.4	*A*
	Subtotal	159	158	99	0.3	*A*
Total		428	426	99	1.3	*A*

Intersection: Medical Drive & Access 3
Type: Unsignalized

Approach	Movement	Demand Volume	Volume Served		Delay/Veh (sec)	
			Avg	%	Avg	LOS
SB	***L***	***3***	***3***	***100***	***6.2***	***A***
	R	2	3	150	2.6	*A*
	Subtotal	5	6	120	4.4	*A*
EB	L	11	9	82	2.0	*A*
	T	166	164	99	0.1	*A*
	Subtotal	177	173	98	0.2	*A*
WB	T	152	151	99	0.2	*A*
	R	1	1	100	0.2	*A*
	Subtotal	153	152	99	0.2	*A*
Total		335	331	99	0.3	*A*

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	EBL	EBT	EBR	WBL	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	4.2	0.0	1.6	0.3	0.3	2.8	6.5	9.6	0.1	0.2	8.0	0.1
Total Del/Veh (s)	67.8	0.6	48.3	73.3	39.3	235.1	219.6	20.2	13.3	54.4	14.0	3.3
Vehicles Entered	223	1	117	16	30	41	103	1696	35	13	2041	133
Vehicles Exited	223	1	118	16	30	40	98	1689	34	13	2037	133
Hourly Exit Rate	223	1	118	16	30	40	98	1689	34	13	2037	133
Input Volume	223	1	116	15	31	41	105	1743	34	14	2034	135
% of Volume	100	133	102	107	96	97	94	97	99	93	100	99

1: Redwood Road (SR-68) & Medical Drive/1140 North Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	33.8
Total Del/Veh (s)	27.1
Vehicles Entered	4449
Vehicles Exited	4432
Hourly Exit Rate	4432
Input Volume	4492
% of Volume	99

2: Redwood Road (SR-68) & Market Street Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.1	0.3	0.0	0.0	0.4
Denied Del/Veh (s)	0.2	0.6	2.0	0.5	0.0	0.0	0.3
Total Delay (hr)	4.8	1.9	1.8	11.7	2.5	0.2	22.9
Total Del/Veh (s)	68.6	44.7	70.3	24.5	4.6	2.6	18.7
Vehicles Entered	244	153	92	1698	1969	214	4370
Vehicles Exited	246	153	91	1682	1967	214	4353
Hourly Exit Rate	246	153	91	1682	1967	214	4353
Input Volume	234	151	90	1721	1972	208	4376
% of Volume	105	101	101	98	100	103	99

3: Pioneer Crossing (SR-145) & Market Street Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.1	0.1	0.1	0.0	0.4
Denied Del/Veh (s)	0.2	1.3	0.2	2.7	2.9	0.2	0.7
Total Delay (hr)	3.8	0.5	2.4	0.2	1.1	1.0	9.0
Total Del/Veh (s)	48.1	10.3	10.5	3.7	23.2	6.0	14.6
Vehicles Entered	273	186	822	165	167	578	2191
Vehicles Exited	273	184	824	165	167	578	2191
Hourly Exit Rate	273	184	824	165	167	578	2191
Input Volume	266	180	819	158	160	586	2169
% of Volume	103	102	101	104	104	99	101

4: Redwood Road (SR-68) & Commerce Drive Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.4	3.8	0.0	0.0	0.0	0.0	0.1
Total Delay (hr)	2.5	1.0	2.7	0.1	1.3	6.5	14.0
Total Del/Veh (s)	79.8	41.8	5.2	2.0	60.7	11.2	11.6
Vehicles Entered	113	83	1845	106	73	2076	4296
Vehicles Exited	113	82	1844	106	74	2075	4294
Hourly Exit Rate	113	82	1844	106	74	2075	4294
Input Volume	115	85	1902	105	75	2069	4350
% of Volume	98	97	97	101	99	100	99

8: Exchange Drive & Medical Drive Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	0.3	3.8	0.0	0.0	0.0	4.0	0.3	0.3	4.2	0.2	1.3
Total Delay (hr)	0.2	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Del/Veh (s)	6.5	3.3	5.1	5.7	2.4	1.6	0.2	0.2	1.6	0.1	3.9
Vehicles Entered	136	68	15	102	28	61	26	12	19	38	505
Vehicles Exited	136	68	15	101	28	61	26	12	19	38	504
Hourly Exit Rate	136	68	15	101	28	61	26	12	19	38	504
Input Volume	140	65	16	103	25	65	27	12	19	39	512
% of Volume	97	104	94	98	111	93	95	100	100	97	98

22: Redwood Road (SR-68) & Access 1 Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	4.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	1.7	0.3	0.2	2.0	2.4	0.0	6.6
Total Del/Veh (s)	296.9	75.7	71.8	3.7	4.0	1.0	5.7
Vehicles Entered	20	15	8	1933	2172	15	4163
Vehicles Exited	19	15	8	1933	2172	15	4162
Hourly Exit Rate	19	15	8	1933	2172	15	4162
Input Volume	20	15	10	1987	2168	15	4214
% of Volume	95	100	80	97	100	100	99

24: Medical Drive & Access 2 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	4.0	0.5
Total Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.2
Total Del/Veh (s)	2.2	0.1	0.3	0.4	6.1	3.0	1.3
Vehicles Entered	28	140	99	60	47	53	427
Vehicles Exited	28	140	99	59	47	53	426
Hourly Exit Rate	28	140	99	59	47	53	426
Input Volume	32	138	101	58	47	52	428
% of Volume	87	102	98	101	99	101	99

27: Medical Drive & Access 3 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	3.9	0.0
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.0	0.1	0.2	0.2	6.2	2.6	0.3
Vehicles Entered	9	164	151	1	3	3	331
Vehicles Exited	9	164	151	1	3	3	331
Hourly Exit Rate	9	164	151	1	3	3	331
Input Volume	11	166	152	1	3	2	335
% of Volume	82	99	99	100	100	150	99

Total Zone Performance

Denied Delay (hr)	1.2
Denied Del/Veh (s)	0.9
Total Delay (hr)	94.0
Total Del/Veh (s)	35.8
Vehicles Entered	4486
Vehicles Exited	9209
Hourly Exit Rate	9209
Input Volume	30150
% of Volume	31

Intersection: 1: Redwood Road (SR-68) & Medical Drive/1140 North

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	UL	T	TR	L	T	T	R
Maximum Queue (ft)	169	200	185	118	284	550	564	107	307	319	265
Average Queue (ft)	88	111	80	41	230	340	315	14	226	243	42
95th Queue (ft)	142	169	155	87	339	619	644	61	339	351	165
Link Distance (ft)		316	316	494		542	542		291	291	
Upstream Blk Time (%)						9	6		2	4	0
Queuing Penalty (veh)						89	58		23	40	0
Storage Bay Dist (ft)	100				135			100			150
Storage Blk Time (%)	8	18			73	11		0	25	22	
Queuing Penalty (veh)	9	20			639	16		0	4	30	

Intersection: 2: Redwood Road (SR-68) & Market Street

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	209	264	224	187	654	624	205	221	81
Average Queue (ft)	102	118	92	94	255	231	94	94	21
95th Queue (ft)	165	199	170	201	804	776	173	185	59
Link Distance (ft)		2341			1554	1554	408	408	
Upstream Blk Time (%)					1	0			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (ft)	165		165	135				180	
Storage Blk Time (%)	1	2	2	2	14		1		
Queuing Penalty (veh)	3	6	5	21	13		1		

Intersection: 3: Pioneer Crossing (SR-145) & Market Street

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (ft)	350	258	298	262	87	176	168	154
Average Queue (ft)	193	60	157	107	38	79	77	56
95th Queue (ft)	311	167	270	230	71	136	144	123
Link Distance (ft)	2341		586	586			811	811
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200			300	350		
Storage Blk Time (%)	9			0				
Queuing Penalty (veh)	16			0				

Intersection: 4: Redwood Road (SR-68) & Commerce Drive

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (ft)	258	150	235	230	110	124	239	143
Average Queue (ft)	117	63	88	91	17	57	36	39
95th Queue (ft)	221	138	208	210	80	104	151	99
Link Distance (ft)	658		303	303			865	865
Upstream Blk Time (%)			1	1			0	
Queuing Penalty (veh)			5	7			0	
Storage Bay Dist (ft)		50			130	85		
Storage Blk Time (%)	57	13		4		6	1	
Queuing Penalty (veh)	48	15		4		58	1	

Intersection: 8: Exchange Drive & Medical Drive

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	R	L	T	R	L	L
Maximum Queue (ft)	84	56	30	59	41	32	19
Average Queue (ft)	40	29	10	26	13	5	1
95th Queue (ft)	67	46	31	45	33	22	9
Link Distance (ft)	501			151			
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		100	50		50	100	100
Storage Blk Time (%)	0		0	0	0		
Queuing Penalty (veh)	0		0	0	0		

Intersection: 22: Redwood Road (SR-68) & Access 1

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	T
Maximum Queue (ft)	140	62	42	80	85	165	179
Average Queue (ft)	48	15	9	8	9	22	34
95th Queue (ft)	128	51	33	85	89	100	126
Link Distance (ft)	595			291	291	303	303
Upstream Blk Time (%)				0	0		0
Queuing Penalty (veh)				1	2		0
Storage Bay Dist (ft)		100	100				
Storage Blk Time (%)	9			1			0
Queuing Penalty (veh)	1			0			0

Intersection: 24: Medical Drive & Access 2

Movement	EB	WB	SB	SB
Directions Served	L	TR	L	R
Maximum Queue (ft)	34	6	55	54
Average Queue (ft)	5	0	26	26
95th Queue (ft)	23	4	52	49
Link Distance (ft)		150	256	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100			100
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 27: Medical Drive & Access 3

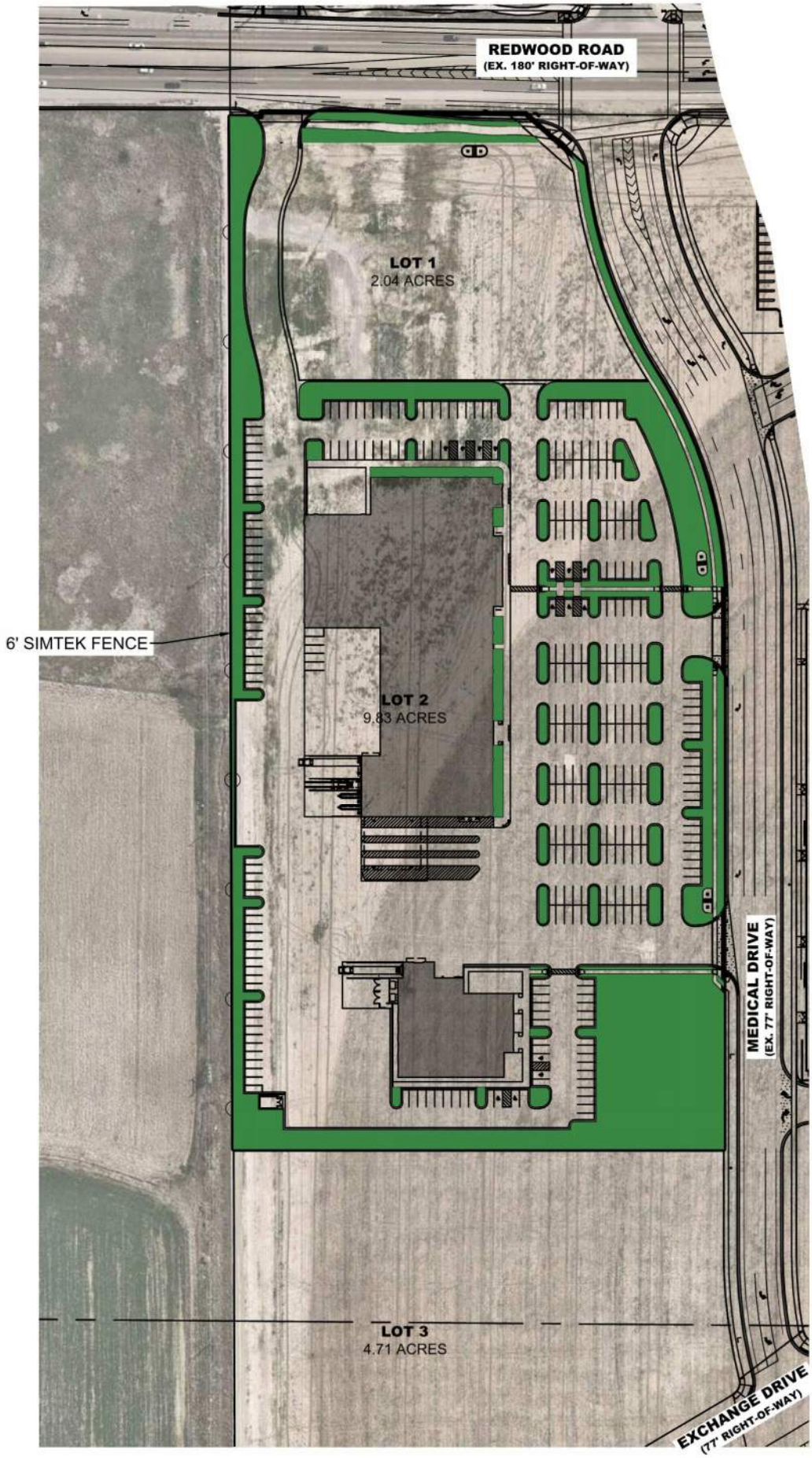
Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	18	24	15
Average Queue (ft)	1	2	2
95th Queue (ft)	11	13	10
Link Distance (ft)		278	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	25		100
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Zone Summary

Zone wide Queuing Penalty: 1137

APPENDIX C

Site Plan


NORTH
REDWOOD ROAD
(EX. 180' RIGHT-OF-WAY)
LOT 1
2.04 ACRES
6' SIMTEK FENCE
LOT 2
9.83 ACRES
MEDICAL DRIVE
(EX. 77' RIGHT-OF-WAY)
LOT 3
4.71 ACRES
EXCHANGE DRIVE
(77' RIGHT-OF-WAY)

APPENDIX D

95th Percentile Queue Length Reports

SimTraffic Queueing Report

Project: Saratoga Springs - Welfare Complex TIS Update

Analysis: Existing (2020) Background

Time Period: Evening Peak Hour

95th Percentile Queue Length (feet)

HALES ENGINEERING
innovative transportation solutions

Project #: UT19-1451

Intersection	NB					SB			EB			WB		
	L	R	T	TR	UL	L	R	T	L	R	TR	L	LTR	R
01: Redwood Road (SR-68) & Medical Drive/1140 North	--	--	209	218	117	32	81	242	144	--	59	--	74	--
02: Redwood Road (SR-68) & Market Street	97	--	161	--	--	--	39	97	130	116	--	--	--	--
03: Pioneer Crossing (SR-145) & Market Street	--	79	291	--	--	196	--	95	--	--	--	213	--	140
04: Redwood Road (SR-68) & Commerce Drive	--	13	--	--	--	84	--	30	--	--	--	785	--	208

SimTraffic Queueing Report

Project: Saratoga Springs - Welfare Complex TIS Update

Analysis: Existing (2020) Plus Project

Time Period: Evening Peak Hour

95th Percentile Queue Length (feet)

HALES ENGINEERING
innovative transportation solutions

Project #: UT19-1451

Intersection	NB					SB			EB			WB		
	L	R	T	TR	UL	L	R	T	L	R	TR	L	LTR	R
01: Redwood Road (SR-68) & Medical Drive/1140 North	--	--	242	239	193	37	77	267	164	--	124	--	75	--
02: Redwood Road (SR-68) & Market Street	90	--	174	--	--	--	48	142	142	116	--	--	--	--
03: Pioneer Crossing (SR-145) & Market Street	--	72	279	--	--	199	--	94	--	--	--	211	--	137
04: Redwood Road (SR-68) & Commerce Drive	--	19	4	--	--	97	--	46	--	--	--	844	--	203
06: Redwood Road (SR-68) & Access 1	50	--	--	--	--	--	2	32	84	35	--	--	--	--
07: Medical Drive & Access 2	--	--	--	--	--	56	--	--	--	--	--	--	--	--
08: Medical Drive & Access 3	--	--	--	--	--	29	--	--	--	--	--	--	--	--

SimTraffic Queueing Report

Project: Saratoga Springs - Welfare Complex TIS Update

Analysis: Future (2025) Background

Time Period: Evening Peak Hour

95th Percentile Queue Length (feet)

HALES ENGINEERING
innovative transportation solutions

Project #: UT19-1451

Intersection	NB					SB				EB				WB			
	L	R	T	TR	UL	L	R	T	TR	L	R	T	TR	L	LTR	R	T
01: Redwood Road (SR-68) & Medical Drive/1140 North	--	--	306	309	191	53	146	343	--	164	--	--	103	--	84	--	--
02: Redwood Road (SR-68) & Market Street	115	--	231	--	--	--	53	141	--	168	163	--	--	--	--	--	--
03: Pioneer Crossing (SR-145) & Market Street	--	78	201	--	--	129	--	115	--	--	--	--	--	498	--	292	--
04: Redwood Road (SR-68) & Commerce Drive	--	46	165	--	--	108	--	173	--	--	--	--	--	220	--	136	--
05: Exchange Drive & Medical Drive	19	--	--	--	--	--	--	--	3	--	44	66	--	--	--	--	46

SimTraffic Queueing Report

Project: Saratoga Springs - Welfare Complex TIS Update

Analysis: Future (2025) Plus Project

Time Period: Evening Peak Hour

95th Percentile Queue Length (feet)

HALES ENGINEERING
innovative transportation solutions

Project #: UT19-1451

Intersection	NB					SB			EB				WB				
	L	R	T	TR	UL	L	R	T	L	R	T	TR	L	LTR	R	T	TR
01: Redwood Road (SR-68) & Medical Drive/1140 North	--	--	619	644	339	61	165	345	156	--	--	155	--	87	--	--	--
02: Redwood Road (SR-68) & Market Street	201	--	790	--	--	–	59	179	182	170	--	--	--	--	--	--	--
03: Pioneer Crossing (SR-145) & Market Street	--	71	250	--	--	136	--	134	--	--	--	--	311	--	167	--	--
04: Redwood Road (SR-68) & Commerce Drive	--	80	209	--	--	104	--	125	--	--	--	--	221	--	138	--	--
05: Exchange Drive & Medical Drive	22	--	--	--	--	9	--	--	--	46	67	--	31	--	33	45	--
06: Redwood Road (SR-68) & Access 1	33	--	87	--	--	–	--	113	128	51	--	--	--	--	--	--	--
07: Medical Drive & Access 2	--	--	--	--	--	52	49	--	23	--	--	--	--	--	--	--	4
08: Medical Drive & Access 3	--	--	--	--	--	13	10	--	11	--	--	--	--	--	--	--	--

APPENDIX E

Trip Generation Data

Saratoga Springs Welfare Complex Traffic Study

4/1/2019 Scott Anderson

Deseret Industries/DCS/SRS

DCS = Development Counseling Services

Time	Vehicles IN Sun	Mon	Tue	Wed	Thur	Fri	Sat	Vehicles OUT Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks IN (Short) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks OUT (Short) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks IN (Semi) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks OUT (Semi) Sun	Mon	Tue	Wed	Thur	Fri	Sat	TOTAL Sun	Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM		13	14	15	15	18	25		5	6	6	7	8	11		2	2	2	2	2			2	2	2	2	2				1							1							23	26	25	26	30	30	160
8:00 AM - 9:00 AM		10	10	11	11	13	18		10	10	11	11	13	18		1	1	1		2			1	1	1		2			1							1				1			23	22	23	22	31	31	152
9:00 AM - 10:00 AM		94	99	104	109	129	178		56	59	62	65	77	100		1	1	1		2			1	1	1		2																	152	160	168	174	209	209	1073
10:00 AM - 11:00 AM		71	75	79	83	98	135		63	68	71	75	99	122				1							1					1							1				1			138	143	152	157	198	198	985
11:00 AM - 12:00 PM		99	104	109	114	135	187		88	93	80	102	121	167																													187	197	189	217	256	256	1302
12:00 PM - 1:00 PM		104	109	114	120	142	196		114	106	115	132	156	216																													218	215	229	252	298	298	1509
1:00 PM - 2:00 PM		119	125	131	138	163	225		111	115	118	121	144	211																													230	240	249	259	307	307	1591
2:00 PM - 3:00 PM		106	112	118	123	146	202		119	128	136	138	163	225		1							1											1							1			227	240	254	263	309	309	1601
3:00 PM - 4:00 PM		103	108	113	119	140	194		112	118	124	123	146	202																													215	226	237	242	286	286	1493
4:00 PM - 5:00 PM		94	99	104	109	129	178		110	116	122	119	140	194																													204	215	226	228	269	269	1410
5:00 PM - 6:00 PM		105	111	117	122	144	200		117	100	106	109	129	182																													222	211	223	231	273	273	1434
6:00 PM - 7:00 PM		119	125	131	138	163	225		129	111	117	122	144	200																													248	236	248	260	307	307	1605
7:00 PM - 8:00 PM			61	64	67	79	110			79	128	120	88	132																														140	192	187	168	168	855
8:00 PM - 9:00 PM			78	82	86	101	140			97	70	83	140	184																														175	152	169	241	241	979
9:00 PM - 10:00 PM										24	25	26	31	43																														24	25	26	31	31	138
		1836	1230	1291	1353	1589	2214		1836	1230	1291	1353	1589	2214		5	4	5	2	6			5	4	5	2	6			2	1		1				2	1		1	2			2697	2470	2593	2712	3212	3212	16285

Time	INS Mon	Tue	Wed	Thur	Fri	Sat	TL	OUTS Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM	15	17	17	17	20	27	114	7	9	8	9	12	15	56
8:00 AM - 9:00 AM	12	11	12	11	15	20	80	12	11	12	12	16	21	82
9:00 AM - 10:00 AM	99	100	105	109	131	180	720	57	60	63	65	79	108	432
10:00 AM - 11:00 AM	72	75	80	83	98	135	542	66	68	72	75	100	123	504
11:00 AM - 12:00 PM	99	104	109	114	135	187	749	88	93	80	102	121	167	652
12:00 PM - 1:00 PM	104	109	114	120	142	196	785	114	106	115	132	156	216	839
1:00 PM - 2:00 PM	119	125	131	138	163	225	900	111	115	118	121	144	211	820
2:00 PM - 3:00 PM	107	112	118	124	146	202	808	120	128	136	139	163	225	911
3:00 PM - 4:00 PM	103	108	113	119	140	194	778	112	118	124	123	146	202	825
4:00 PM - 5:00 PM	94	99	104	109	129	178	713	110	116	122	119	140	194	801
5:00 PM - 6:00 PM	105	111	117	122	144	200	799	117	100	106	109	129	182	743
6:00 PM - 7:00 PM	119	125	131	138	163	225	900	129	111	117	122	144	200	823
7:00 PM - 8:00 PM		61	64	67	79	110	381		79	128	120	88	132	547
8:00 PM - 9:00 PM		78	82	86	101	140	488		97	70	83	140	184	574
9:00 PM - 10:00 PM									24	25	26	31	43	150
	1043.45	1233	1297	1356	1605	2220	8759.95	1043.6	1235	1296.05	1356	1607	2223.6	8759.05

Bishops Storehouse/Home Storage Center

Time	Vehicles IN Sun	Mon	Tue	Wed	Thur	Fri	Sat	Vehicles OUT Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks IN (Short) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks OUT (Short_ Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks IN (Semi) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks OUT (Semi) Sun	Mon	Tue	Wed	Thur	Fri	Sat	TOTAL Sun	Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM			2	2	2	2																																						2	2	2	2	2		10
8:00 AM - 9:00 AM			4	4	4	4																								1	1	1	1												5	5	5	5	5		25
9:00 AM - 10:00 AM			10	10	10	10	10			10	10	10	10	10																								1	1	1	1			21	21	21	21	21		105
10:00 AM - 11:00 AM			15	15	15	15	15			15	15	15	15	15																														30	30	30	30	30		150
11:00 AM - 12:00 PM			15	15	15	15	15			15	15	15	15	15																														30	30	30	30	30		150
12:00 PM - 1:00 PM			5	5	5	5	5			5	5	5	5	5																														10	10	10	10	10		50
1:00 PM - 2:00 PM			5	5	5	5	5			5	5	5	5	5				1	1	1	1																							11	11	11	11	11		55
2:00 PM - 3:00 PM			10	10	10	10				10	10	10	10											1	1	1	1																		21	21	21	21	21		105
3:00 PM - 4:00 PM			15	15	15	15				15	15	15	15																															30	30	30	30	30		150
4:00 PM - 5:00 PM			15	15	15	15				15	15	15	15																															30	30	30	30	30		150
5:00 PM - 6:00 PM			10	10	10	10				10	10	10	10																															20	20	20	20	20		100
6:00 PM - 7:00 PM										6	6	6	6																															6	6	6	6	6		30
7:00 PM - 8:00 PM																																																			
8:00 PM - 9:00 PM																																																			
9:00 PM - 10:00 PM																																																			
			109	109	109	109	52			109	109	109	109	52				1	1	1	1				1	1	1	1			1	1	1	1				1	1	1	1			218	218	218	218	218		1080

Time	INS Mon	Tue	Wed	Thur	Fri	Sat	TL	OUTS Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM		2	2	2	2		8							
8:00 AM - 9:00 AM		5	5	5	5	1	21							
9:00 AM - 10:00 AM		10	10	10	10	10	50		11	11	11	11	11	55
10:00 AM - 11:00 AM		15	15	15	15	15	75		15	15	15	15	15	75
11:00 AM - 12:00 PM		15	15	15	15	15	75		15	15	15	15	15	75
12:00 PM - 1:00 PM		5	5	5	5	5	25		5	5	5	5	5	25
1:00 PM - 2:00 PM		6	6	6	6	6	30		5	5	5	5	5	25
2:00 PM - 3:00 PM		10	10	10	10		40		11	11	11	11	1	45
3:00 PM - 4:00 PM		15	15	15	15		60		15	15	15	15		60
4:00 PM - 5:00 PM		15	15	15	15		60		15	15	15	15		60
5:00 PM - 6:00 PM		10	10	10	10		40		10	10	10	10		40
6:00 PM - 7:00 PM									6	6	6	6		24
7:00 PM - 8:00 PM														
8:00 PM - 9:00 PM														
9:00 PM - 10:00 PM														
		108	108	108	108	52	484		108	108	108	108	52	484

Family Services

Time	Vehicles IN Sun	Mon	Tue	Wed	Thur	Fri	Sat	Vehicles OUT Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks IN (Short) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks OUT (Short_ Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks IN (Semi) Sun	Mon	Tue	Wed	Thur	Fri	Sat	Trucks OUT (Semi) Sun	Mon	Tue	Wed	Thur	Fri	Sat	TOTAL Sun	Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM			3	3	3																																							3	3	3				9
8:00 AM - 9:00 AM			1	1	1																																							1	1	1				3
9:00 AM - 10:00 AM			2	2	2					1	1	1																																2	2	2				6
10:00 AM - 11:00 AM			5	5	5					2	2	2																																7	7	7				21
11:00 AM - 12:00 PM										5	5	5																																5	5	5				15
12:00 PM - 1:00 PM			5	5	5																																							5	5	5				15
1:00 PM - 2:00 PM			5	5	5					5	5	5																																10	10	10				30
2:00 PM - 3:00 PM			5	5	5					5	5	5																																10	10	10				30
3:00 PM - 4:00 PM			5	5	5					5	5	5																																10	10	10				30
4:00 PM - 5:00 PM			3	3	3					5	5	5																																8	8	8				24
5:00 PM - 6:00 PM			3	3	3					8	8	8																																9	9	9				27
6:00 PM - 7:00 PM			2	2	2					3	3	3																																5	5	5				15
7:00 PM - 8:00 PM			2	2	2					2	2	2																																4	4	4				12
8:00 PM - 9:00 PM			2	2	2					2	2	2																																4	4	4				12
9:00 PM - 10:00 PM										2	2	2																																2	2	2				6
			43	43	43					43	43	43																																86	86	86				258

Time	INS Mon	Tue	Wed	Thur	Fri	Sat	TL	OUTS Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM		3	3	3			9							
8:00 AM - 9:00 AM		1	1	1			3							
9:00 AM - 10:00 AM		2	2	2			6		1	1	1			3
10:00 AM - 11:00 AM		5	5	5			15		2	2	2			6
11:00 AM - 12:00 PM									5	5	5			15
12:00 PM - 1:00 PM		5	5	5			15							
1:00 PM - 2:00 PM		5	5	5			15		5	5	5			15
2:00 PM - 3:00 PM		5	5	5			15		5	5	5			15
3:00 PM - 4:00 PM		5	5	5			15		5	5	5			15
4:00 PM - 5:00 PM		3	3	3			9		5	5	5			15
5:00 PM - 6:00 PM		3	3	3			9		6	6	6			18
6:00 PM - 7:00 PM		2	2	2			6		3	3	3			9
7:00 PM - 8:00 PM		2	2	2			6		2	2	2			6
8:00 PM - 9:00 PM		2	2	2			6		2	2	2			6
9:00 PM - 10:00 PM									2	2	2			6
		43	43	43			129		43	43	43			129

Total for All Tenants (Includes staff and customers)

Time	Vehicles IN							Vehicles OUT							Trucks IN (Short)							Trucks OUT (Short_							Trucks IN (Semi)							Trucks OUT (Semi)							TOTAL							TL
	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	
7:00 AM - 8:00 AM		13.3	19	19.7	20.4	20.2	25.2		5.4	6	6.3	6.6	7.8	10.8		2	2	2	2	2			2	2	2	2	2					1							1						22.7	31	30	31	32	32	178.7
8:00 AM - 9:00 AM		9.5	15	15.5	16	17	18		9.5	10	10.5	11	13	18		1	1	1		2			1	1	1		2			1	1	1	1	1			1					1		23	28	29	28	36	35	180
9:00 AM - 10:00 AM		94.05	111	116	120.9	138.7	188.2		56.05	70	72.95	75.9	86.7	116.2		1	1	1		2			1	1	1		2												1	1	1	1			152.1	184	191.9	197.8	230.4	230.4	1186.6
10:00 AM - 11:00 AM		71.25	95	98.75	102.5	112.5	150		94.0	85	88.4	91.8	114	137.4				1							1					1							1						1	137.8	180	189.2	194.3	227.5	227.5	1156.3
11:00 AM - 12:00 PM		90.8	119	124.2	129.4	150.2	202.2		88.35	113	100	122.3	135.9	182.4																														187.2	232	224.2	251.7	286.1	288.1	1467.25
12:00 PM - 1:00 PM		103.6	119	124.5	129.9	146.7	201.2		114	122	120	137	161	221																														217.6	230	244.5	266.9	307.7	387.7	1574.3
1:00 PM - 2:00 PM		138.8	155	161.5	167.5	167.5	250		131.2	125	128	131	149	215.8			1	1	1	1																									229.9	251	270.3	279.5	317.5	317.5	1675.65
2:00 PM - 3:00 PM		139.4	127	132.6	138.2	155.6	201.6		119	143	151	155	175	225		1							1	1	1	1	1							1											227.4	271	284.6	294.2	329.6	329.6	1736.4
3:00 PM - 4:00 PM		132.8	128	133.4	138.8	155.4	194.4		112.1	138	143.9	149	161	202																														214.7	266	277.3	291.8	316.4	316.4	1672.6
4:00 PM - 5:00 PM		94.05	117	122	126.9	143.7	178.2		110.2	136	141.8	149	155	194																														194.3	253	263.8	265.9	298.7	258.7	1586.3
5:00 PM - 6:00 PM		105.1	124	129.6	135.1	154.3	198.8		116.9	116	122	125	139	182																														222.1	240	251.6	260.1	293.3	293.3	1560.55
6:00 PM - 7:00 PM		138.8	127	132.2	137.5	162.5	225		129.2	120	126	131	150	200																														268	247	259.2	270.5	312.5	312.5	1649.7
7:00 PM - 8:00 PM			62	64.85	68.1	78.8	109.8			81	130	122	88.4	142																															143	196.1	191.1	167.7	167.7	884.55
8:00 PM - 9:00 PM			80	83.9	87.8	101.4	140.4			99	72	85	140	188																															179	155.9	173.8	241.4	241.4	986.5
9:00 PM - 10:00 PM										26	27.2	28.4	31.2	43.2																															26	27.2	28.4	31.2	31.2	144
		1336	1379	1441	1502	1705	2284		1336	1379	1440	1502	1755	2264		5	5	6	5	7			5	5	6	5	7			2	2	1	2	1		2	2	1	2	1			2887	2772	2895	3014	3428	3428	17623.4

Total for All Tenants (Includes staff and customers) ROUNDED

Time	Vehicles IN							Vehicles OUT							Trucks IN (Short)							Trucks OUT (Short_							Trucks IN (Semi)							Trucks OUT (Semi)							Percent Trucks						
	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Mon	Tue	Wed	Thur	Fri	Sat
7:00 AM - 8:00 AM		14	14	20	17	21	26		6	6	7	7	8	11		1	2	2	2	2			1	2	2	2	2					1							1						17%	14%	13%	13%	12%		
8:00 AM - 9:00 AM		10	16	16	16	17	18		10	10	11	11	13	18		1	1	1		2			1	1	1		2			1	1	1	1	1			1					1		17%	11%	10%	9%	13%		
9:00 AM - 10:00 AM		95	115	116	121	139	188		57	70	73	76	87	117		1	1	1		2			1	1	1		2												1	1	1	1			1%	2%	2%	1%	2%		
10:00 AM - 11:00 AM		72	95	99	103	113	150		95	85	89	92	114	138				1							1					1							1					1		1%		1%		0%		
11:00 AM - 12:00 PM		90	119	125	130	151	202		89	113	100	123	136	183																																				
12:00 PM - 1:00 PM		104	119	125	130	147	202		114	122	120	137	161	221																																				
1:00 PM - 2:00 PM		119	155	162	168	168	250		112	125	128	131	149	216			1	1	1	1																									0%	0%	0%	0%	0%		
2:00 PM - 3:00 PM		107	127	133	139	156	202		119	143	151	155	175	225		1							1	1	1	1	1													1					1%	0%	0%	1%	0%		
3:00 PM - 4:00 PM		103	128	133	139	156	196		113	138	144	149	161	203																																				
4:00 PM - 5:00 PM		95	117	122	127	144	179		111	136	142	149	155	194																																				
5:00 PM - 6:00 PM		106	124	130	136	155	200		117	116	121	125	139	182																																				
6:00 PM - 7:00 PM		119	127	132	140	163	225		130	120	126	131	150	200																																				
7:00 PM - 8:00 PM			62	67	70	80	110			81	130	122	88	142																																				
8:00 PM - 9:00 PM			80	84	88	102	141			99	72	85	140	188																																				
9:00 PM - 10:00 PM										26	28	28	32	44																																				
		1343	1379	1447	1508	1712	2270		1343	1379	1444	1504	1757	2247		5	5	6	5	7			5	5	6	5	7			2	2	1	2	1		2	2	1	2	1			1%	0%	0%	0%	1%		

Time	TOTAL							INS							OUTS						
	Mon	Tue	Wed	Thur	Fri	Sat	TL	Mon	Tue	Wed	Thur	Fri	Sat	TL	Mon	Tue	Wed	Thur	Fri	Sat	TL
7:00 AM - 8:00 AM	24	31	31	32	32	43	192	19	22	22	23	23	28	134	5	9	9	9	10	15	58
8:00 AM - 9:00 AM	24	28	30	28	36	42	188	12	17	18	17	20	21	105	12	11	12	11	16	21	83
9:00 AM - 10:00 AM	154	184	192	198	231	311	1270	96	112	117	121	141	191	778	58	72	75	77	90	120	492
10:00 AM - 11:00 AM	139	180	189	195	228	289	1221	73	95	100	103	113	150	634	66	85	89	92	115	139	587
11:00 AM - 12:00 PM	188	232	224	252	287	386	1571	99	119	125	130	151	202	827	89	113	100	122	136	183	744
12:00 PM - 1:00 PM	218	230	245	267	308	423	1691	104	119	125	130	147	202	827	114	111	120	137	161	221	864
1:00 PM - 2:00 PM	231	281	271	283	318	443	1806	119	156	163	169	169	251	947	112	125	128	131	149	216	861
2:00 PM - 3:00 PM	228	271	285	295	332	428	1837	108	127	133	140	156	202	866	120	144	152	155	176	226	971
3:00 PM - 4:00 PM	215	266	276	282	317	357	1756	103	128	134	139	156	196	855	112	138	144	143	161	202	901
4:00 PM - 5:00 PM	206	253	264	264	299	373	1661	95	117	122	127	144	179	784	111	136	142	139	155	194	877
5:00 PM - 6:00 PM	225	240	252	261	294	363	1642	106	124	130	136	155	200	851	117	116	122	125	139	163	791
6:00 PM - 7:00 PM	249	247	260	271	313	425	1765	119	127	134	140	163	225	908	130	120	126	131	150	200	857
7:00 PM - 8:00 PM		143	197	192	168	242	942		62	67	70	80	110	390		81	130	122	88	142	552
8:00 PM - 9:00 PM		179	156	173	242	325	1075		80	84	88	102	141	495		99	72	85	140	188	580
9:00 PM - 10:00 PM		26	28	29	32	44	159									26	28	29	32	44	159
	2188	2772	2964	3022	3437	4551	18792	1050	1386	1454	1513	1720	2278	9401	1050	1386	1450	1509	1717	2277	9390

MEMORANDUM

Date: July 9, 2020

To: Gordon L. Miner, M.E.M., P.E.

From: Hales Engineering

Subject: Saratoga Springs Welfare Complex Access 3 Analysis

UT19-1451

This memorandum discusses the study completed for the proposed Welfare Complex in Saratoga Springs. Plans currently exist for a property access onto Medical Drive on the west end of the project, designated as "Access 3" in the TIS report. This proposed access is negatively offset from the existing Costco access (labeled as "Access E" in the Kittelson & Associates Costco TIS) on the south side of Medical Drive, approximately 150 feet to the west of the proposed access.

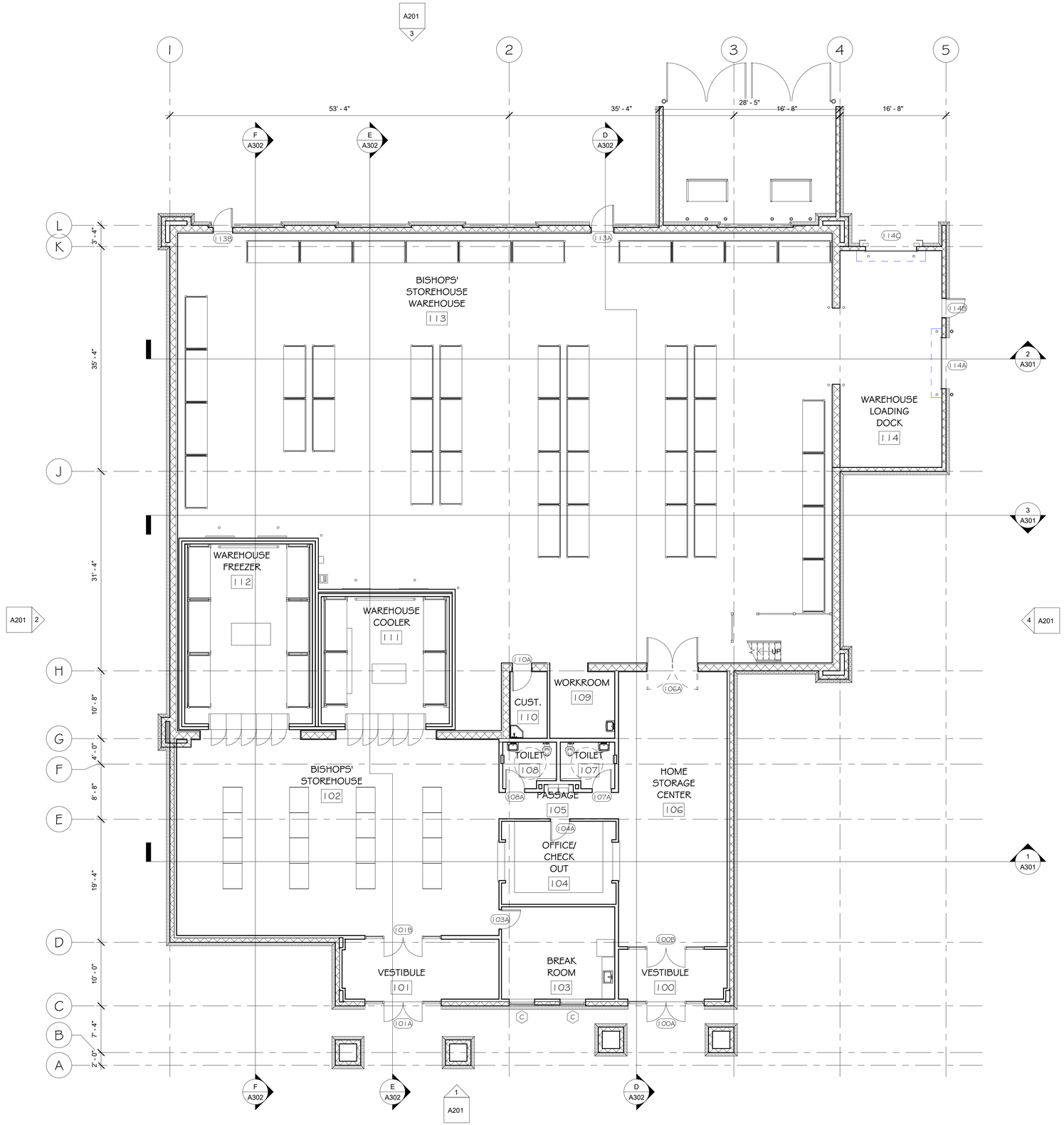
Based on projected 2020 evening peak hour traffic volumes on Medical Drive, as estimated by the Kittelson & Associates Costco TIS as well as additional traffic from the Welfare Complex, no major left-turning movement conflict is expected to exist going into these accesses prior to the completion of Exchange Drive.

In the 2025 plus project evening peak hour traffic condition, only 25 westbound left-turning vehicles are projected with 11 conflicting eastbound left-turning vehicles. Synchro and SimTraffic analysis of these offset accesses yield excellent levels of service in the report and show a 95th percentile eastbound left-turn queue of 15 feet at Access 3 and a 95th percentile westbound left-turn queue of 25 feet. This indicates that ample storage length would exist for both eastbound left-turn and westbound left-turn movements to queue and make their movements with minimal delay during the evening peak hour in future (2025) conditions.

Hales Engineering recommends that a center two-way left-turn lane (TWLTL) be utilized for left-turn movements between the Costco Access E and the project Access 3 on Medical Drive. It is not anticipated that significant queuing will occur by the year 2025 that would create safety concerns at this location. However, it is important to consider that future traffic on Medical Drive may continue to increase beyond the 2025 horizon year and that these offset accesses should be monitored and evaluated if potential left-turn queuing conflicts arise after the year 2025.

Layer #	Depth to Midlayer (ft)	qc tsf	qt tsf	fs tsf	γ pcf	Thickness (ft)	Depth to Bottom (ft)	σ_{vo} tsf	* σ'_{vo} tsf	** σ'_{vo} tsf	σ_{vo} kPa	* σ'_{vo} kPa	** σ'_{vo} kPa	qc kPa	fs kPa	F	Q	n	Ic criteria by iteration: Ic 1st	Ic 2nd	Ic 3rd	Ic 4th	Ic	Cq <=1.7	overburd. corection q_{c1N}	Kc	clean sand correction $(q_{c1N})cs$	$CRR_{7.5}$	r_d	PSHA CSR	PSHA FS	Settlement (inches): Y&I	T&S	Pradel
500	41.010	13.46	13.5329	0.55	120	0.08	41.05	2.462	2.519	2.462	235.7	241.2	235.7	1,289	53	5.001	4.2	1.100	3.411	3.411	3.411	3.411	3.571	0.40	5.0	15.43	77.5	0.123	0.840	0.2135	*******			
501	41.092	13.27	13.3425	0.56	120	0.08	41.13	2.467	2.521	2.467	236.2	241.5	236.2	1,271	54	5.211	4.1	1.100	3.428	3.428	3.428	3.428	3.588	0.39	4.9	15.76	77.9	0.124	0.840	0.2136	*******			
502	41.174	14.22	14.2988	0.44	120	0.08	41.22	2.472	2.524	2.472	236.7	241.7	236.7	1,362	43	3.779	4.5	1.100	3.321	3.321	3.321	3.321	3.481	0.39	5.3	13.75	72.7	0.116	0.839	0.2136	*******			
503	41.256	17.36	17.4466	0.45	120	0.08	41.30	2.477	2.526	2.477	237.2	241.9	237.2	1,662	43	3.003	6.0	1.100	3.170	3.169	3.169	3.169	3.329	0.39	6.4	11.16	71.9	0.115	0.838	0.2137	*******			
504	41.338	23.51	23.5944	0.50	120	0.08	41.38	2.482	2.529	2.482	237.6	242.1	237.6	2,251	48	2.378	8.9	1.047	2.972	2.970	2.969	2.969	3.129	0.41	9.1	8.30	75.6	0.120	0.838	0.2137	*******			
505	41.420	28.41	28.5217	0.60	120	0.08	41.46	2.486	2.531	2.486	238.1	242.4	238.1	2,721	58	2.326	11.2	1.020	2.884	2.880	2.880	2.880	3.040	0.42	11.2	7.20	80.9	0.129	0.837	0.2138	*******			
506	41.502	26.31	26.4773	0.77	120	0.08	41.54	2.491	2.533	2.491	238.6	242.6	238.6	2,519	73	3.212	9.9	1.056	3.004	3.002	3.001	3.001	3.161	0.40	10.1	8.72	87.8	0.143	0.836	0.2138	*******			
507	41.584	24.9	25.0611	0.80	120	0.08	41.63	2.496	2.536	2.496	239.0	242.8	239.0	2,384	77	3.571	9.2	1.073	3.057	3.056	3.055	3.055	3.215	0.40	9.4	9.46	88.7	0.145	0.836	0.2139	*******			
508	41.666	24.16	24.3045	1.28	120	0.08	41.71	2.501	2.538	2.501	239.5	243.0	239.5	2,314	123	5.914	8.5	1.100	3.214	3.214	3.214	3.214	3.374	0.39	8.9	11.89	105.4	0.189	0.835	0.2139	*******			
509	41.748	26.24	26.3782	1.28	120	0.08	41.79	2.506	2.540	2.506	240.0	243.3	240.0	2,513	123	5.410	9.5	1.100	3.155	3.154	3.154	3.154	3.314	0.39	9.6	10.93	105.0	0.188	0.834	0.2140	*******			
510	41.830	26.8	26.9578	1.17	120	0.08	41.87	2.511	2.543	2.511	240.5	243.5	240.5	2,566	112	4.809	9.8	1.089	3.113	3.111	3.111	3.111	3.271	0.39	9.9	10.28	101.6	0.177	0.834	0.2140	*******			
511	41.912	27.17	27.3348	1.13	120	0.08	41.95	2.516	2.545	2.516	240.9	243.7	240.9	2,602	108	4.563	9.9	1.083	3.093	3.091	3.091	3.091	3.251	0.39	10.0	9.98	100.3	0.174	0.833	0.2141	*******			
512	41.994	31.85	31.9608	1.13	120	0.08	42.04	2.521	2.547	2.521	241.4	243.9	241.4	3,050	108	3.863	12.2	1.049	2.980	2.978	2.977	2.977	3.137	0.40	12.1	8.40	101.8	0.178	0.832	0.2141	*******			
513	42.076	32.66	32.7857	1.07	120	0.08	42.12	2.526	2.550	2.526	241.9	244.2	241.9	3,128	102	3.534	12.6	1.039	2.945	2.942	2.942	2.942	3.102	0.41	12.5	7.95	99.4	0.171	0.832	0.2142	*******			
514	42.158	32.51	32.6474	1.06	120	0.08	42.20	2.531	2.552	2.531	242.3	244.4	242.3	3,113	102	3.536	12.5	1.039	2.948	2.945	2.945	2.945	3.105	0.40	12.4	7.99	99.1	0.171	0.831	0.2142	*******			
515	42.240	30.65	30.7925	1.09	120	0.08	42.28	2.536	2.555	2.536	242.8	244.6	242.8	2,935	104	3.881	11.5	1.055	2.999	2.997	2.997	2.997	3.157	0.40	11.5	8.66	99.8	0.172	0.830	0.2143	*******			
516	42.322	30.86	31.0042	1.35	120	0.08	42.36	2.541	2.557	2.541	243.3	244.8	243.3	2,955	129	4.760	11.4	1.072	3.057	3.055	3.055	3.055	3.215	0.39	11.4	9.45	107.8	0.196	0.830	0.2143	*******			
517	42.404	32.02	32.1834	1.57	120	0.08	42.45	2.545	2.559	2.545	243.8	245.1	243.8	3,066	150	5.323	11.8	1.078	3.076	3.074	3.074	3.074	3.234	0.39	11.7	9.73	114.3	0.219	0.829	0.2144	*******			
518	42.486	34.64	34.8151	1.69	120	0.08	42.53	2.550	2.562	2.550	244.2	245.3	244.2	3,317	162	5.263	12.9	1.068	3.042	3.040	3.040	3.040	3.200	0.39	12.8	9.25	118.3	0.234	0.828	0.2144	*******			
519	42.568	43.61	43.7794	2.00	120	0.08	42.61	2.555	2.564	2.555	244.7	245.5	244.7	4,176	192	4.872	17.0	1.034	2.930	2.927	2.927	2.927	3.087	0.40	16.6	7.76	128.6	0.278	0.828	0.2144	*******			
520	42.650	53.97	54.1374	2.35	120	0.08	42.69	2.560	2.566	2.560	245.2	245.7	245.2	5,168	225	4.569	21.9	1.004	2.830	2.827	2.827	2.827	2.987	0.41	21.0	6.60	138.6	0.328	0.827	0.2145	*******			
521	42.732	77.5	77.6825	3.02	120	0.08	42.77	2.565	2.569	2.565	245.6	246.0	245.6	7,421	289	4.030	33.4	0.953	2.660	2.655	2.655	2.655	2.815	0.43	31.5	4.91	154.8	0.425	0.826	0.2145	*******			
522	42.814	98.5	98.6315	3.59	120	0.08	42.86	2.570	2.571	2.570	246.1	246.2	246.1	9,432	344	3.740	43.9	0.920	2.552	2.547	2.547	2.547	2.707	0.44	41.1	4.05	166.5	0.509	0.826	0.2146	*******			
523	42.896	119.63	119.716	4.65	120	0.08	42.94	2.575	2.573	2.575	246.6	246.4	246.6	11,456	446	3.976	54.1	0.907	2.508	2.503	2.502	2.502	2.662	0.45	50.5	3.73	188.3	0.701	0.825	0.2146	*******			
524	42.978	134.29	134.377	5.54	120	0.08	43.02	2.580	2.576	2.580	247.1	246.7	247.1	12,860	530	4.204	61.1	0.901	2.489	2.485	2.484	2.484	2.644	0.45	56.8	3.61	205.1	0.883	0.824	0.2146	*******			
525	43.061	144.12	144.206	6.49	120	0.08	43.10	2.585	2.578	2.583	247.5	246.9	247.3	13,801	621	4.582	65.5	0.904	2.497	2.493	2.492	2.492	2.652	0.45	60.8	3.66	222.7	1.108	0.824	0.2147	*******			
526	43.143	138.56	138.64	7.01	120	0.08	43.18	2.590	2.580	2.585	248.0	247.1	247.6	13,269	671	5.153	61.9	0.920	2.551	2.547	2.547	2.547	2.707	0.44	57.6	4.05	232.9	1.255	0.823	0.2147	*******			
527	43.225	125.38	125.474	7.29	120	0.08	43.27	2.595	2.583	2.588	248.5	247.3	247.8	12,006	698	5.933	54.6	0.945	2.633	2.629	2.629	2.629	2.789	0.43	50.9	4.69	238.7	1.345	0.822	0.2148	*******			
528	43.307	116.91	117.003	6.97	120	0.08	43.35	2.600	2.585	2.590	248.9	247.6	248.0	11,195	667	6.097	50.4	0.954	2.665	2.661	2.661	2.661	2.821	0.43	47.0	4.96	233.3	1.261	0.822	0.2148	*******			
529	43.389	109.95	110.03	6.52	120	0.08	43.43	2.605	2.588	2.592	249.4	247.8	248.2	10,529	625	6.076	47.0	0.960	2.683	2.679	2.679	2.679	2.839	0.42	44.0	5.13	225.4	1.145	0.821	0.2148	*******			
530	43.471	106.11	106.186	5.82	120	0.08	43.51	2.609	2.590	2.595	249.9	248.0	248.5	10,161	557	5.621	45.5	0.955	2.668	2.664	2.664	2.664	2.824	0.42	42.6	4.99	212.4	0.971	0.820	0.2149	*******			
531	43.553	103.26	103.326	5.37	120	0.08	43.59	2.614	2.592	2.597	250.4	248.2	248.7	9,888	514	5.338	44.3	0.952	2.659	2.655	2.655	2.655	2.815	0.43	41.5	4.91	203.8	0.867	0.820	0.2149	*******			
532	43.635	100.68	100.73	4.80	120	0.08	43.68	2.619	2.595	2.599	250.8	248.5	248.9	9,641	460	4.894	43.4	0.946	2.638	2.634	2.634	2.633	2.793	0.43	40.7	4.73	192.3	0.741	0.819	0.2149	*******			
533	43.717	99.04	99.0858	4.57	120	0.08	43.76	2.624	2.597	2.602	251.3	248.7	249.2	9,484	438	4.741	42.7	0.945	2.633	2.629	2.628	2.628	2.788	0.43	40.0	4.69	187.5	0.693	0.818	0.2150	*******			
534	43.799	96.18	96.2189	4.25	120	0.08	43.84	2.629	2.599	2.604	251.8	248.9	249.4	9,210	407	4.544	41.5	0.943	2.629	2.625	2.624	2.624	2.784	0.43	38.9	4.65	180.8	0.629	0.818	0.2150	*******			
535	43.881	97.02	97.0559	3.92	120	0.08	43.92	2.634	2.602	2.607	252.2	249.1	249.6	9,291	375	4.153	42.2	0.933	2.596	2.591	2.591	2.591	2.751	0.43	39.5	4.38	173.2	0.564	0.817	0.2150	*******			
536	43.963	101.52	101.544	3.81	120	0.08	44.00	2.639	2.604	2.609	252.7	249.4	249.8	9,722	365	3.852	44.6	0.921	2.556	2.551	2.550	2.550	2.710	0.44	41.8	4.07	170.2	0.538	0.816	0.2151	*******			
537	44.045	107.02	107.052	3.65	120	0.08	44.09	2.644	2.606	2.611	253.2	249.6	250.1	10,248	349	3.492	47.8	0.906	2.505	2.500	2.500	2.500	2.660	0.44	44.6	3.71	165.6	0.502	0.816	0.2151	*******			
538	44.127	112.06	112.09	3.48	120	0.08	44.17	2.649	2.609	2.614	253.7	249.8	250.3	10,731	333	3.177	50.7	0.892	2.459	2.453	2.452	2.452	2.612	0.45	47.3	3.40	160.9	0.468	0.815	0.2151	*******			
539	44.209	112.03	112.054	3.58	120	0.08	44.25	2.654	2.611	2.616	254.1	250.0	250.5	10,728	343	3.275	50.5	0.895	2.469	2.463	2.463	2.463	2.623	0.44	47.1	3.47	163.4	0.486	0.814	0.2152	*******			
540	44.291	113.22	113.242	3.63	120	0.08	44.33	2.659	2.614	2.618	254.6	250.3	250.7	10,842	348	3.283	51.0	0.894	2.466	2.461	2.460	2.460	2.620	0.44	47.6	3.45	164.4	0.493	0.814	0.2152	*******			
541	44.373	116.36	116.381	3.48	120	0.08	44.41	2.664	2.616	2.621	255.1	250.5	251.0	11,143	333	3.056	52.9	0.884	2.434	2.428	2.427	2.427	2.587	0.45	49.3	3.25	160.2	0.463	0.813	0.2152	> 1.4			
542	44.455	124.16	124.178	3.32	120	0.08	44.50	2.669	2.618	2.623	255.5	250.7	251.2	11,890	318	2.730	57.4	0.866	2.374	2.368	2.367	2.367	2.527	0.46	53.4	2.91	155.6	0.430	0.812	0.2152	> 1.4			
543	44.537	131.33	131.345	3.23	120	0.08	44.58	2.673	2.621	2.625	256.0	250.9	251.4	12,576	310	2.513	61.6	0.852	2.328	2.321	2.321	2.321	2.481	0.46	57.2	2.67	152.9	0.412	0.812	0.2153	> 1.4			
544	44.619	122.81	122.824	3.22	120	0.08	44.66	2.678	2.623	2.628	256.5	251.2	251.6	11,760	308	2.679	56.8	0.866	2.372	2.366	2.365	2.365	2.525	0.46	52.8	2.90	153.1	0.414	0.811	0.2153	> 1.4			
545	44.701	119.46	119.47	3.07	120	0.08	44.74	2.683	2.625	2.630	257.0	251.4	251.9	11,439	294	2.630	55.1	0.867	2.376	2.370	2.369	2.369	2.529	0.45	51.3	2.92	149.7	0.392	0.810	0.2153	> 1.4			
546	44.783	118.86	118.869	3.00	120	0.08	44.82	2.688	2.628	2.633	257.4	251.6	252.1	11,382	287	2.582	54.8	0.866	2.372	2.366	2.365	2.365	2.525	0.45	51.0	2.90	147.9	0.381	0.810	0.2153	> 1.4			

APPENDIX F – ARCHITECTURAL RENDERING AND ELEVATIONS



1 A101/1 - FLOOR PLAN
1/8" = 1'-0"

12,303 sqft.

NORTH

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Project For:
THE CHURCH OF
JESUS CHRIST
OF LATTER-DAY SAINTS

SARATOGA SPRINGS
BISHOPS' STOREHOUSE

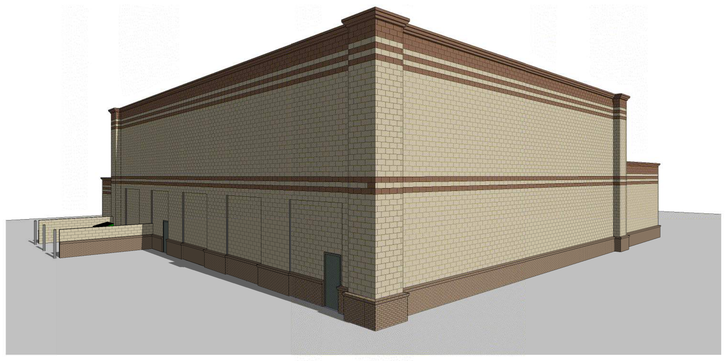
PROJECT ADDRESS

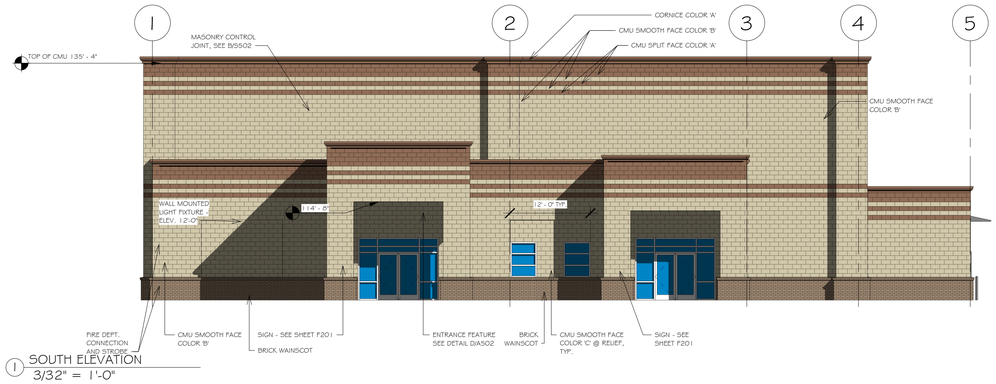
MARK	DATE (D-M-Y)	DESCRIPTION

Project Number: 123
Plan Series: 123
JRWA Project: 757
Property Number: 123

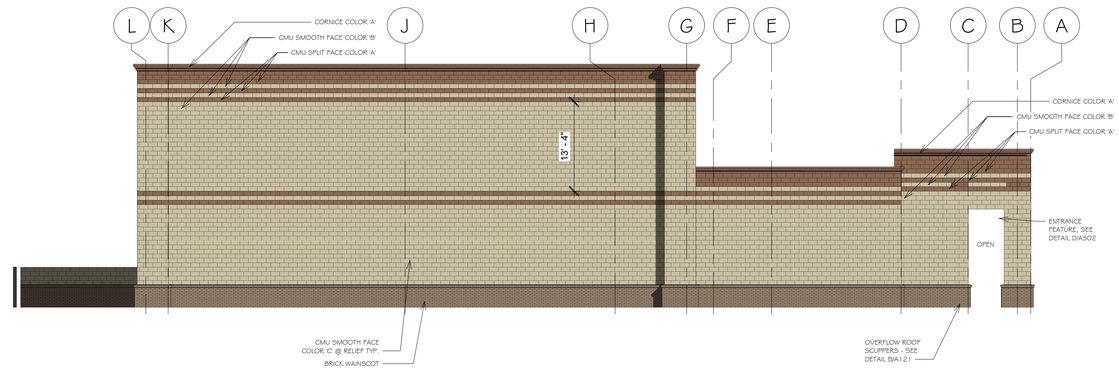
SHEET:
FLOOR PLANS

A101

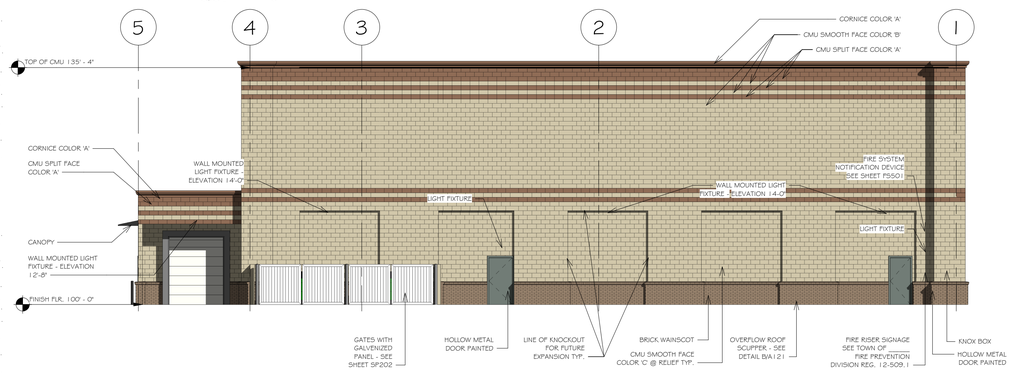




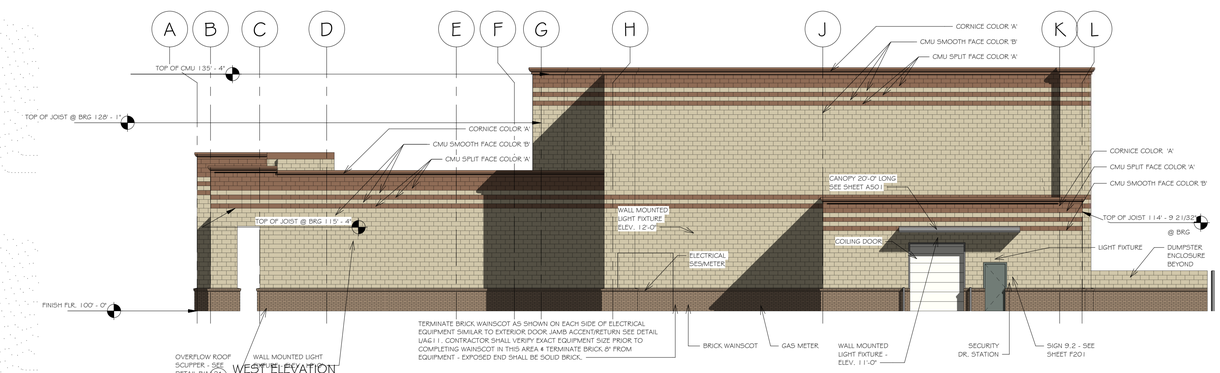
1 SOUTH ELEVATION
3/32" = 1'-0"



2 EAST ELEVATION
3/32" = 1'-0"



3 NORTH ELEVATION
3/32" = 1'-0"



4 WEST ELEVATION
3/32" = 1'-0"

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Project For:
THE CHURCH OF
JESUS CHRIST
OF LATTER-DAY SAINTS

SARATOGA SPRINGS
BISHOPS' STOREHOUSE

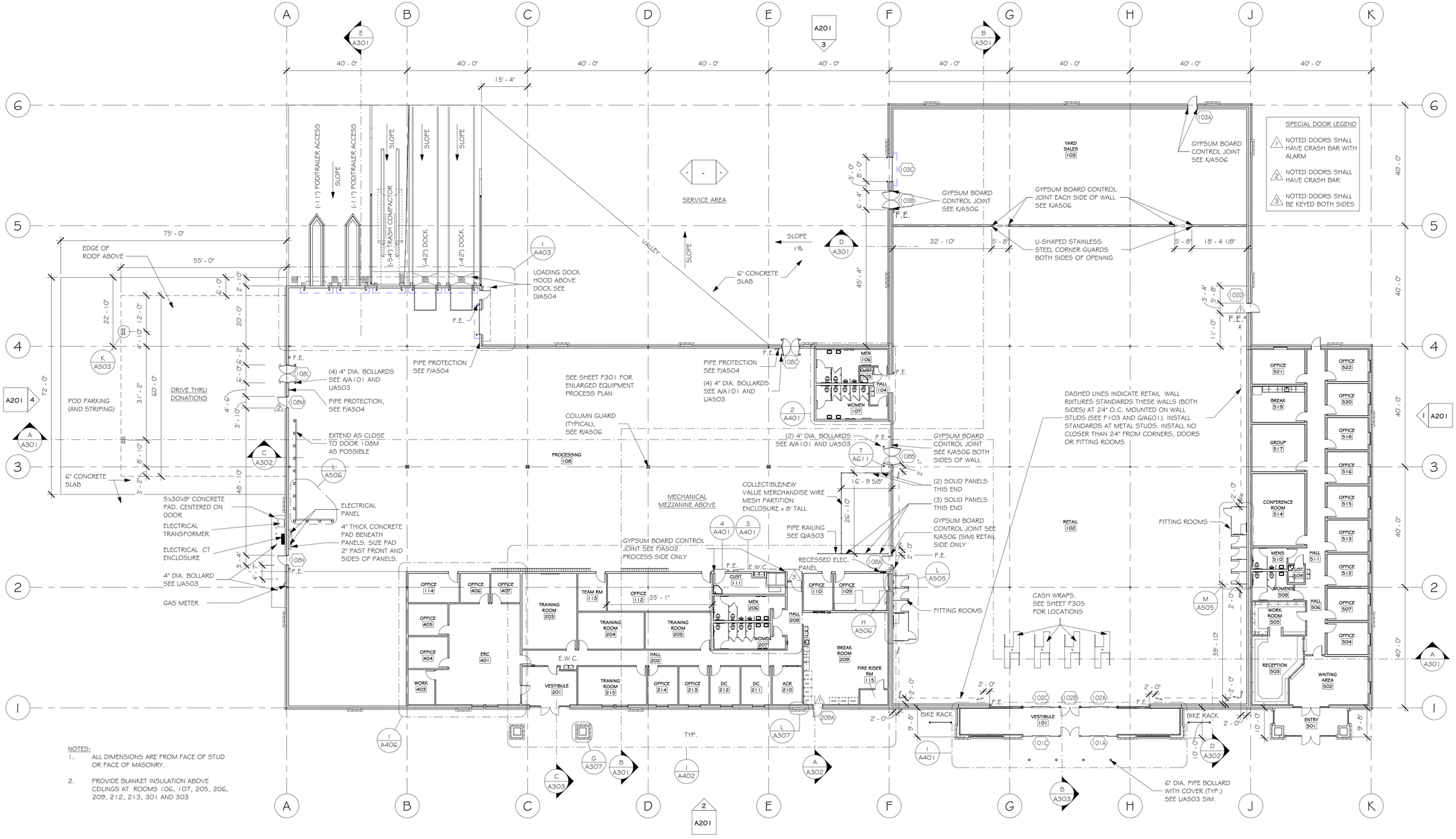
PROJECT ADDRESS

MARK	DATE (D-M-Y)	DESCRIPTION

Project Number: 123
Plan Series: 123
JRWA Project: 757
Property Number: 123

SHEET:
EXTERIOR ELEVATIONS

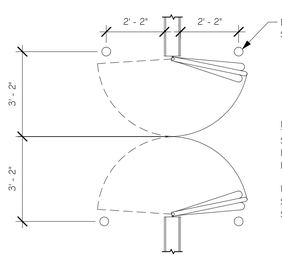
A201



NOTES:

1. ALL DIMENSIONS ARE FROM FACE OF STUD OR FACE OF MASONRY.
2. PROVIDE BLANKET INSULATION ABOVE CEILINGS AT ROOMS 106, 107, 205, 206, 209, 212, 213, 301 AND 303

(A) FLOOR PLAN
1/16" = 1'-0"
57,497 sqft



NOTE:
SEE FLOOR PLAN FOR BOLLARD LOCATIONS. NO BOLLARDS IN RETAIL 102.

NOTE:
SET BOLLARDS SO DOOR SWING IS LESS THAN 90

(2) BOLLARD PLACEMENT
3/8" = 1'-0"

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Issue Date

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WWW.JRWA.COM VOICE (208) 359-2209 FAX (208) 359-2271

Project For:
THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS

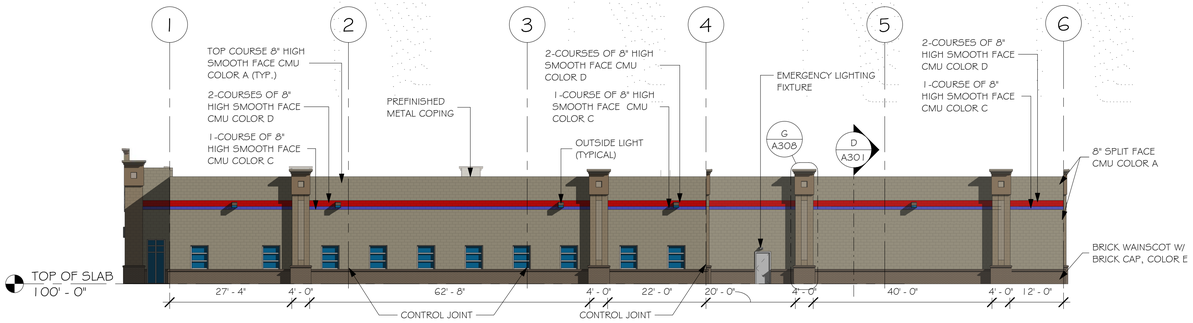
SARATOGA SPRINGS, UTAH
DESERET INDUSTRIES
PROJECT ADDRESS

MARK	DATE (D-M-Y)	DESCRIPTION

Project Number: 123
Plan Series: 123
JRWA Project: 757
Property Number: 123

SHEET:
MAIN FLOOR PLAN

A101

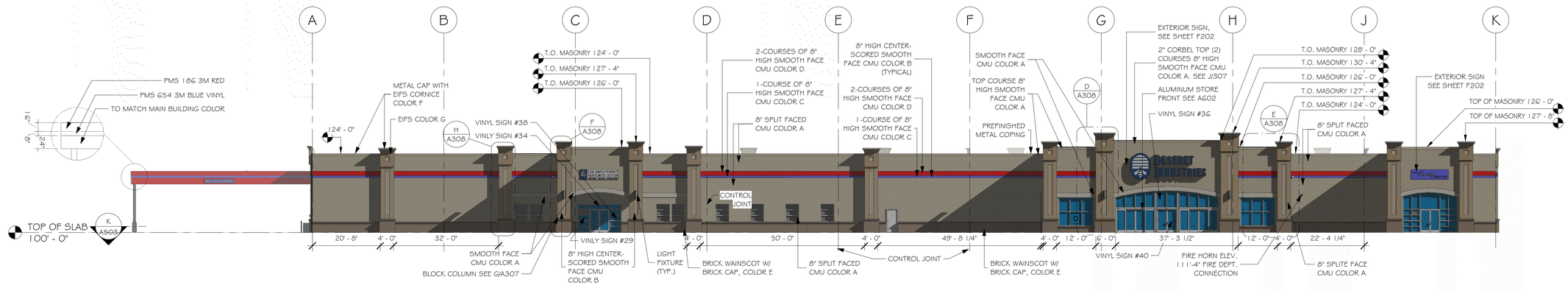


1 WEST ELEVATION
1/16" = 1'-0"

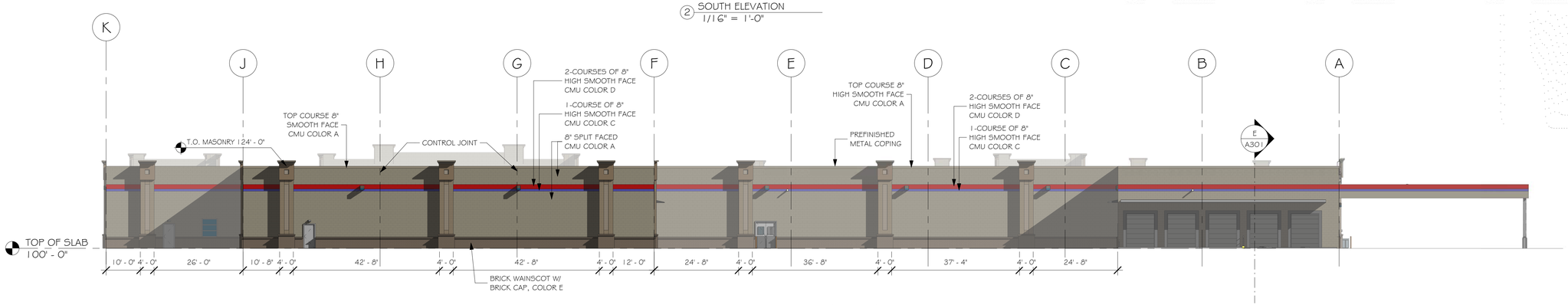
EXTERIOR CMU COLORS

NOTE: BLOCK COLORS ARE BY AMCOR
BRICK COLOR IS BY INTERSTATE BRICK
EIFS COLORS ARE BY DRYVIT

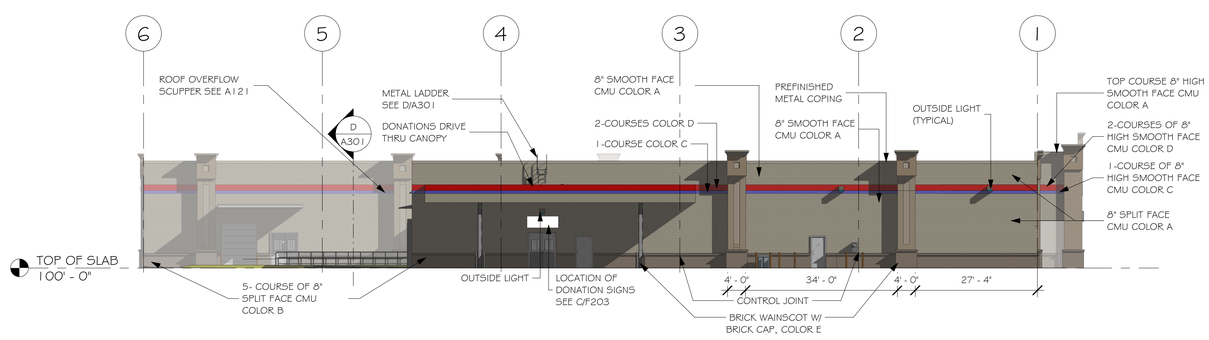
COLOR A SPLIT FACE	PEPPERCREAM	COLOR E BRICK VENEER WAINSCOT	WALNUT (INTERSTATE BRICK)
COLOR B SPLIT FACE	INCA TAN	COLOR F MET CAP AND EIFS CORNICE	"TAMALE #382" METAL CAP TO MATCH EIFS COLOR
COLOR C STRIPE	D.I. BLUE		
COLOR D STRIP	D.I. RED	COLOR G EIFS COLUMN CAPS	"VAN DYKE#110"



2 SOUTH ELEVATION
1/16" = 1'-0"



3 NORTH ELEVATION
1/16" = 1'-0"



4 EAST ELEVATION
1/16" = 1'-0"

Issue Date

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SHEET:
EXTERIOR ELEVATIONS

A201

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