North Hermiston Local Circulation Plan

Spring 2022
Hermiston

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PSU Civil & Environmental Engineering Capstone

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HERMISTON OREGON
SCI Sustainable Cities Institute
SCYP Sustainable City Year Program

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Project Disclaimer

This report was prepared as part of a class project for the Civil and Environmental Engineering Project Management and Design course at Portland State University. The contents of this report were developed by the student authors and do not necessarily reflect the views of Portland State University. The analyses, conclusions, and recommendations contained in the report should not be construed as an engineering report or used as a substitute for professional engineering services.

Acknowledgements

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About SCI

The Sustainable Cities Institute (SCI) is an applied think tank focusing on sustainability and cities through applied research, teaching, and community partnerships. We work across disciplines that match the complexity of cities to address sustainability challenges, from regional planning to building design and from enhancing engagement of diverse communities to understanding the impacts on municipal budgets from disruptive technologies and many issues in between.

SCI focuses on sustainability-based research and teaching opportunities through two primary efforts:

1. Our Sustainable City Year Program (SCYP), a massively scaled university-community partnership program that matches the resources of the University with one Oregon community each year to help advance that community's sustainability goals; and

2. Our Urbanism Next Center, which focuses on how autonomous vehicles, e-commerce, and the sharing economy will impact the form and function of cities.

In all cases, we share our expertise and experiences with scholars, policymakers, community leaders, and project partners. We further extend our impact via an annual Expert-in-Residence Program, SCI China visiting scholars program, study abroad course on redesigning cities for people on bicycle, and through our co-leadership of the Educational Partnerships for Innovation in Communities Network (EPIC-N), which is transferring SCYP to universities and communities across the globe. Our work connects student passion, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and a partner in Oregon, in which students and faculty in courses from across the university collaborate with a public entity on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner agency through a variety of studio projects and service-learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations that result in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About City of Hermiston

Hermiston is a vibrant destination that incorporates rural and urban opportunities as the largest city in eastern Oregon. In the 1860s Hermiston was known as a hotel called the "Six Mile House," a stop for travelers in the Columbia River Basin. Following the establishment of railroads, the City was incorporated in 1907. Approximately eight square miles in area, Hermiston currently has more than 19,000 residents.

Hermiston's employment rate is 62.1%, which is above Oregon's employment rate of 59.3%, and has a mean household income of $54,123. Seventy percent of the residents are between the ages of 18-64.

Hermiston is located at the junction of Interstate 82 and Interstate 84 in Umatilla County, near the Oregon-Washington border. Stanfield, the closest city, is five miles southeast, and Umatilla is located six miles north along the Umatilla River.

Renowned for its watermelons, Hermiston's desert climate and proximity to the Umatilla River and the Columbia River have made agriculture a dominant industry since the early 1900s. In the 1970s potato processing plants and the introduction of center pivot irrigation firmly established agriculture as an economic asset to the City. At the same time, industrial businesses like Marlette Homes, Inc., Lamb Weston, and Union Pacific expanded into Hermiston, further stimulating the economy. Additional commercial development in the 1990s and 2000s with Walmart and FedEx building distribution centers, led to an increase in employment opportunities and diversified economic growth. The 2010s saw further diversification of the economic base with the construction of data centers in Boardman and Umatilla with additional centers proposed for Hermiston as well. The City is a regional trade hub and is central to a broader area serving over 76,000 people. Hermiston's success as a retail and data center continues to spur growth and development.

The City maintains 13 parks, 15 landscape areas, and more than 100 acres for the community while Hat Rock State Park, located near Hermiston, offers City residents and visitors a variety of recreational activities. In the summer, the Eastern Oregon Trade and Event Center hosts the Umatilla County Fair and Farm-City Pro Rodeo, among other events that highlight Hermiston's rural culture.

Forty-four percent of Hermiston's population is Hispanic and as the City grows, it has emphasized inclusion. The City created the Hispanic Advisory Committee in 2012, which proceeded to represent and integrate Hermiston's Hispanic communities. It was presented the National League of Cities 2013 City Cultural Diversity Award, following achievements such as an annual Cinco de Mayo festival. Much of Hermiston's outreach materials are available in Spanish and English, including information and inquiries related to the City's most recent visioning process, Hermiston 2040.

In 2016, the Livable Hermiston process included feedback from over 2,000 residents who identified priority assets, including the development of more parks and a multi-use facility over the next 20 years. In 2013, the Hermiston Urban Renewal Agency (HURA) was created to revitalize Hermiston's downtown area and in 2019 HURA was awarded Urban Renewal Project of the Year for development that stimulated the local downtown economy. With numerous plans to incorporate community ideals in the City's development, Hermiston has a promising cultural and economic future.

Sources:
United States Census Bureau
City of Hermiston
Hermiston Chamber of Commerce
Hermiston 2040

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Executive Summary

The City of Hermiston is a growing town located in the northeast part of Oregon. In the early 2000s, Hermiston had a population of about 13,000 people. With more homes and schools under construction, the town expects to reach a population of 20,000 in the next decade. Hermiston is a small town, and with a growing population, traffic will increase, causing large amounts of congestion. The congestion will primarily be an issue during peak hours in the morning and afternoon. Most of the congestion occurs on Highway 395.

Portland State University capstone students are responsible for designing different alternatives that the team will present to the city of Hermiston. The report will include CAD drawings, a cost estimate, and a construction schedule. The alternative designs will focus on easing congestion, providing better access for residents and commercial establishments, pedestrian and driver safety, and total construction time.

During a site visit, the team looked for areas along Highway 395 where drivers could make an earlier turn that would ease up the turning lanes on W Theater Lane and Highway 207. Highway 207 had an issue with an existing business, so the team decided not to evaluate the street for a potential redesign. ODOT had already purchased as much right-of-way as possible in the intersection, but the existing business showed no interest in relocating. No more can be done unless the property is bought and demolished.

At an early design stage, the City of Hermiston decided that designing bike lanes was not preferred due to the popularity of using automobiles to get around town. The team ultimately produced three designs that the City could look into, not including a no-build option. The alternatives include a new street layout from Highway 395 to W Theater Lane, a new street layout from Highway 395 to NE 4th Street, and an intersection redesign from W Theater Lane to Highway 395.

The team met with stakeholders around the area, and all alternative designs were disclosed. The stakeholders approved of each one. Stakeholders described that congestion was noticeably becoming an issue and wanted a solution. Some stated it was nearly impossible to make a left turn onto Highway 395. Another issue was the safety of employees, as drivers would speed and cut through the parking lots to get around traffic.

With stakeholders understanding that redevelopment will occur throughout the city, these problems will worsen if no initiative is taken.

After a thorough analysis, the recommended solution to solve the central issue of congestion and safety is to create a new street layout. The new street layout will cut through the privately-owned property to connect Highway 395 to NE 4th Street. The new street layout connecting Highway 395 to NE 4th Street is the best alternative as it will provide the best solution to ease congestion on Highway 395. The new road would also provide better street access to nearby residential areas and discourage the public from entering businesses using their rear entrance. This design will not affect traffic flow but will require right-of-way acquisition from private parties.

The City of Hermiston officials approved this design as it would better impact congestion while having a slightly better cost than other design alternatives. In addition to adding a new roadway, swales will be added for drainage, and sidewalks will be constructed for pedestrians. This layout will allow the City to incorporate a new signal at Highway 395.

1.0 Project Understanding

The City of Hermiston, Oregon has identified the need for improvements to traffic flow in the areas surrounding Highway 395 between Highway 207 and Theater Lane. Improvements to access between surrounding residential neighborhoods and this commercial district are needed. Portland State University's Civil and Environmental Engineering Capstone Program has been contacted to study alternatives and provide a recommendation for improvements to the study area. The primary objective is a preliminary design report at 30% completion delivered to the City of Hermiston. This design report will include cost estimates, potential street layouts, and a timeline for construction.

The desired outcomes any improvements will achieve are:

1. Improve traffic flow and relieve congestion
2. Improve access from nearby residential areas
3. Improve access to commercial establishments
4. Improve safety for all stakeholders

The study area is occupied by a growing commercial presence including Walmart, The Home Depot, and Ace Hardware stores. These three businesses see the most traffic within the study area. According to management of these stores, vehicles access and cut through these properties by using undesignated entrances and entrances of other businesses. The vehicles cutting from one lot to the next pose a safety hazard.

The study area, shown in Figure 1, is primarily commercial with some industrial and residential, and is bordered by Theater Lane, Highway 207, NE 4th Street, North 1st Place, and NW Greer Rd. These roads make up the north, south, east, and west boundaries respectively with 1st Place and Greer Rd combining for the western boundary. Highway 395 is the main road through Hermiston and this study area.

FIG. 1

Hermiston Study Area

Source: Google Earth

Previously the City of Hermiston proceeded with plans to build roads improving access to The Home Depot and neighboring stores west of Highway 395. One of the roads would have run north from the northeast corner of The Home Depot lot and connected with W Theater Lane to the east of the Goodwill store. This plan was disputed by the owner of Hermiston Cinema who shares the same parking lot with Goodwill. After a legal dispute with the Hermiston Cinema owner this option is not viable at the present time.

The Oregon Department of Transportation (ODOT) purchased right-of-way several times to increase the radius for the right-hand turn from northbound Highway 395 to eastbound Highway 207. ODOT advised they are unable to further increase the radius of this turn without purchasing the building and business (Shiki Steakhouse and Sushi) that reside at the southeast corner of this intersection. Figure 2 shown below reflects the total right-of-way ODOT purchased to improve this turn.

FIG. 2

Total Right-of-Way purchased by ODOT to improve right-hand-turns from northbound Highway 395 to eastbound Highway 207.

Source: Google Earth

A previous recommendation was made by the Hermiston City Planning Director, Clint Spencer, to create a truck route that will take most trucking traffic off Highway 395. This option may be revisited by the city in the future.

1.1 EXISTING SITE CONDITIONS

Hermiston lies 459 feet above sea level within the Columbia River Plateau on top of basalt flows that occurred 16.7-5.5 million years ago. The climate is semi-arid with hot summers and cold winters. The average high temperature is 65.8°F, and the average low is 39.7°F. Hermiston has an annual average rainfall of approximately 8.9 inches (Climate - hermiston (Oregon). Despite low rainfall totals, there is an abundance of water from the Columbia River and the Columbia Plateau Aquifer System. Agriculture is a dominant industry in the region and is the primary use of land in unincorporated areas.

Hermiston has a logistical advantage regarding the cargo and freight industry. Hermiston is close enough to all major populated areas in the Pacific Northwest where one can drive to any of these regions and back within a day. Eugene, Oregon at approximately 4.5 hours travel time is the farthest metropolitan area from Hermiston. Tri-Cities in Washington is 30 miles to the north. The Port of Umatilla is 6.6 miles to the north on the Columbia River, and Union Pacific's Hinkle Rail Yard is approximately 2 miles south.

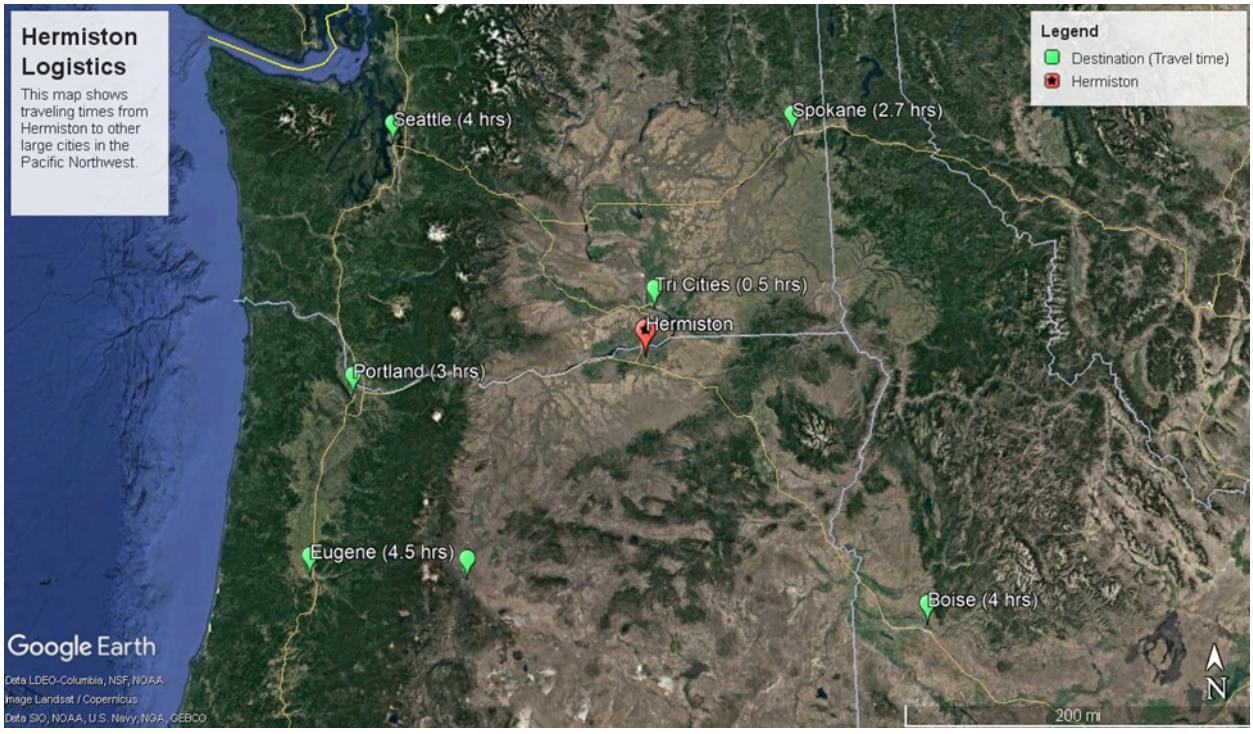


FIG. 3
Hermiston Logistics
Source: Google Earth

Trucking traffic has one of the greatest impacts on traffic within the study area. Highway 395 runs north-south and is the primary road through Hermiston. It is a popular route for trucks traveling north to Washington or south to connect with Interstate 84. The intersection of Highways 207 and 395 is the busiest intersection on the east side of Oregon, experiencing over 20,000 vehicles per day. This intersection is the most congested in the region, and despite efforts from ODOT to increase the radius of the turn, large trucks have difficulty navigating the right-hand turn from northbound Highway 395 onto eastbound Highway 207. For any vehicles attempting to access Highway 395 from local commercial and industrial sites, their only options are the Highway 395-Highway 207 intersection, and the intersection of Highway 395 and Theater Lane. The posted speed limit for Highway 395 is 30 mph, which few vehicles traveling this stretch of road follow. Southbound traffic on Highway 395 approaches the intersection with West Theater Lane while traveling down a grade. This can make it difficult to stop when approaching this intersection.

Traffic associated with school also has a significant impact on congestion within the study area. Loma Vista Elementary is the new elementary school currently under construction to the east of the study area at the intersection of E Theater Lane and 10th Street. The new school will serve the two nearby residential subdivisions. When completed, Loma Vista Elementary will add vehicle, pedestrian, and bicycle traffic. Currently, there are inadequate options for pedestrians and bicyclists traveling along Theater Lane near the intersection of Highway 395. When construction for the new grade school is complete the intersection of

Highway 395 and Theater Lane may require school zone traffic patterns before and after school.

Forecasted population growth and an increased commercial presence warrant planning for future demand. Future residential and commercial expansion will likely occur north of the study area. Two car dealerships have already relocated from within the study area to new locations just north on Highway 395. As commercial and residential use expands to the north traffic will increase within the study area. The intersection that could see the greatest impact from future development is Highway 395 and Theater Lane.

FIG. 4

Project Area Land Use

Source: Google Earth

1.2 STAKEHOLDERS

After discussions with the City of Hermiston Planning Department, the following parties have been identified as stakeholders.

The City of Hermiston

The City of Hermiston is under pressure from citizens to alleviate the increasing congestion in the study area. Any traffic or construction changes that occur off Highway 395 will fall under the jurisdiction of the City of Hermiston and must adhere to their code and regulations. Easements and rights-of-way in these same areas off Highway 395 will fall under the City's jurisdiction.

Oregon Department of Transportation (ODOT)

Highway 207 and Highway 395 fall under the jurisdiction of the Oregon Department of Transportation. Any changes to these roads or traffic patterns must meet the code and requirements for ODOT.

Local Businesses

Local businesses expressed concerns with safety and access. As traffic congestion and usage increase, so will the number of safety concerns. The number of drivers taking short-cuts through parking lots and using entrances not designed for high traffic volume is increasing. This poses a safety hazard for pedestrians and delivery traffic in the study area. Each business understands that decreased access to their site will be counterproductive to their success.

Car Drivers

The residents of Hermiston want to alleviate the increasing congestion within the study area. As residential and retail development expands in and around the study area the congestion and queue times will increase. They will also expect safe access to and from all businesses in the study area.

Pedestrians

Pedestrian access is a byproduct of the proximity of nearby residential areas to businesses within the study area. When the new elementary school opens children will be walking to and from school. All roads in and around the study area will be used by children, and parents will require safe travel options for their children traveling.

Bicyclists

Bicyclists both young and old currently travel in the study area, and this mode of transportation will become more frequent. Bicyclists use the study area to travel to work, patronize the businesses, or pass through. When the elementary school opens children riding bicycles to and from school will increase.

Truckers

Trucks make up a large portion of the vehicle traffic in the study area. Highway 395 is a shortcut connecting Interstates 84 and 82, and many trucks use Highway 395 to bypass the scales in Umatilla. A large agricultural presence in the region and nearby industrial sites contribute to the number of trucks using the study area. This makes Highway 395 through Hermiston an ideal route for both local and interstate shipping and commerce.

2.0 Alternatives Analysis

Four alternate designs were made within the study area, each addressing different criteria as per the clients. Designs include two street layouts, an intersection improvement, and a no-build option. Alternatives would be scored based on five selected criteria with a final score provided for each alternative on a Pugh Matrix to assist decision making for the client.

2.1 ALTERNATIVES CONSIDERED

2.1.1 Street Layout: Highway 395 to W Theater Lane

The street layout from Highway 395 to W Theater Lane consists of a street layout that runs between the two existing roads, which starts from the middle and goes south of W Theater Lane, which cuts across an empty land then connects to the hermiston ditch and then goes behind Home Depot and then connects to the existing entry road at Highway 395. This alternative allows drivers to easily get from Highway 395 to various retail locations west of the Highway. Also, drivers can take this road without dangerously cutting between two businesses to avoid the busy intersections on Highway 395

FIG. 5
Street Layout of Highway 395 to W Theater Lane

FIG. 6

Proposed project site between Highway 395 to W Theater Lane (Taken from Highway 395 in the West direction)

2.1.2 Street Layout: Highway 395 to NE 4th Street

The street layout from Highway 395 to NE 4th Street consists of a street layout that runs between the two existing roads, which cuts across the privately owned empty plot of land in between. With the expected population growth on the east side of Highway 395, this alternative provides a third route to get to Highway 395 to alleviate congestion at the intersections at Highway 207 and Theater Road with Highway 395. Giving drivers quick access to Highway 395 may also reduce the amount of drivers that cut through the back of Walmart. At the intersection between this layout and Highway 395, this road would lead directly to the retail stores west of Highway 395.

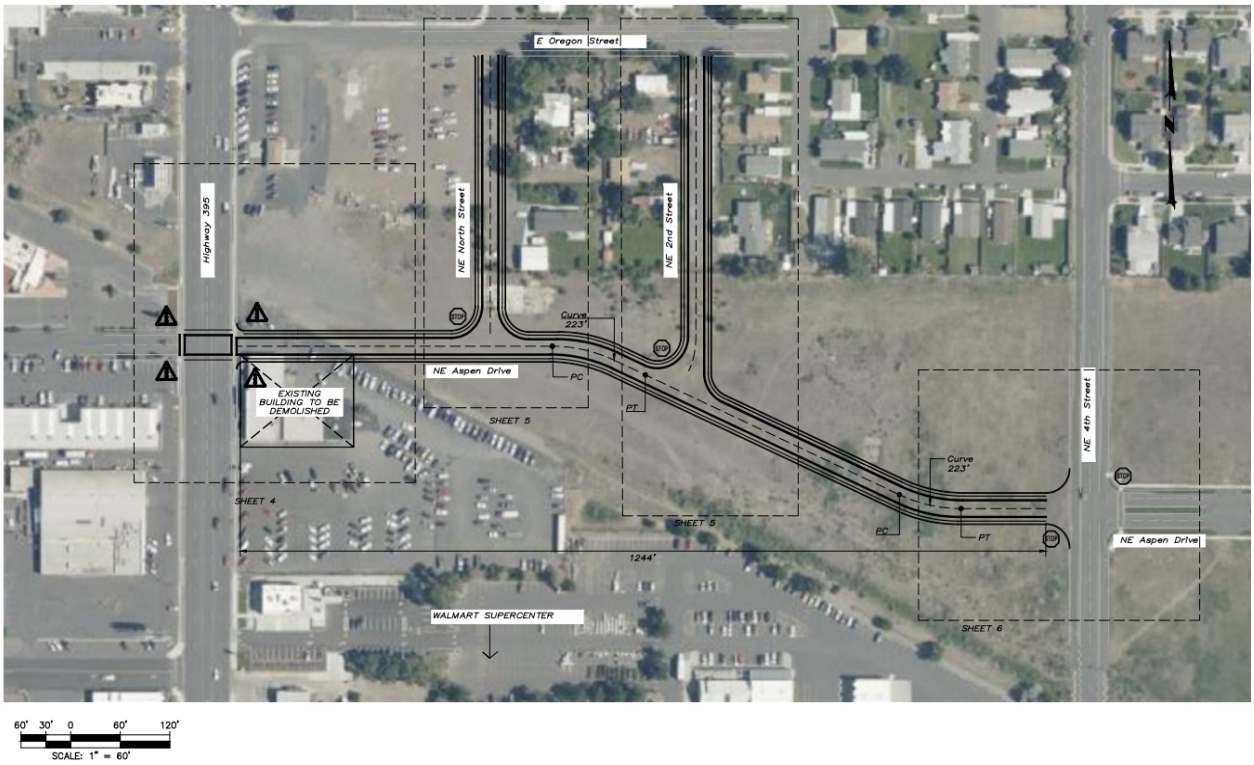


FIG. 7

Street layout of Highway 395 to NE 4th Street

FIG. 8

Proposed project site between Highway 395 to NE 4th Street (Taken from NE 4th Street in the west direction)

2.1.3 Intersection Improvement: East Theater Lane and Highway 395

An intersection redesign for East Theater Lane and Highway 395 would include improvements over existing conditions. This would include a slip lane on Highway 395 to reduce congestion in the north-south direction of the intersection, as that direction has the most traffic volume. Because of the developing communities along the east and west sides of Highway 395, improvements could be made for pedestrian users and bicyclists such as a bike lane and better sidewalks.

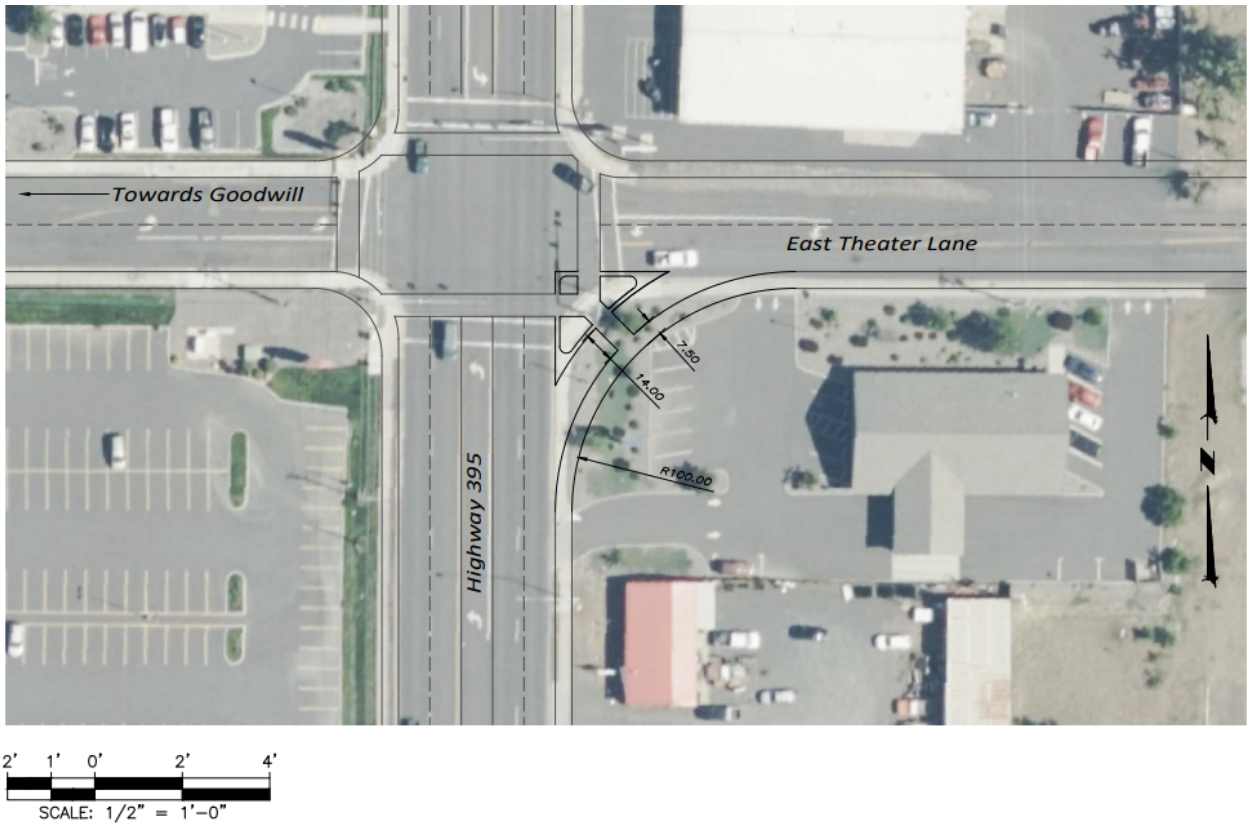


FIG. 9

Intersection improvement of Highway 395 and E Theater Lane

FIG. 10
Proposed project site between Highway 395 to E Theater Lane (Taken from Highway 395 in the north direction)

2.1.4 No Build

The no build option leaves the intersection and street layouts in their in-situ conditions. This option is the cheapest, as there aren't any associated costs from construction. Additionally, there wouldn't be any congestion induced from the construction due to closed sections of roads. However with the growing population east of Highway 395, this option will lead to more problems later. With higher traffic coming from the east, traffic can only get to Highway 395 by passing through intersections on Highway 395 at Highway 207 or Harper Road. Consequently, a no-build could lead to increased congestion at these two intersections on Highway 395 at a later time with the growing population in Hermiston.

2.2 SELECTION CRITERIA

The five following criteria were found to be important factors for determining which option would be the most recommended. Each alternative is graded from 1 to 4. A total grade is provided on the Pugh Matrix in Section 2.3. Each score is simply the ranking of the alternative among the other options. The highest final sum of scores in the Pugh Matrix will determine which alternative is the most recommended option.

2.2.1 Congestion Reduction

Congestion reduction was identified to be the most important factor in selection of a project because this is the purpose of the project within this study area. This reduction would be a measurable benefit on Highway 395

from south of Theater Road to north of Highway 207, along with those respective intersections. A ranking of 4 would represent the best reduction of congestion of the alternatives, whereas a lower ranking of 1 represents the lowest reduction of the design alternatives.

2.2.2 Driver Safety

Driver safety was identified as another important factor because in many parts of the study areas, driver safety became a concern. Implementation of an alternative in key areas could improve areas where drivers tend to speed when cutting through an area, or key components of a section redesign may also improve safety. A high ranking of 4 would indicate the highest increase of driver safety over existing conditions, whereas a low ranking of 1 would represent a minimal improvement of driver safety of all the design alternatives.

2.2.3 Pedestrian Safety

Because pedestrian traffic is low but still present within the study area, pedestrian safety is still a consideration for choosing an alternative. Improvements to street alignments or intersections such as improvements to sidewalks or signage may aid in improving safety for pedestrians. A high ranking of 4 indicates the alternative increases pedestrian safety the most, whereas a low ranking of 1 indicates little to no improvement of pedestrian safety over existing conditions.

2.2.4 Cost

Cost takes into account the total cost of the project. This would include costs associated with purchasing right-of-way, construction, permitting, etc. Cost is an important consideration because all of these design alternatives have large differences in costs. The highest ranking of 4 indicates the alternative has the lowest cost, whereas a low ranking of 1 indicates that the design alternative is the most costly option.

2.2.5 Time

The time factor takes into account the time required for the construction of the project. For the designs based on existing roads, the time can encompass how long the road section spends closed or has limited traffic flow, which can induce congestion, making time a factor to keep in mind when selecting an alternative. A high ranking of 4 indicates the alternative requires the lowest time to construct. In contrast, a low rank of 1 indicates that the project may require more time to be completed.

2.3 ALTERNATIVES SCORING

2.3.1 Pugh Matrix

	The total construction cost of the project	Time required for the project	Increase of safety for drivers	Increase of safety for pedestrian users	Reduction of vehicle congestion	Sum of the criteria
ALTERNATIVE TITLE & DESCRIPTION	**COST**	**TIME**	**DRIVER SAFETY**	**PEDESTRIAN SAFETY**	**CONGESTION REDUCTION**	**TOTAL**
1) Street Layout: Highway 395 to W Theater Lane New street layout from Highway 395 to W Theater Lane to allow drivers to easily get from Highway 395 to various retail locations west of the Highway.	1	2	3	3	3	12
2) Street Layout: Highway 395 to NE 4th Street New street layout from Highway 395 to NW 4th street.	2	1	4	4	4	15
3) Intersection Improvement: Theater Lane and Highway 395 Right turn pockets for the north direction on Highway 395 to turn onto E Theater Lane	3	3	2	2	2	12
4) No-Build No action is taken; the street and intersection layouts will remain as is.	4	4	1	1	1	11

2.3.2 Alternative 1: Street Layout: Highway 395 to W Theater Lane

This street layout from Highway 395 to W Theater Lane is the second lowest ranking alternative for the time criteria. Requiring construction of new pavement and sidewalks but using some pre-existing layouts, this alternative requires less time than alternative 2. However, this alternative is the most expensive alternative to construct since there would be a significant amount of right-of-way to be purchased, as this project would run in front of many businesses. This alternative ranks third within the driver safety improvement because this would eliminate the dangers of drivers cutting across the parking lot south of Ace Hardware, and an intersection between this street layout and Highway 395 would improve safety of drivers entering the highway. The addition of sidewalks would improve safety for the pedestrians using this road, as there aren't sidewalks in the existing conditions. This alternative ranks 3rd for congestion reduction, as this gives drivers access to Highway 395 from W Harper Road, W Theater Lane, and businesses west of Highway 395. Overall, this alternative gets a total score of 13.

2.3.3 Alternative 2: Street Layout: Highway 395 to NE 4th Street

This street layout from Highway 395 to NE 4th street has the highest overall ranking at 15 points overall. Giving drivers a safe and quick route to go from Highway 395 to NE 4th street, this layout ranks the highest in driver safety and congestion reduction because drivers won't need to cut through either of the two busy intersections on Highway 395 at theater lane or Highway 207. Additionally, this layout ranks the highest in pedestrian safety because there will be an addition of sidewalks that meet code requirements. However, this street layout ranks the lowest in overall time required because the right-of-way would need to be purchased and the street layout would be built without any pre-existing pavement. This alternative design ranked as the second most expensive since there will be a street designed and built from no existing roads, but wouldn't be as expensive since there would be a right-of-way to be purchased only from one landowner and not multiple businesses.

2.3.4 Alternative 3: Intersection Improvement: Highway 395 and Theater Lane

This intersection improvement for the intersection at Highway 395 and theater lane will provide a slip lane to allow drivers to turn right from Highway 395 northbound to east theater lane. Because of this benefit of not needing to make a stop at the light, this street layout will provide some improvements for congestion reduction and driver safety but little to no benefit for pedestrian safety. Additionally, this alternative would be the quickest to construct. Right-of-way would need to be purchased as well, but this alternative would likely remain cheaper than alternatives 1 and 2.

2.3.5 Alternative 4: No-Build

Alternative 4 is a no-build option, which would leave the site as is in the in-situ conditions. This would be the cheapest alternative, as no action would be taken. However, the problems related to the congestion within the intersections on Highway 395 at Highway 207 and theater lane would get worse over time, which is why this alternative wouldn't be recommended.

2.4 PREFERRED ALTERNATIVE

Alternative 2: Street Layout from Highway 395 to NE 4th Street is our preferred alternative. Scoring the highest at 15, this design adds a whole new road east from Highway 395 to NE 4th Street, which would include sidewalks and a signalized intersection. Existing conditions have residents living on the east side of Highway 395 needing to get through the intersections on Highway 395 at Theater Lane or Highway 207. Congestion at those intersections has some drivers dangerously cutting through the Walmart parking lot. With a new school being built on the east side of Highway 395 and more residential development, congestion at these intersections will get worse over time. Therefore, we recommend this street layout from Highway 395 to NE 4th Street to give drivers a third way to access Highway 395.

3.0 Facility Design

The new street connects NE 4th Street to Highway 395 and also connect to extensions of NE 2nd Street and NE North Street. This street will be new construction, and the proposed site is the open field immediately to the north of the Walmart store. This new street is yet to be named but will be referenced as NE Aspen Drive. Per the City of Hermiston Planning Department this street will be designed as a collector street. It will provide access to many businesses in the heart of this commercial area without having to travel down Highway 395, or through the busy intersection at Highways 395 and 207. This section details the design elements for this project.

3.1. OVERALL SITE DESIGN

The new street will be a two-lane collector street. It will be lined up with the driveway on the west of Highway 395 that accesses several businesses. Two of these businesses are Aaron's and the Hermiston Liquor Store. This will leave open the opportunity for a future street on the west of Highway 395 accessing The Home Depot and aligned with this extension of NE Aspen Drive. Due to the misalignment of both ends of the new street there will be two 30-mile-per-hour curves to help realign with two intersections. One new intersection is with Highway 395 and the other is the existing NE 4th Street and NE Aspen Drive intersection. There will be no on-street parking. Curbs and sidewalks will be present along with infiltration swales in the buffer zone. The same design specifications and geometry will apply to all three roads being constructed.

3.1.1 Street Layouts

The street layout design specifications referenced for this project are found in Figure ST12 of the Hermiston Design Specifications, Option 2, with no parking. The overall width for the design is 46 feet. Starting from the center stripe the street will include the following features: travel lane, gutter, infiltration swale, sidewalk, and buffer zone. Drawings and dimensions for this extension of NE Aspen Drive can be found on Sheet 7 in Appendix C .

Starting at Highway 395 the street travels 467 feet east to the first of two 30-mph curves. This first curve turns the road 24.5 degrees to the south and travels another 468 feet to the east-southeast where it meets the second 30-mph curve. This second curve turns the road 24.5 degrees to the north to align the road with NE Aspen Drive. The road then travels another 161 feet to the intersection of NE 4th Street and NE Aspen Drive.

3.1.2 Lanes

The specifications referenced for design are found in the Hermiston Design Specifications figure ST12, Option 2. Travel lane widths are 12 feet for the entire length of the new street excluding approaches for the intersections on the east and west end of this span. There will be a minimum 2.5% slope from the center line to the gutters. A drawing of these design specifications can be found in Appendix C, Sheet 7, Urban Street Local Cross Section.

3.1.3 Intersections

This new road will incorporate a total of four intersections. The intersection at Highway 395 will fall under ODOT design specifications and the other three intersections will fall under Chapter 9 of AASHTO's design specifications. All intersections were designed for a Class 3 vehicle with 35-foot radiuses for all corners. Drawings for all intersections can be found on Sheets 4, 5, and 6 in Appendix C.

The intersection at Highway 395 will include signals for traffic control. The alignment of this intersection is to allow vehicular traffic to enter the driveway immediately across Highway 395 to access nearby businesses and The Home Depot store.

The intersection of NE North Street and NE Aspen Drive will not be signalized. Stop signs will be used to control the flow of traffic from NE 4th Street onto NE Aspen Drive.

The intersection at NE 2nd Street and NE Aspen Drive will also have a stop sign to control traffic from NE 2nd Street onto NE Aspen Drive. This intersection will have a 27.2-degree curve to align NE 2nd Street perpendicular to NE Aspen Drive. This curve will maximize sight distance for vehicles queued at the stop sign.

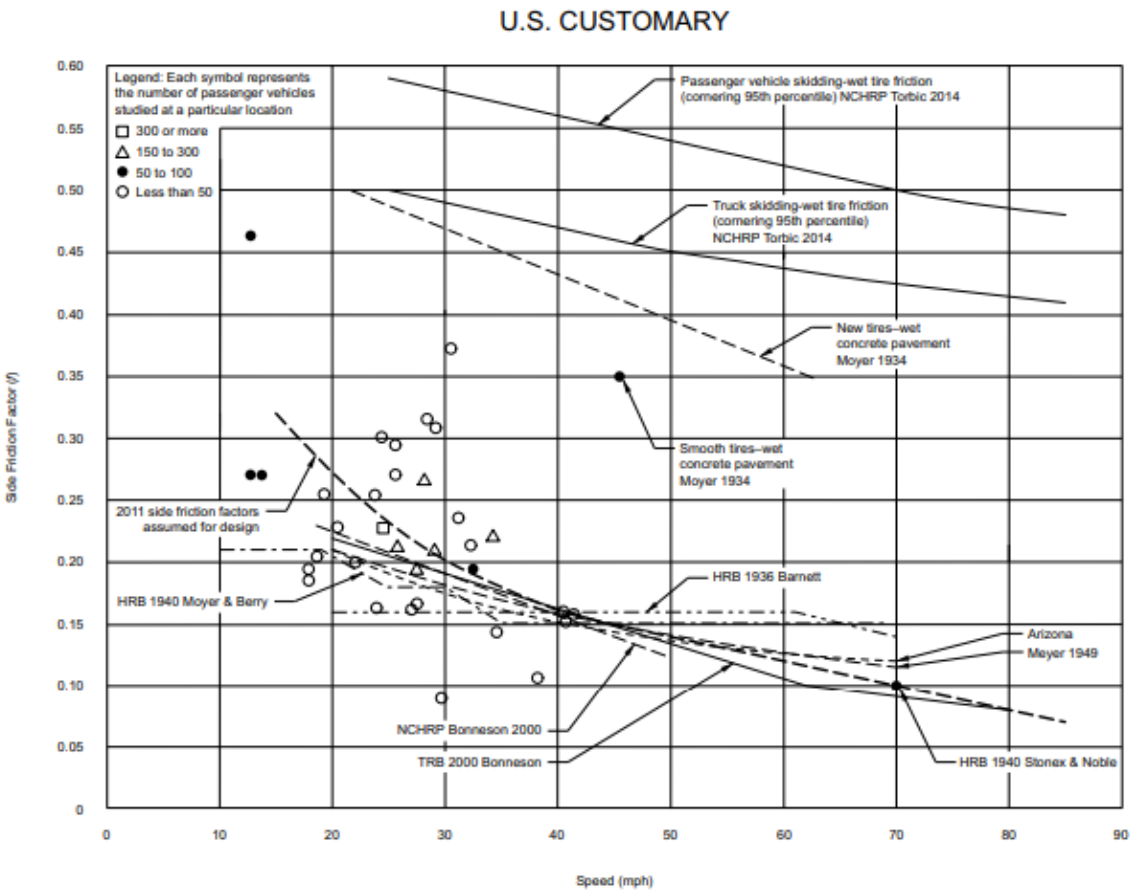
The intersection of NE 4th Street and NE Aspen Drive will have stop signs for traffic traveling both directions on NE Aspen Drive. The traffic on NE 4th Street will not have any stop signs.

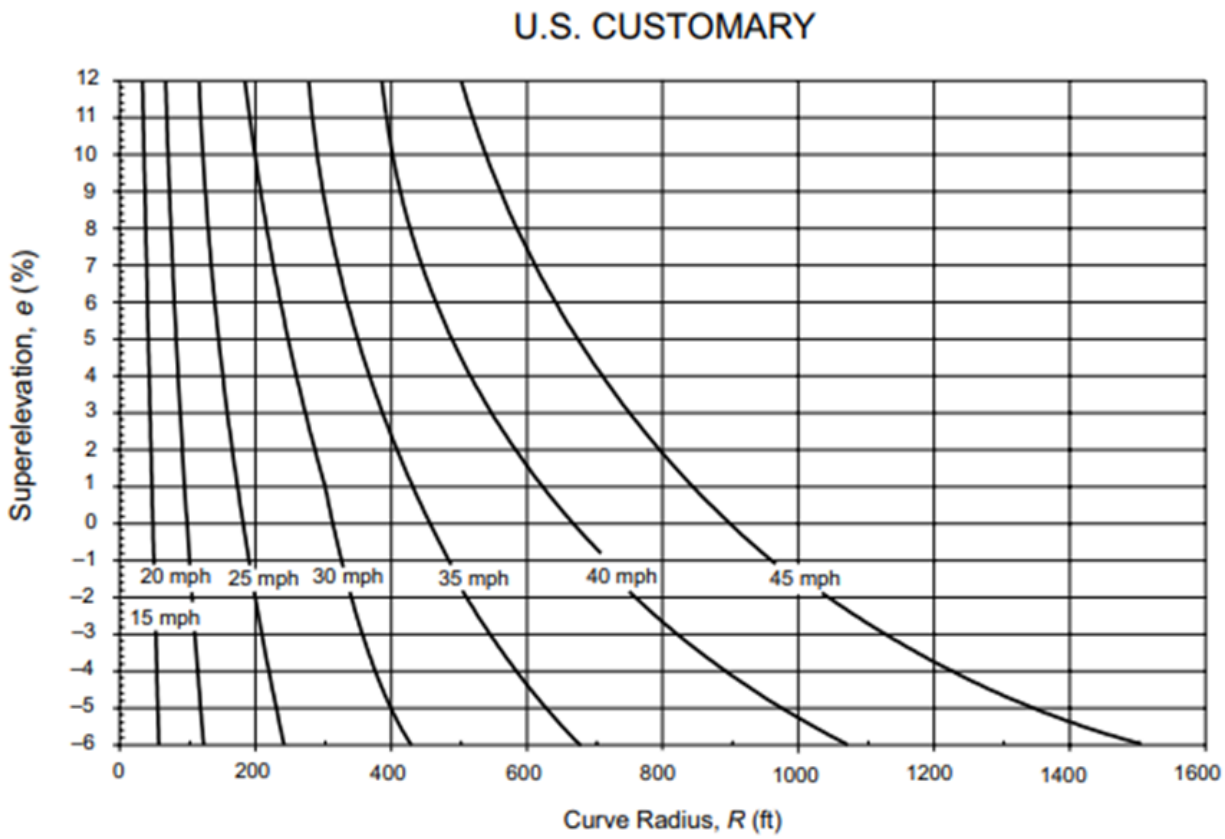
3.1.4 Curves

Two 30-mph curves are needed to align the intersections on both ends of this new street. Section 3.3 in the AASHTO Green Book was referenced for the design criteria of the horizontal curves. The figures below are from Section 3.3 of the Green Book and provide the equations and tables used to calculate the minimum radius for the 30-mph curves. A superelevation value of e = 0.05 was used with the side frictional force value of 0.22 found in the table below to calculate the minimum radius of 223 feet. The full calculation is provided in Appendix D.

U.S. Customary	Metric
$R_{min} = \frac{V^2}{15(0.01e_{max} + f_{max})}$	$R_{min} = \frac{V^2}{127(0.01e_{max} + f_{max})}$

(3-8)





Note: Negative superelevation values beyond –2.0 percent should be used for unpaved surfaces such as gravel, crushed stone, and earth. However, areas with intense rainfall may use normal cross slopes of –2.5 percent on paved surfaces.

3.1.5 Sidewalks, Curbs, and Gutters

Per Hermiston Required Specifications Figure ST04, the sidewalks will be designed with minimum 4-foot width. There will be an infiltration swale within the setback from the curb. The minimum thickness of the sidewalk is 4 inches. There will be a maximum 2% slope for runoff.

A standard curb and infiltration swale design will be utilized for this design. Per drawing ST04 of Hermiston Required Specifications, the combined curb and gutter width is 2 feet with a curb height of 6 inches and curb depth of 7 inches.

Please refer to sheet 3 of the attached set of drawings for this project for design specifications and dimensions of sidewalks, gutters, and infiltration swale. These drawings can be found in Appendix C.

3.1.6 Infiltration Swales

Per Hermiston Required Specifications drawing ST12, Infiltration Swale Option 1, design specifications for the infiltration swale include a 3:1 slope to collect runoff. The top layer of the infiltration swale will be 4 inches of native vegetation with native soil beneath.

3.1.7 Crosswalks and Curb Ramps

Crosswalks are located at all intersections within the project. The intersection at Highway 395 will have three crosswalks on the north, south, and east approaches. There will be no crosswalk on the west approach,

which is a private driveway owned and maintained by the property owner. At both intersections with NE North Street and NE 2nd Street there will be crosswalks on the north, east, and west approaches to the intersections. At the intersection of Aspen Drive and NE 4th Street, there will be crosswalks at all approaches to the intersection. No mid-block crossings will be incorporated into the design.

Crosswalk markings are also expected in all intersections to provide safety for the crossing pedestrians. Per AASHTO, "Curb ramps must be provided at all marked and unmarked crosswalks to accommodate persons with disabilities".

3.1.8 Signage

According to the Sign Design Standard of ODOT, the priority for sign placement are regulatory, warning, and guide signs. Many of the regulatory signs are placed in critical locations, per MUTCD they should be placed as close as possible to where the speed changes are. Stop signs, symbol signs, or any other warning signs have also had the next highest priority in location placement. After that, the guide sign can be considered. Below are the roadway signs that we are expecting when the construction has been completed:

- Regulatory sign

- Warning signs

- Guide Sign
  Street Name - NE Aspen Drive

3.2 CODES/STANDARDS/ SPECIFICATIONS

The following design specifications were referenced for this project.

3.3.1

Hermiston: City of Hermiston Design Specifications and Standards, November 2021

3.3.2

ODOT: 2012 Highway Design Manual

3.3.3

AASHTO: The Green Book; A Policy of Geometric Design of Highways and Streets, 7th Edition, 2018

3.3 CALCULATIONS

All calculations for design and cost can be found in Appendix D.

3.4 CONSTRUCTION COST ESTIMATE

The cost for bid items is $1,682,000.17, the cost for anticipated items is $227,787.02, and the contingency is $58,870 for a total of $1,968,657 total construction cost. With fees, right-of-way purchases, and additional contingency the total comes to $5,241,017. Please refer to Appendix Z for the itemized construction cost estimate.

3.5 CONSTRUCTION SCHEDULE

With a default start date of July 1st, the expected completion date would be the 7th of November. This is a total of 129 days to complete the construction portion of this project. The anticipated construction schedule is located in Appendix B.

4.0 Regulatory Compliance and Permitting

This section details the governing entities that hold jurisdiction over public roadways in this region. Permitting requirements for each entity pertaining to this project will be provided.

4.1 HERMISTON: CITY OF HERMISTON DESIGN SPECIFICATIONS AND STANDARDS, NOVEMBER 2021

No permits will be needed for the city-owned right-of-way.

4.2 OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT holds jurisdiction over changes made to State Highway 395, and will have final approval to the design, implementation, and maintenance of the new intersection with Highway 395. Per ORS 374.305(I), any person or entity wanting to construct a new approach or change an existing one must obtain written permission from ODOT. Form 734-2680 is the application for a new state highway approach. This application would be completed and submitted by the City of Hermiston for review by ODOT. Hermiston is in the region overseen by the Pendleton ODOT office. In the Pendleton ODOT office Tom Lapp reviews requests for and issues all permits in this region.

4.3 UMATILLA COUNTY

This project does not involve work on any county roads. As a result, no permits will be required from Umatilla County.

5.0 Conclusion

The design that the team proposed is a new street layout connecting Highway 395 to NE 4th Street. The City of Hermiston is experiencing significant development, which is expected to cause an increase in population. With more people, one can expect more vehicles leading to more traffic. This design aims to create a new road that would decrease congestion on Highway 395, improve access to businesses for pedestrians, and improve overall safety.

5.1 BENEFITS

The benefit of this project is the decrease in traffic volumes along Highway 395 and NE 4th Street. Fewer cars piling up will lead to less congestion and allow for better traffic flow on Highway 395. Another benefit is the increase in safety for both drivers and pedestrians. After completing this project, there will be more opportunities for food carts and a possible park for families to enjoy time together.

5.2 LIMITATIONS

The area where the new street layout is being proposed has high groundwater. Having high groundwater limits the draining options and only allows for bioswales. There are two private properties that the layout is cutting through, and the owners have a rough history. Acquiring the right-of-way necessary may prove to be complicated. The last known limitation is time. The proposed design will require the most time and effort out of every alternative. This is due to all of the excavation required, purchase of right-of-way, the building of a feasible draining system, clearing of all of the grub, and the construction of the new layout.

5.3 POSSIBLE IMPROVEMENTS

With this new layout comes new sidewalk and curb returns. Each corner will require a new ADA compliant ramp so everyone can use the new sidewalk. There is also the possibility of constructing a left-turning lane with a left turn signal. The left-turn lane would prevent cars from having to stop for each other and improve the flow of traffic. The street would only need this addition at the west entrance to get onto Highway 395. Another possible improvement would be the addition of bike lanes, which would both encourage the usage of bikes and make biking an overall safer and less stressful experience.

5.4 RECOMMENDED NEXT STEPS

Some recommended steps would be to purchase the privately-owned property. Once this property is acquired, the City can buy topographic surveying so designers can get started on creating vertical and horizontal alignments. A step that engineers may consider would be performing a traffic volume study to determine if the layout would require a left-turning lane or bike lanes. Other measures include having a professional engineer approve the 30% design and moving on to the 60% design process.

References

Will Woods, WW. Lily Nguyen, LN. Rich Crossler-Laird, RC. Christopher Henson, CH. Aaron Myton, AM. Dave Warrick, DW. (2012). "Highway Design Manual." Design controls and criteria,1.4.2.10, 1-19/1-20/1-21/1-22. <https://www.oregon.gov/odot/Engineering/Pages/Hwy-Design-Manual.aspx>

"Hermiston design standards specifications and plans." (2021). Hermiston, OR, <https://www.hermiston.or.us/commdev/page/hermiston-design-standards-specifications-and-p lans> .

For ASCE Citation Reference and format please refer to <https://www.canterbury.ac.nz/library/support/citations-and-referencing/asce-citation-style/>

Transportation Research Board. (2012). Chapter 8: Intersections. In Highway Design 2012 (pp. 8–39-8–39). essay.

Well designed right turn slip lanes. (n.d.). Retrieved March 5, 2022, from https://safety.fhwa.dot.gov/saferjourney1/Library/countermeasures/15.htm

Oregon Department of Transportation Projects. Oregon Department of Transportation : Oregon Department of Transportation Projects : Projects : State of Oregon. (n.d.). Retrieved June 3, 2022, from https://www.oregon.gov/ODOT/Projects/Pages/default.aspx

Figure 1: Digitally altered image of Hermiston Oregon study area. (n.d.). Google Earth. Figure 2: Digitally altered image of ODOT right-of-way improvements. (n.d.). Google Earth. Figure 3: Hermiston logistical map. (n.d.). Google Earth.

Figure 4: Project area land use. (n.d.). Google Earth.

"Climate - hermiston (Oregon)." (n.d.). Hermiston climate: weather by month, temperature, precipitation, when to go, <https://www.climatestotravel.com/climate/united-states/hermiston> (Mar. 13, 2022).

Appendix A

Construction Cost Estimate

Version: March 2022

CITY OF HERMISTON, OREGON
BUREAU OF TRANSPORTATION
ENGINEERS ESTIMATE FOR 2020 STANDARD CONSTRUCTION SPECIFICATIONS
2022.HERM **Date: MAY, 2022** **KA, GAPM**

PRELIMINARY ENGINEER'S ESTIMATE FOR NEW STREET LAYOUT

BID ITEMS

ITEM	ITEMS OF WORK AND MATERIALS	SPEC REFERENCE	UNIT	TOTAL QUANTITY	UNIT PRICES	TOTAL AMOUNT
1	MOBILIZATION	0210	LS	1	$ 132,813.37	$ 132,813.37
2	TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC	0221	LS	1	$ 66,406.69	$ 66,406.69
4	SEQUENTIAL ARROW SIGNS	0222	EACH	2	$ 1,788.00	$ 3,576.00
5	PORTABLE CHANGEABLE MESSAGE SIGNS	0222	EACH	2	$ 7,860.00	$ 15,720.00
6	TEMPORARY SIGNS	0222	SQFT	100.0	$ 19.11	$ 1,911.00
14	TEMPORARY BARRICADES, TYPE III	0224	EACH	6	$ 137.70	$ 826.20
31	CHANNELIZING DEVICES	0228	FOOT	50.0	$ 32.06	$ 1,603.00
39	EROSION CONTROL	0280	LS	1	$ 26,562.67	$ 26,562.67
44	INLET PROTECTION, TYPE 3	0280	EACH	1	$ 102.72	$ 102.72
45	POLLUTION CONTROL PLAN	0290	LS	1	$ 1,642.67	$ 1,642.67
51	CONSTRUCTION SURVEY WORK	0305	LS	1	$ 19,922.01	$ 19,922.01
61	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	0310	LS	1	$ 53,125.35	$ 53,125.35
63	CLEARING AND GRUBBING	0320	LS	1	$ 53,125.35	$ 53,125.35
66	GENERAL EXCAVATION	0330	CUYD	2,810.2	$ 68.17	$ 191,571.33
68	12 INCH SUBGRADE STABILIZATION	0331	SQYD	875.0	$ 57.20	$ 50,050.00
72	SUBGRADE GEOTEXTILE	0350	SQYD	5,833.0	$ 1.40	$ 8,166.20
143	AGGREGATE BASE, 8 INCHES THICK	0640	SQYD	5,833.0	$ 23.67	$ 138,067.11
148	LEVEL 3, 1/2 INCH ACP MIXTURE WITH PG 70-22 ASPHALT	0744	TON	1,021.00	$ 181.00	$ 184,801.00
164	CONCRETE CURBS, CURB AND GUTTER	0759	FOOT	4,250.0	$ 85.67	$ 364,097.50
171	CONCRETE WALKS (INCLUDES AGGREGATE BASE)	0759	SQFT	17,000.0	$ 11.50	$ 195,500.00
179	EXTRA FOR NEW CURB RAMPS	0759	EACH	22	$ 505.00	$ 11,110.00
180	TRUNCATED DOMES ON NEW SURFACES	0759	SQFT	220.0	$ 40.00	$ 8,800.00
223	PERMANENT SURFACE MOUNTED FLEXIBLE SIGNS, ONE-SIDED	0935	EACH	4	$ 625.00	$ 2,500.00
233	nb	0990	LS*	1	$ 150,000.00	$ 150,000.00
TOTAL BID ITEMS						$ 1,682,000.17

ANTICIPATED ITEMS

TED	ITEMS OF WORK AND MATERIALS	SPEC REFERENCE	UNIT	TOTAL QUANTITY	UNIT PRICE	TOTAL AMOUNT
1	RIGHT OF WAY MONUMENTATION (TBD)		LS	1	$ 20,000.00	$ 20,000.00
2	RELOCATE WATER FACILITIES - FIRE HYDRANT		EACH	1	$ 25,745.00	$ 25,745.00
3	RELOCATE WATER FACILITIES - METER		EACH	1	$ 7,160.00	$ 7,160.00
17	TESTING CONTAMINATED MEDIA		LS	1	$ 5,000.00	$ 5,000.00
19	BOLI FEE PAYMENT		LS	1	$ 1,682.00	$ 1,682.00
20	CONTRACT CONTINGENCY		LS	1	$ 168,200.02	$ 168,200.02
TOTAL ANTICIPATED ITEMS						$ 227,787.02

ITEM	ITEMS OF WORK AND MATERIALS	SPEC REFERENCE	UNIT	TOTAL QUANTITY	UNIT PRICES	TOTAL AMOUNT

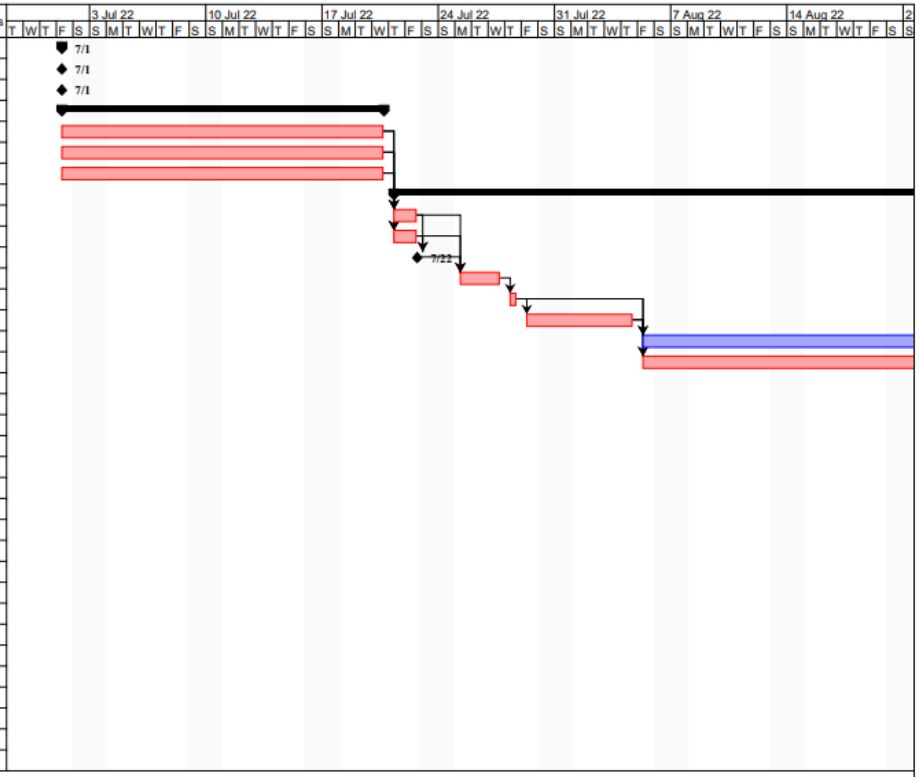
SCHEDULE SUMMARY

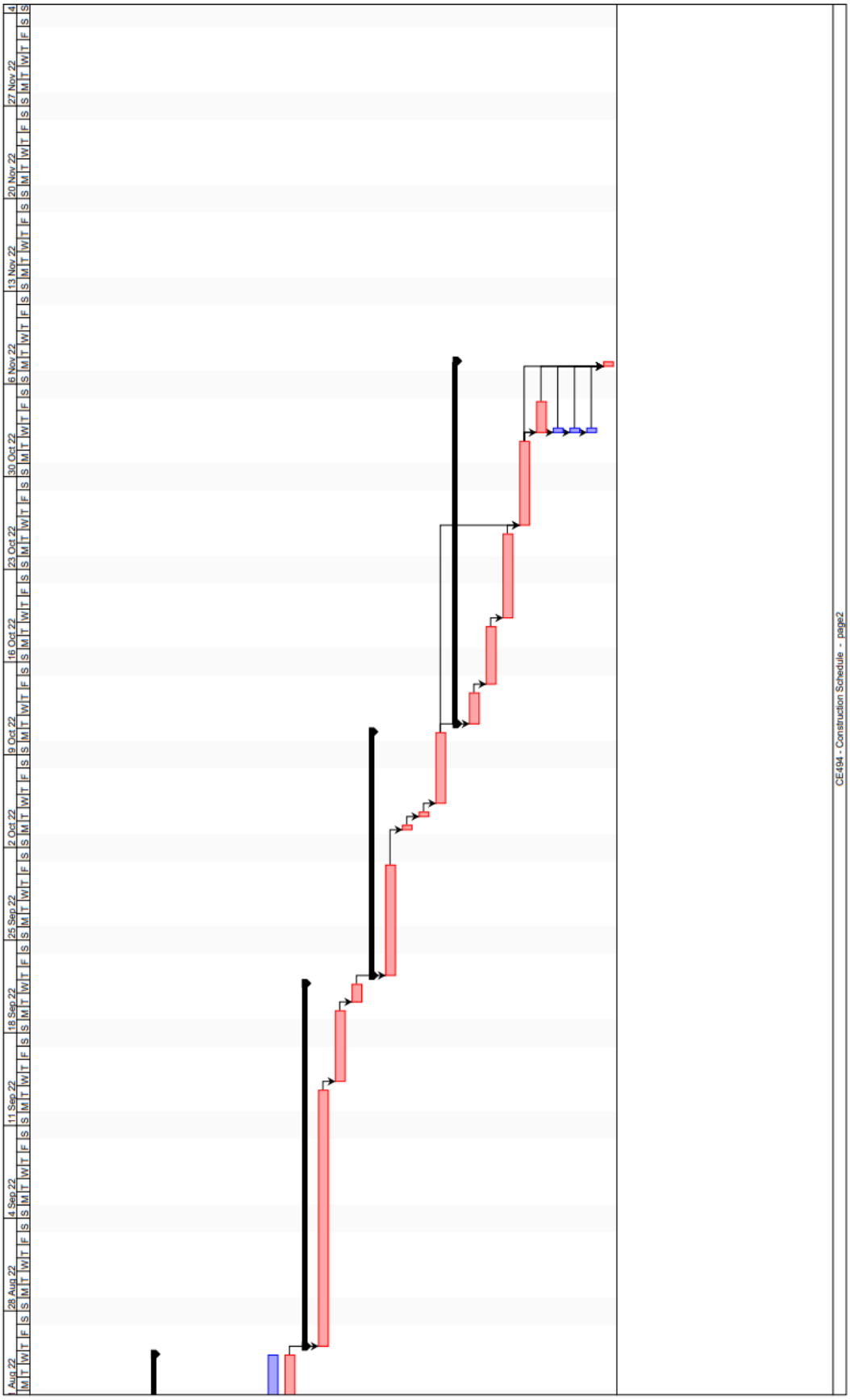
BID ITEMS				$ 1,682,000
CONSTRUCTION CONTINGENCY		4%	of Bid Items*	$ 58,870
SUBTOTAL				$ 1,740,870
ANTICIPATED ITEMS				$ 227,787
TOTAL CONSTRUCTION				**$ 1,968,657**
PROJECT MANAGEMENT		5%	of Bid Items	$ 84,100
DESIGN ENGINEERING		25%	of Bid Items	$ 420,500
CONSTRUCTION MANAGEMENT		15%	of Bid Items	$ 252,300
SUBTOTAL				$ 756,900
PROJECT ENGINEERING & MANAGEMENT OVERHEAD		74.97%	of PM, Eng., and CM	$ 567,448
TOTAL PROJECT ENGINEERING & MANAGEMENT				**$ 1,324,348**
RIGHT-OF-WAY LAND, IMPROVEMENTS, AND DAMAGES				$ 200,000
RIGHT-OF-WAY APPRAISAL, TITLE INSURANCE, AND NEGOTIATION				$ -
RIGHT-OF-WAY CONTINGENCY		20%	of Land, Improve, and Damages	$ 40,000
TOTAL PROJECT RIGHT-OF-WAY				**$ 240,000**
	Years	Inflation		
INFLATION RATE ON CONSTRUCTION CONTRACT	5	5.1%	of Construction	$ 555,891
INFLATION RATE ON PERSONNEL COSTS	5	2.3%	of Eng. & Mgmt.	$ 159,469
ALLOWANCE FOR DESIGN REFINEMENT		20%	of Const, Eng. & Mgmt., and Inflation	$ 801,673
TOTAL INFLATION AND ALLOWANCE FOR DESIGN REFINEMENT				**$ 1,517,033**
PROJECT ESTIMATE				**$ 5,050,038**

Appendix B

Construction Schedule

		Name	Duration	Start	Finish	Total Slack	Predecessors
1		**Milestone**	**0 days**	**7/1/22 8:00 AM**	**7/1/22 8:00 AM**	**92 days**	
2		PSU- HERM, Design Report	0 days	7/1/22 8:00 AM	7/1/22 8:00 AM	92 days	
3		PSU- HERM, Drawing Sets	0 days	7/1/22 8:00 AM	7/1/22 8:00 AM	92 days	
4		**Project Meetings**	**14 days**	**7/1/22 8:00 AM**	**7/20/22 5:00 PM**	**0 days**	
5		Project Kick-off Meeting	14 days	7/1/22 8:00 AM	7/20/22 5:00 PM	0 days	
6		Project Design Report Review Session	14 days	7/1/22 8:00 AM	7/20/22 5:00 PM	0 days	
7		Drawing Sets Review Session	14 days	7/1/22 8:00 AM	7/20/22 5:00 PM	0 days	
8		**Earthwork**	**25 days?**	**7/21/22 8:00 AM**	**8/24/22 5:00 PM**	**53 days**	
9		Topographic Survey	2 days	7/21/22 8:00 AM	7/22/22 5:00 PM	0 days	7;6;5
10		Field Utility Survey	2 days	7/21/22 8:00 AM	7/22/22 5:00 PM	0 days	7;6;5
11		Call In Locates	0 days	7/22/22 5:00 PM	7/22/22 5:00 PM	0 days	10;9
12		Silt Fence / Construction Entrance	3 days	7/25/22 8:00 AM	7/27/22 5:00 PM	0 days	11;10;9
13		Cleanup Grub Mowing	1 day?	7/28/22 8:00 AM	7/28/22 5:00 PM	0 days	12
14		Road Strip and Haul Out	5 days	7/29/22 8:00 AM	8/4/22 5:00 PM	0 days	13
15		Excavation Haul Off	14 days	8/5/22 8:00 AM	8/24/22 5:00 PM	53 days	14;13
16		General Excavation to Onsite Fil	14 days	8/5/22 8:00 AM	8/24/22 5:00 PM	0 days	14;13
17		**Sewer**	**20 days**	**8/25/22 8:00 AM**	**9/21/22 5:00 PM**	**0 days**	
18		Sewer Main and Structures Installation	14 days	8/25/22 8:00 AM	9/13/22 5:00 PM	0 days	16
19		Sewer Laterals	4 days	9/14/22 8:00 AM	9/19/22 5:00 PM	0 days	18
20		Sewer Testing	2 days	9/20/22 8:00 AM	9/21/22 5:00 PM	0 days	19
21		**Storm Water**	**13 days?**	**9/22/22 8:00 AM**	**10/10/22 5:00 PM**	**0 days**	
22		Water Main Installation	7 days	9/22/22 8:00 AM	9/30/22 5:00 PM	0 days	20
23		Hydrant Assemblies Installation	1 day?	10/3/22 8:00 AM	10/3/22 5:00 PM	0 days	22
24		Thrust Blocking Installation	1 day?	10/4/22 8:00 AM	10/4/22 5:00 PM	0 days	23
25		Testing and Tie Ins	4 days	10/5/22 8:00 AM	10/10/22 5:00 PM	0 days	24
26		**Public Streets**	**20 days?**	**10/11/22 8:00 AM**	**11/7/22 5:00 PM**	**0 days**	
27		Dry Utilities Crossing	3 days	10/11/22 8:00 AM	10/13/22 5:00 PM	0 days	25
28		Subgrade Road	3 days	10/14/22 8:00 AM	10/18/22 5:00 PM	0 days	27
29		Placement of Base and Top Rock	5 days	10/19/22 8:00 AM	10/25/22 5:00 PM	0 days	28
30		Asphalt Final Grade	5 days	10/26/22 8:00 AM	11/1/22 5:00 PM	0 days	29;25
31		Pavement Installation	3 days	11/2/22 8:00 AM	11/4/22 5:00 PM	0 days	30
32		Road Markings	1 day?	11/2/22 8:00 AM	11/2/22 5:00 PM	2 days	30
33		Reflectors Installation	1 day?	11/2/22 8:00 AM	11/2/22 5:00 PM	2 days	30
34		Roadway Signs Installations	1 day?	11/2/22 8:00 AM	11/2/22 5:00 PM	2 days	30
35		Vegetation Planting	1 day	11/7/22 8:00 AM	11/7/22 5:00 PM	0 days	34;33;32;...

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25 Sep 22
2 Oct 22
9 Oct 22
16 Oct 22
23 Oct 22
30 Oct 22
6 Nov 22
13 Nov 22
20 Nov 22
27 Nov 22
CE494 - Construction Schedule - page2

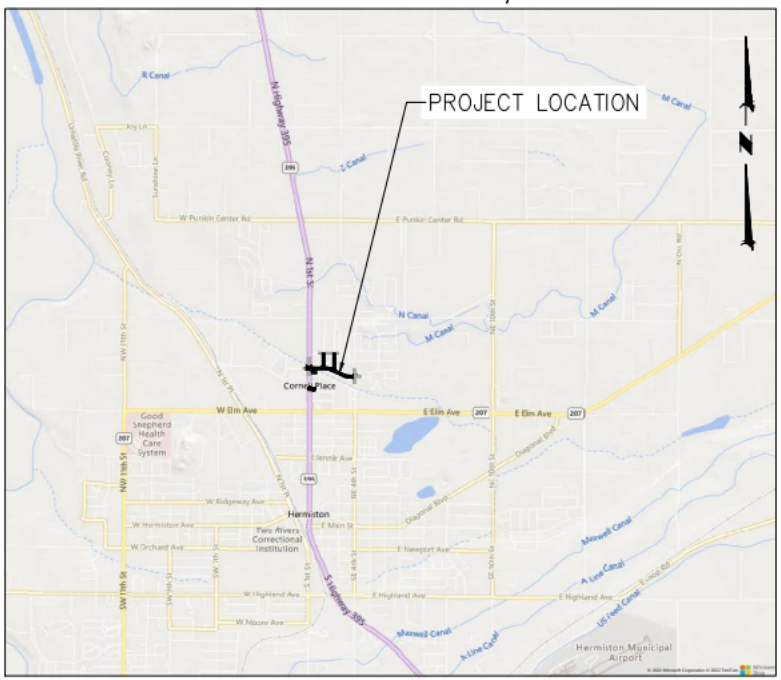
Appendix C

Drawings

CITY OF HERMISTON

NORTH HERMISTON LOCAL CIRCULATION PLAN

PSU CAPSTONE PROJECT 2022



VICINITY MAP

INDEX

CITY OF HERMISTON STD. DRAWINGS

1. MOUNTABLE CURB AND GUTTER ST01
2. SIDEWALK DETAILS ST04
3. URBAN LOCAL STREET (W/ SWALE) ST12

CLIENTS

Byron Smith
Clinton Spencer

PSU STUDENTS
[2022.HERM.01]

Evin Sam
Gee Ann Miranda
Omar Orozco
Arthur Siebenthaler
Khaled Alghanim

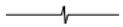
DEMOLISH

STOP SIGN

TRAFFIC LIGHT

NORTH ARROW

BREAK LINES



CONCRETE

AGGREGATE

ASPHALT

EARTH

TOP SOIL

LAWN GRASS OR CITY APPROVED VEGETATION

BIOSWALES

GUTTER

ROAD OUTLINE

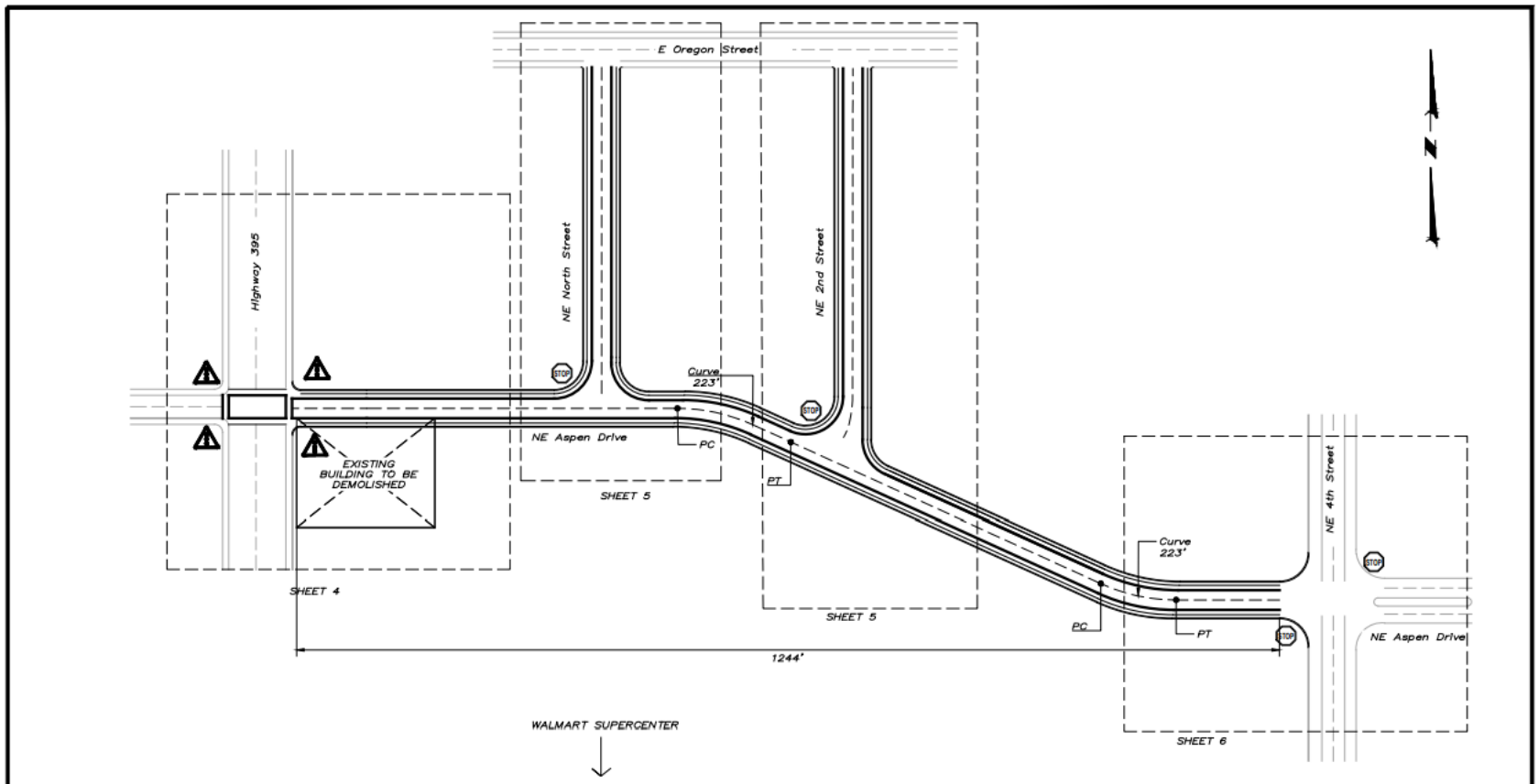
ROAD STRIPE

SIDEWALK

REVISION NO: 1	BY: GAPM & KA	DATE: 08.27.22		DO NOT SCALE THIS DRAWING FOLLOW DIMENSIONS. INDICATED SCALES CORRECT ONLY FOR FULL SIZE SHEET (22"X34")	CITY OF HERMISTON North Hermiston Local Circulation Plan
DESIGNED BY: KA			JOB NUMBER: –	DATE: –	SHEET: 1
DRAWN BY: KA			ACAD FILE: –		
REVIEWED BY: GAPM			COPYRIGHT 2022 BY PORTLAND STATE UNIVERSTY		LEGEND

HERM_FINALREV.DWG

PLOT DATE: 08/27/2033 PLOT TIME: 10:00PM USER: GAPM



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DESIGNED BY KA & GAPM		JOB NUMBER –	DATE –
DRAWN BY KA		ACAD FILE –	
REVIEWED BY GAPM		COPYRIGHT 2022 BY PORTLAND STATE UNIVERSTY	

60' 30' 0 60' 120'
SCALE: 1" = 60'

DO NOT SCALE THIS DRAWING
FOLLOW DIMENSIONS. INDICATED
SCALES CORRECT ONLY FOR
FULL SIZE SHEET (22"X34")

HERMISTON OREGON

CITY OF HERMISTON
North Hermiston Local Circulation Plan

SHEET INDEX

SHEET 2

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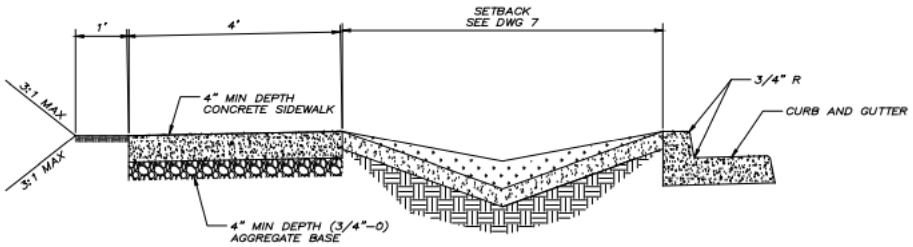
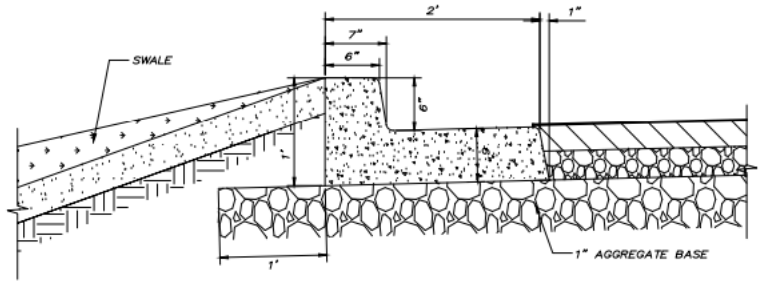


SIDEWALK SECTION WITH SETBACK

SCALE: 1" = 1'-0"



INFILTRATION SWALE OPTION 1

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

REVISION NO. 1	BY: GAPM	DATE: 05.27.22	
DESIGNED BY: GAPM			
DRAWN BY: GAPM			
REVIEWED BY: KA & GAPM			

JOB NUMBER: — DATE: —

XCAD FILE: —

DO NOT SCALE THIS DRAWING
FOLLOW DIMENSIONS. INDICATED
SCALES CORRECT ONLY FOR
FULL SIZE SHEET (22"X34")

CITY OF HERMISTON

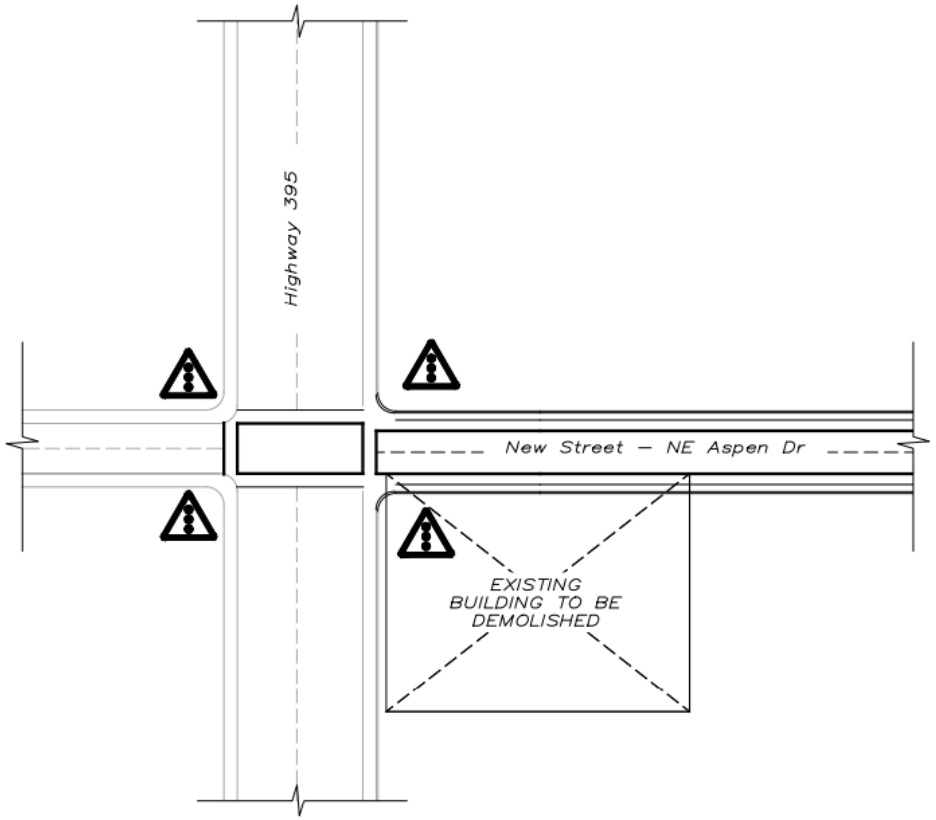
North Hermiston Local Circulation Plan

SIDEWALK AND GUTTER DETAILS

SHEET 3

HERM_FINALRCV.DWG

PLOT DATE: 05/27/2022 PLOT TIME: 10:00PM USER: GAPM



HIGHWAY 395 & NE ASPEN DR PLAN

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DESIGNED BY: KA & GAPM		JOB NUMBER: –	DATE: –
DRAWN BY: KA		ACAD FILE: –	
REVIEWED BY: KA			

30' 15' 0 30' 60'
SCALE: 1" = 30'

DO NOT SCALE THIS DRAWING FOLLOW DIMENSIONS. INDICATED SCALES CORRECT ONLY FOR FULL SIZE SHEET (22"X34")

HERMISTON OREGON

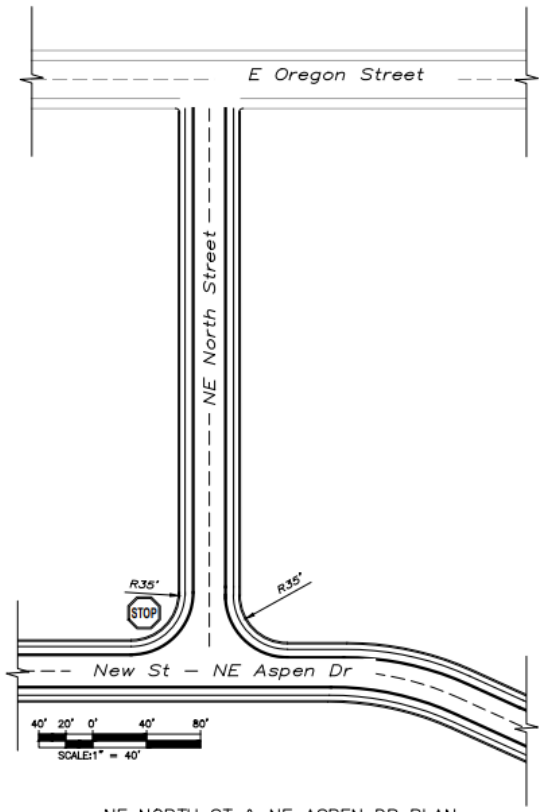
CITY OF HERMISTON
North Hermiston Local Circulation Plan

HIGHWAY 395 ST & NE ASPEN DR PLAN

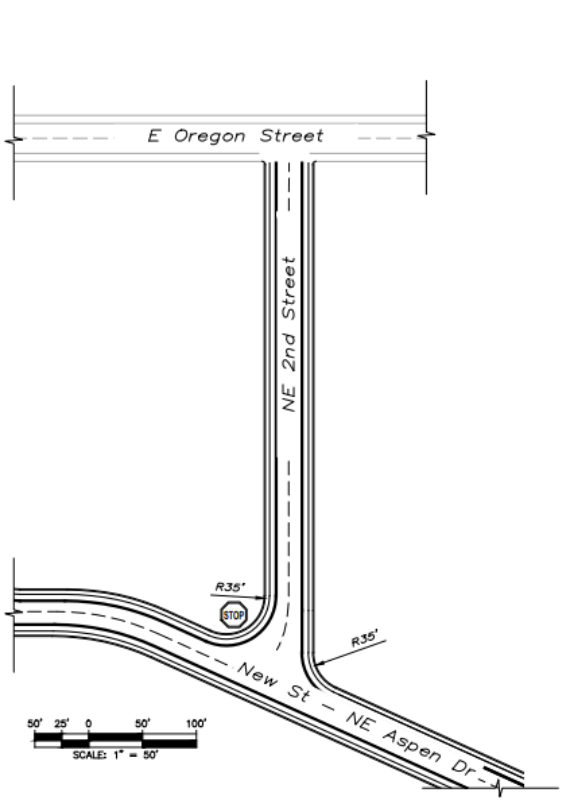
SHEET 4

HERM_FINALREV – EXTEDLDWG

PLOT DATE: 05/27/2022 PLOT TIME: 10:00PM USER: GAPM



NE NORTH ST & NE ASPEN DR PLAN



NE 2ND ST & NE ASPEN DR PLAN

REVISION NO: 7	BY: KA & GAPM	DATE: 06.10.22	
DESIGNED BY: KA & GAPM		JOB NUMBER: –	DATE: –
DRAWN BY: KA		ACAD FILE: –	
REVIEWED BY: KA		COPYRIGHT 2022 BY PORTLAND STATE UNIVERSTY	

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CITY OF HERMISTON

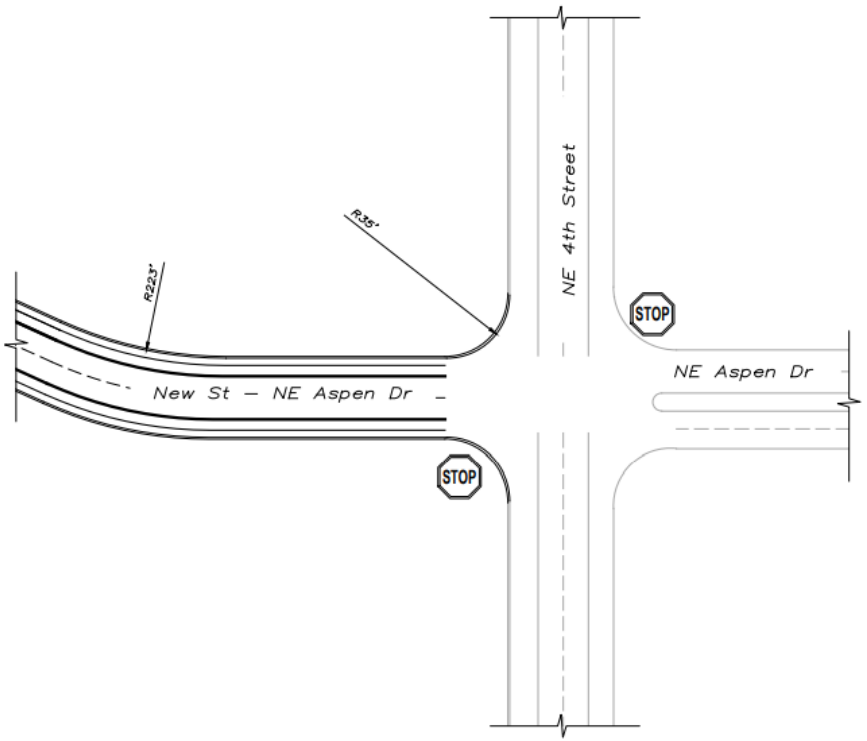
North Hermiston Local Circulation Plan

NE STREETS & NE ASPEN DR PLAN

SHEET 5

HERM_FINALREV – COPY.DWG

PLOT DATE: 05/27/2022 PLOT TIME: 10:00PM USER: GAPM



REVISION NO. 7	BY KA & GAPM	DATE 05.19.22	
DESIGNED BY KA & GAPM			
DRAWN BY KA			
REVIEWED BY KA			

30' 15' 0 30' 60'

SCALE: 1" = 30'

JOB NUMBER – DATE –

ACAD FILE –

DO NOT SCALE THIS DRAWING FOLLOW DIMENSIONS. INDICATED SCALES CORRECT ONLY FOR FULL SIZE SHEET (22"X34")

HERMISTON OREGON

CITY OF HERMISTON

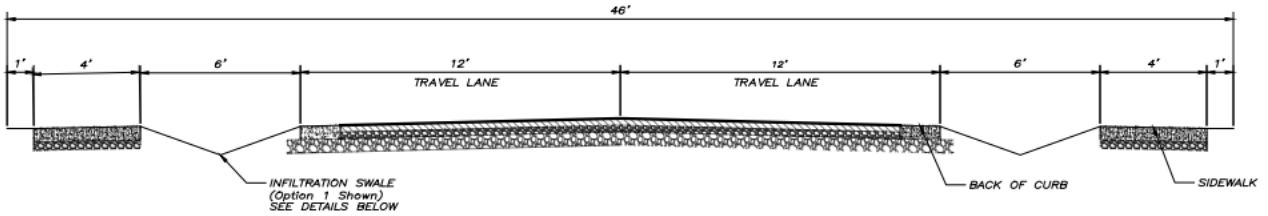
North Hermiston Local Circulation Plan

NE 4th St & NE ASPEN DR PLAN

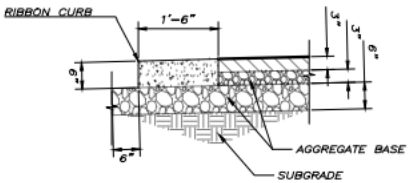
SHEET 6

HERM_FINALREV2.DWG

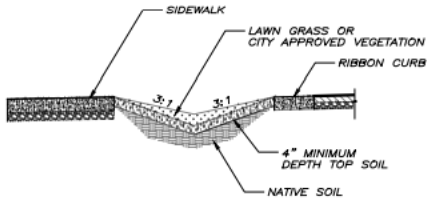
PLOT DATE: 05/27/2022 PLOT TIME: 10:00PM USER: GAPM



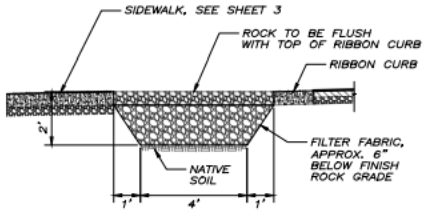
URBAN STREET LOCAL CROSS SECTION



PAVEMENT SECTION
SCALE: 1" = 1'-0"



INFILTRATION SWALE OPTION 1
SCALE: 1" = 2'-0"



INFILTRATION SWALE OPTION 2
SCALE: 1" = 2'-0"

			2' 1' 0' 2' 4' SCALE: 1" = 2'-0"	DO NOT SCALE THIS DRAWING FOLLOW DIMENSIONS. INDICATED SCALES CORRECT ONLY FOR FULL SIZE SHEET (22"X34")	CITY OF HERMISTON North Hermiston Local Circulation Plan URBAN LOCAL STREET CROSS SECTIONS WITH SWALE
REVISION NO: 1	BY: GAPM	DATE: 05.27.22			SHEET 7
DESIGNED BY: GAPM			JOB NUMBER: —	DATE: —	
DRAWN BY: GAPM			ACAD FILE: —		
REVIEWED BY: KA & GAPM			COPYRIGHT 2022 BY PORTLAND STATE UNIVERSTY		

HERM_FINALREV2.DWG

PLOT DATE: 05/27/2022 PLOT TIME: 10:00PM USER: GAPM

Appendix D

Calculations

Calculations for new street layout

Temporary Signs:
Cost: x * $19.11 = $1,911
x = Square footage of required space for signs

Channelizing Devices:
Cost: x * $32.06 = $1,603
x = Linear footage of space required

General Excavation:
Cost: x * $68.17 = $191,571.33
x = Cubic yardage of excavation

12 Inch Subgrade Stabilization:
Cost: x * $57.20 = $50,050.00
x = Square foot of subgrade required

Subgrade Geotextile:
Cost: x * $1.40 = $8,166.20
x = Square footage of geotextile required

Aggregate Base, 8 Inches Thick
Cost: x * $23.67 = $138,067.11
x = Square footage of aggregate base required

Level 3, ½ Inch ACP Mixture with PG 70-22 Asphalt
Cost: x * $181.0 = $184,801.00
x = Tonnage of mixture required

Concrete Curbs, Curb and Gutter
Cost: x * $85.67 = $364,097.50
x = Linear footage of space required

Concrete Walks
Cost: x * $11.50 = $195,500.00
x = Square footage of sidewalk required

Truncated Domes
Cost: x * $40.00 = $8,800
x = Square footage of domes required

Calculations for Horizontal Alignment Curve

V=30 miles per hour speed limit
Rate of superelevation (e) = 5%
Urban friction factor = 0.22
Radius= $V^2/[15(e+f)]$
Radius= $30^2/[15(0.05+0.22)]$
Radius= 223ft

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Megan Banks	SCYP Director, University of Oregon
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