CITY OF CACHE OKLAHOMA

ALTERNATIVE TRANSPORTATION MASTER PLAN

DATED: August 11, 2022

CITY OF CACHE

Table of Contents
City of Cache, Oklahoma
Alternate Transportation Master Plan

List of Appendices

Executive Summary

The City of Cache is working to improve its community by encouraging new residential development, commercial development and amenities for its citizens to use and enjoy. Members of the City Council and staff have worked closely with the Planning Commission, Chamber of Commerce and the Cache Economic Development Authority to coordinate these efforts into an effective tool promoting growth and advancement in the community.

One important facet of this overall effort is taking a hard look at transportation networks and modes of travel within the community. Southwest Oklahoma and its small towns and cities lend itself to travel primarily by automobile due to the great distances between communities, schools, places of employment, religious centers and homes. However, in more recent years communities are witnessing an increase in people employing other modes of travel such as walking and biking. The walking path at the City Park at the northeast corner of “H” Avenue and S. 8th Street is being continuously used by walkers and young bikers to enjoy a outdoor activity and exercise. Further, a person can seldom drive along U.S. Highway 62 between the cities of Lawton and Cache without seeing several bicyclists riding towards the Wichita Mountain Wildlife Refuge.

To provide additional opportunities for promotion of alternate means of transportation, the City Council elected to prepare this master planning document to form a framework for future alternative transportation development efforts. This master plan is a culmination of a planning effort where input was gathered from community leaders and residents alike to determine the wishes of the people.

Special thank you is extended to Mr. Paul Couture, City of Cache, and Mr. Alvin R. Jung, P.E. of Jung Engineering for their work on the project. Funding for this project was provided from a State Planning and Research (SPR) Transportation Mini Planning Grant issued by ODOT and administered by the Southwestern Regional Transportation Planning Organization (SORTPO).

I. Master Plan Purpose

This master planning effort was undertaken by the City of Cache to produce a document that will be used to guide future efforts in development of alternative transportation facilities for the community. It is important that the plan address connectivity of major trip generators such as Cache Public Schools, the City Park, Maloy Park, the downtown business district, a future east-side park and residential neighborhoods. Further, a few years ago the Oklahoma Department of Transportation (ODOT) created bike lanes on each side of S.H. 115 north of the city extending into the south entry of the Wichita Mountains Wildlife Refuge. A key ingredient of this master plan is to connect to those bike lanes to encourage bicyclists traveling from Lawton to the refuge to enter the City of Cache for a rest stop, lunch, quick snack, cool-down visit, etc. Likewise, the connection will provide a handy means for Cache citizens to travel to the refuge.

II. Project Planning Area

Location: The City of Cache, located within Comanche County, is situated roughly eight miles west of the western outskirts of the City of Lawton at the junction of U.S. Highway 62 and State Highway 115. Being so close to the major employers in Lawton; i.e., Fort Sill Fires Center of Excellence, Goodyear Tire & Rubber Company, Comanche County Memorial Hospital, Southwestern Hospital, Cameron University, Great Plains Technology Center, etc., Cache serves as a "bedroom community". Appendix "A" contains a map showing the general area.

The Cache Public Schools system serves the community and surrounding area with excellent educational opportunities for pre-school thru high school graduation with a typical total enrollment of 1850 students. The school has had an aggressive building program over the last few decades and has newer, modern classrooms and facilities throughout its campus.

Trip generators for alternate transportation opportunities consist of the school campus, City Park, Maloy Park, the future east-side park, downtown business district, residential neighborhoods, and probably most importantly, existing bike trails on either side of S.H. 115 north of U.S. Highway 62 leading into the Wichita Mountains Wildlife Refuge.

The Wichita Mountains Wildlife Refuge is a world-class federal installation that boasts being the home of indigenous bison, elk, deer, Texas longhorn cattle, and other wildlife. The nearly 60,000-acre property has numerous recreational activities that attract in excess of 2,000,000 visitors a year. The south entry to the refuge is a short three miles north of the north edge of the City of Cache. The refuge has a storied history being formed in 1901 as a forest preserve, six years before Oklahoma statehood. Bison, which once roamed across the plains country in the millions, were reintroduced in 1907 and Rocky Mountain elk were stocked the following year. Those herds have grown into the hundreds and are intensively managed by the Refuge staff.

Roads & Streets: Cache is bounded on the north by U.S. Highway 62, a four-lane divided highway that provides access across the state terminating at El Paso, TX at the

Mexican border and Niagara Falls, NY at the Canadian border. The community is also served by S.H. 115, a scenic two-lane undivided, north/south highway that begins at U.S. Highway 62 on the north side of the city and extends thru the Wichita Mountains Wildlife Refuge before terminating at Binger, OK. This highway offers some of the best scenic vistas southwest Oklahoma has to offer.

According to ODOT maps, all roads and streets in and around Cache are functionally classified as local except "H" Avenue located near the southern edge of town and S. 8th Street that bisects the town north/south, which are both classified as major collectors. "H" Avenue was the original routing of U.S. Highway 62 until the current alignment was constructed. S. 8th Street is the south extension of S.H. 115. ODOT's functional classification is included in Appendix "B".

Population: The City of Cache has enjoyed steady growth since its inception and appears to be poised for continued growth into the future. Table 1 shows the historic population of the City of Cache over the last five decades including the year 2020, based on the U.S. Census.

Table 1
Historic Population

Year	*City of Cache*
1980	1661
1990	2251
2000	2371
2010	2796
2020	2930

Environmental Considerations: Exact alignments of proposed alternate transportation routes have not been determined since the project is early in the planning phases. However, it is safe to determine that all of the routes will be located within currently dedicated and occupied street rights-of-way and easements. Since these strips of land where the proposed routing will be placed has previously been disturbed by development including building and street construction and installation of above-ground

and underground utilities, it is safe to conclude that no “new” or “previously undisturbed” land will be affected. Therefore, it should be possible to issue a Categorical Exclusion for construction of proposed projects.

Several documents are included in the appendix of this report showing that the project is benign and will have no negative environmental impacts. These documents include:

Appendix “C” - Custom Soil Resource Report for Comanche County, Oklahoma
Appendix “D” - FEMA Special Flood Hazard Areas (SFHA)
Appendix “E” - Sole Source Aquifers
Appendix “F” - Wilderness Areas

The National Resources Conservation Service (NRCS) soil report shows that the soils covering the project area include the Foard-Hinkle complex, Brico-Rock outcrop complex, Lawton loam, Ashport loan, Ashport-Oscar complex and Vernon-Knoco complex. Of these soils the Lawton loam, Ashport loam and Ashport-Oscar complex are identified as prime farmland. However, none of the land within the project area is being used for agricultural purposes and has been previously developed into an urban/suburban setting, and as such, the project will not take any of these soils out of agricultural production.

The FEMA Special Flood Hazard Area (SFHA) map shows that roughly 800 feet of the eastern end of the proposed Oak Avenue routing will be located within the SFHA. During design and construction of this proposed segment, special attention will need to be given to protect the proposed facilities from flood-related damages and to protect the floodplain from impacts due to placement of the proposed facilities. All other segments of the project will be located outside the SFHA.

The USEPA Sole Source Aquifer mapping tool shows that the nearest sole source aquifer to the project site is located east of the City of Sulphur, which is roughly ninety-five miles to the east of the project. At that distance, this project will have no negative impact on the aquifer.

There are two wilderness areas located on the Wichita Mountains Wildlife Refuge. The closest to the project site is the Charon Garden Wilderness Area which is roughly six miles from the southeast corner of the wilderness area to the north edge of the City of Cache. Therefore, no negative environmental impacts to the wilderness areas are anticipated.

According to quadrangle maps published by the United States Geological Survey (USGS), West Cache Creek, located in the western portion of Cache, is a “blue stream” and Crater Creek, located in the eastern portion of Cache, is also a “blue stream” which places them under possible jurisdiction of the United States Army Corps of Engineers (USACE) as “waters of the state”. However, the streams themselves are outside of the project area so the project will have no negative environmental impact on waters of the state.

According to the U.S. Fish & Wildlife Service (USFWS) Oklahoma On-Line Project Review process (iPaC), there are five threatened or endangered bird species that might frequent the project area; black-capped vireo, least tern, piping plover, red knot and whooping crane. However, since the proposed alternative transportation routes are all located on previously developed properties, it can be determined that the project will have “no effect” on those species.

III. Community Engagement

For a project of this nature it is critical to solicit input and support from community leaders and the general public to determine the “wishes of the people”. A concerted effort was made on this project to do that. Towards that end, two meetings were held with the City of Cache Planning and Zoning Commission. At its regularly scheduled meeting of June 28, 2002, Messrs. Paul Couture and Alvin Jung met with the commission to introduce the project and solicit input. It was decided at that meeting that a public hearing would be held by the commission at its July meeting inviting the general public for input.

Citizen Input: Prior to the July commission meeting, City of Cache staff mailed letters of explanation and blank maps of the community to every utility customer within the City. The letter introduced the project and requested that all interested parties sketch routings on the blank map showing where alternative transportation plan routing might be beneficial. Eight maps where returned, and these are included in Appendix “G”.

At the July 14, 2022, Planning Commission meeting roughly fifteen residents attended in addition to the commission members and City staff. Messrs. Couture and Jung led a discussion where the purposes of the project were outlined and public comment was encouraged. A lively debate ensued concerning details of the project, potential impacts on the community and proposed routings.

Cache Public Schools: It was determined early in the planning phase for the master plan that input from Cache Public Schools would be crucial. The school will be a major trip generator and will be the southern anchor for the entire system. Messrs. Couture and Jung met with Superintendent Chad Hance and Assistant Superintendent Tammie Reynolds on June 28, 2022. The superintendent and assistant superintendent were highly interested and very supportive of the project.

It was decided at that meeting that a pedestrian-controlled traffic signal on “H” Avenue would be a huge safety improvement for pedestrian traffic crossing the street. “H” Avenue is the major east/west street in the community carrying more traffic than most

other streets. ODOT reports the year 2020 average daily traffic counts on “H” Avenue as being 5,000. As a comparison, the 2020 average daily traffic counts on 8th Street near US Highway 62 is 6,400.

Currently, the school provides crossing guards when school is in session to help students cross the street. However, during non-school hours there is still significant pedestrian and bicycle crossings of the street without the protection of a crossing guard. Mr. Hance reported that even with the crossing guard, two pedestrians had been struck by vehicles in the last year while attempting the crossing. Fortunately, neither pedestrian suffered major injury. A copy of ODOT’s standard detail for traffic signal installations is included Appendix “H” showing what that signal might look like.

A review of potential locations for the traffic signal was made and it was determined that the best location would be at the existing striped crossing location west of the new gymnasium. Further, the school would be agreeable to have the south leg of the alternative transportation route cross school property west of the gymnasium between the traffic signal and “G” Avenue. A detailed agreement will need to be prepared between the City of Cache and Cache Public Schools to facilitate this routing. That effort will be undertaken during the project design phase.

ODOT: In an effort to gauge support from ODOT, Mr. Jung contacted Division 7 District Engineer, Mr. Jay Earp, on July 6, 2022. Mr. Earp was excited about the master planning effort and provided an email on that date expressing support. The bike lanes on either side of S.H. 115 north of U.S. Highway 62 have their southern end at the north side of the bridge over U.S. 62. To allow connection of the proposed alternate transportation plan routing from the north side of Cache to these existing bike lanes will require designating bike lanes over the U.S. 62 bridge. Messrs. Earp and Jung discussed this issue specifically and decided that a connection across the bridge would be allowable as long as requirements of the Federal Highway Administration’s (FHWA) “Manual on Uniform Traffic Control Devices” were met.

A very interesting development came out the conversation with Mr. Earp. He recounted how ODOT had prepared a very high-level analysis of bike path routing between the

City of Lawton and S.H. 115 north of Cache. Currently, there is a large volume of bicycle traffic that uses the shoulders along the north and south sides of U.S. Highway 62 to travel between Lawton and S.H. 115 and then north to the Wichita Mountains Wildlife Refuge. This routing is less than desirable since U.S. 62 has a marked speed limit of 70 miles per hour placing slow-moving bicycle traffic within a few feet of fast moving motorized vehicles. The proposed routing would encourage bicycle traffic to relocate one-half mile north along Rogers Lane. This alignment would be much safer and also more scenic. It would have the added benefit of extending and enhancing efforts by the City of Cache in providing alternative transportation opportunities. A map showing the routing is included in Appendix “I” to this report.

Comanche Tribe: During his discussions with Comanche Tribe officials, Mr. Couture was told that the tribe was considering reopening the Hummingbird Golf Course. Several years ago a private developer built Hummingbird Estates and an accompanying nine-hole golf course on the south side of “H” Avenue east of the Sonic Drive-In. The residential neighborhood was very successful but the golf course was closed after a few years. Since then the Comanche Tribe has acquired the golf course property. Mr. Couture discussed the possibility of extending the master plan to include a path around the outer edge of the golf course to provide enhanced recreational and exercise opportunities to the citizens of Cache. Tribal officials were very receptive to the idea, and it should be pursued if the golf course is reopened.

IV. Recommended Alternative Transportation Routing

Appendix “J” is the “Master Plan Map”, which shows potential project routing and phasing. This map is the culmination of community leader and citizen input and study from City staff. It will provide the framework from which future design decisions are made.

When each phase is designed there will be two options considered for the improvement. These options are shown Appendix “K” as Option A and Option B. Option A will be a less expensive option and will place the new paving near the outer edge of existing street right-of-way. As shown by the option sketches, the street right-of-way is typically sixty feet wide throughout the City leaving enough room for the existing street and proposed paving with an intervening grass median where local stormwater can be conveyed.

Option B envisions placing the new paving immediately adjacent to the existing street paving. Under this option, the street would be rebuilt and curbs added as part of the project which would allow the City to also address the less-than-adequate stormwater drainage situation along those streets. This option would be significantly more expensive but would be a huge improvement for the community along those streets so treated. Due to the proximity of the alternative transportation paving to vehicular traffic it is thought that a wider, ten-foot, section would be advisable.

Either option would be designed and constructed in accordance with the latest FHWA and ODOT guidelines and American with Disabilities Act (ADA) requirements. The new paving would provide the citizens of Cache expanded opportunities for multi-modal transportation that are currently hard to achieve with the motorized vehicle-centric approach to the current street layout.

One area that will require additional study is the proposed railroad crossing on S 6th Street. The existing street crosses the railroad tracks and the City will need to work with Stillwater Central Railroad to expand the crossing to include the proposed Phase 3 crossing.

V. Cost Estimates

It is anticipated that the bulk of the funding for actual construction of this project will be provided thru grants. Some possible fund sources are shown on the "Pedestrian and Bicycle Funding Opportunities" spreadsheet provided by the U.S. Department of Transportation, a copy of which is included in Appendix "L". It will likely be necessary to divide the project into phases. In order to easily estimate the potential cost of each phase, the construction cost of a "typical" block has been estimated for each option. Then, to estimate the cost of each phase, it was a simple matter to multiply the per-block cost by the number of blocks in a phase for a total phase cost. Anticipated engineering fees were added to each phase cost estimate in order to derive a total cost.

Construction costs were estimated based on prices bid in recent ODOT bid lettings for similar work. Recent surges in inflation and supply issues have dramatically affected construction costs. The estimates presented for these projects will need re-evaluation whenever the design of a proposed phase is undertaken.

A table is included in Appendix "M" showing the work items, quantities and unit costs of a "typical" block for each paving option. Table 2 shows the breakdown of anticipated phases along with a cost estimate for each paving option.

Table 2
Cost Estimates

Phase	*Alignment*	*Beginning Street*	*Ending Street*	*Option A Cost*	*Option B Cost*
1	S 3rd Street	"H" Avenue	"G" Avenue	$120,000	$120,000
2	"G" Avenue	S 6th Street	Deer Drive	$475,000	$1,000,000
3	S 6th Street	"G" Avenue	Railroad	$510,000	$1,140,000
4	S 6th Street	Railroad	U.S. 62	$850,000	$1,900,000
5	East Oak Ave	N 6th Street	Meadow Ln	$680,000	$1,520,000
6	S 4th Street	"H" Avenue	S 6th Street	$520,000	$1,100,000
			Totals	$3,155,000	$6,780,000

References

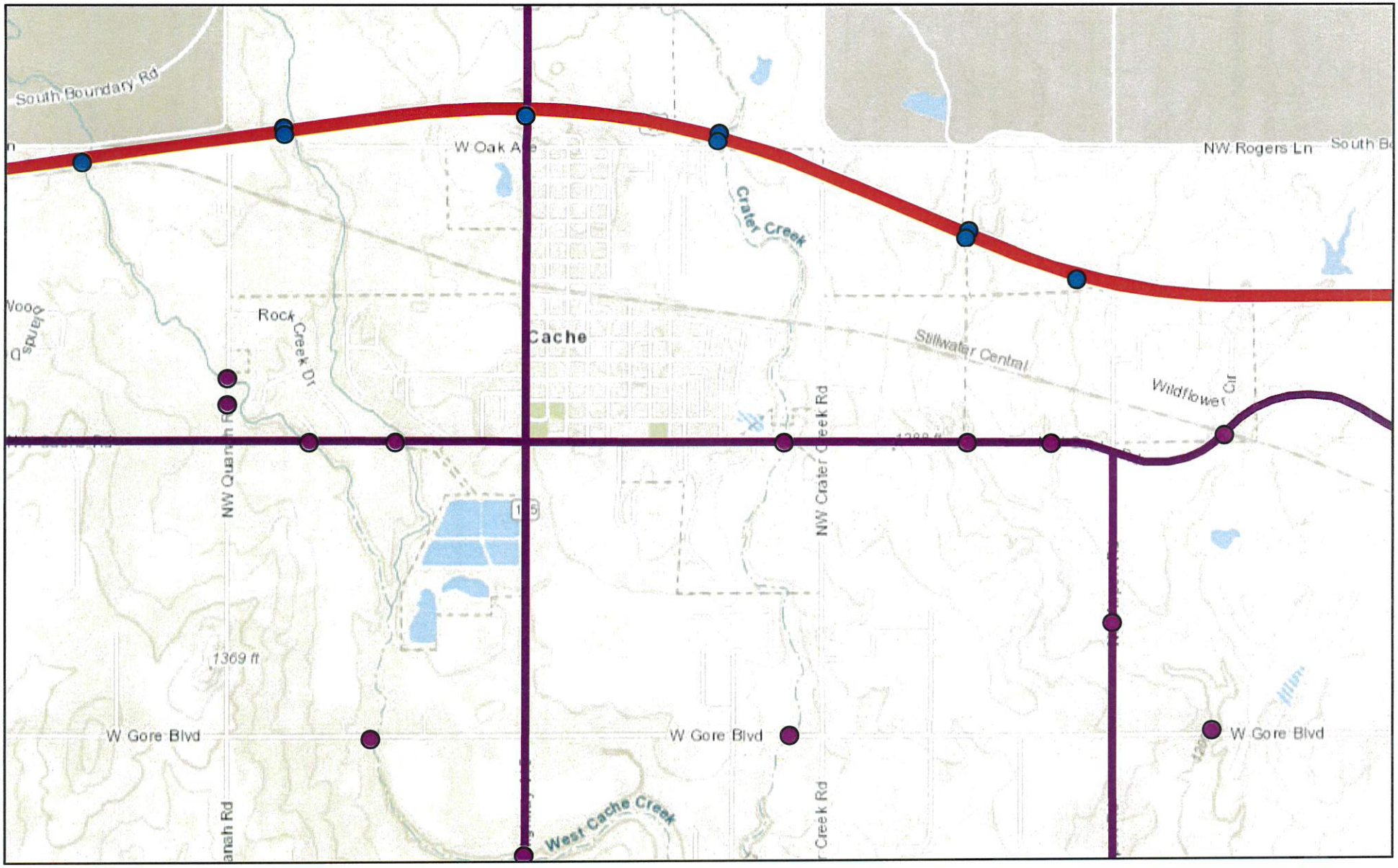
1) ODOT Master Roadway & Bridge Data Viewer, https://spotlight-okdot.hub.arcgis.com/apps/master-roadway-bridge-data-viewer/explore
2) NRCS Web Soil Survey, https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
3) FEMA Flood Map Service Center, https://msc.fema.gov/portal/search?AddressQuery=cache%2C%20ok#searchresultsanchor
4) EPA Sole Source Aquifers for Drinking Water, https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b
5) Wilderness Areas, https://wilderness.net/visit-wilderness/google-earth.php
6) Wichita Mountains Wildlife Refuge, https://www.fws.gov/refuge/wichita-mountains
7) U.S. Census Bureau Fact Finder, https://www.census.gov/library/visualizations/interactive/2020-population-and-housing-state-data.html
8) Pedestrian and Bicycle Funding Opportunities, U.S. Department of Transportation Transit, Highway, and Safety Funds, https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Appendices

City of Cache Alternative Transporation Master Plan
Area Map

Appendix "A"

ODOT Inventory GIS Data



8/3/2022, 11:25:25 AM

On-System Bridges & Culverts

Off-System Bridges & Culverts

Roadways

Principal Arterial - Other

Major Collector

County Boundaries

1:36,112

0 0.25 0.5 1 mi

0 0.4 0.8 1.6 km

Texas Parks & Wildlife, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, METI/NASA, EPA, USDA

Author: Oklahoma Department of Transportation

Appendix "B"

United States Department of Agriculture

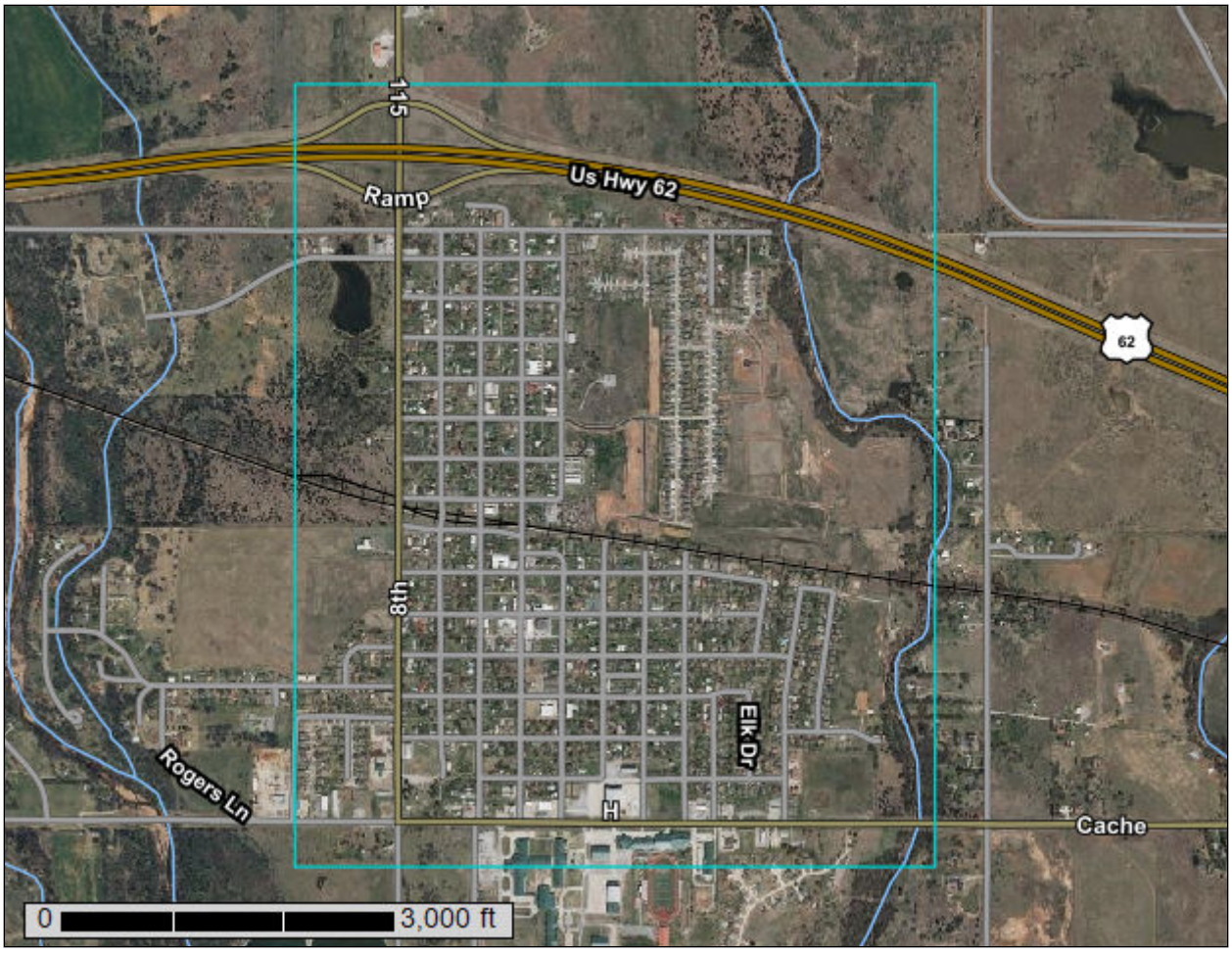
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Comanche County, Oklahoma

City of Cache Alternative Transportation Master Plan



August 3, 2022

Appendix "C"

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

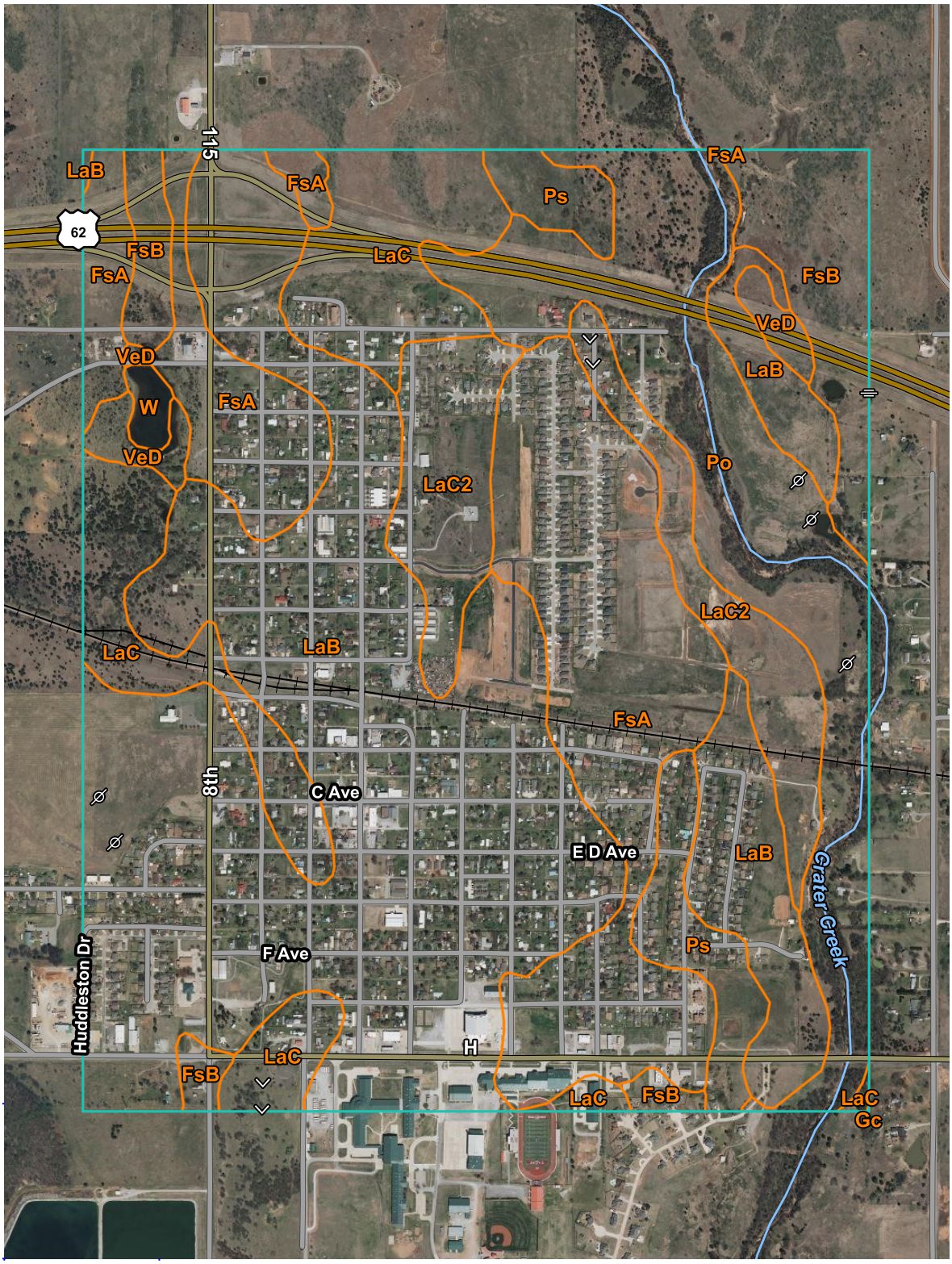
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

98° 38' 15" W
98° 36' 53" W
34° 38' 40" N
34° 37' 10" N



Map Scale: 1:13,600 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 200 400 800 1200

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Comanche County, Oklahoma
Survey Area Data: Version 18, Aug 27, 2021

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

Date(s) aerial images were photographed: Mar 27, 2021—Mar 28, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FsA	Foard-Hinkle complex, 0 to 1 percent slopes	169.8	18.3%
FsB	Foard-Hinkle complex, 1 to 3 percent slopes	52.5	5.7%
Gc	Brico-Rock outcrop complex, 5 to 40 percent slopes	0.0	0.0%
LaB	Lawton loam, 1 to 3 percent slopes	375.1	40.5%
LaC	Lawton loam, 3 to 5 percent slopes	92.2	10.0%
LaC2	Lawton loam, 3 to 5 percent slopes, eroded	67.8	7.3%
Po	Ashport loam, 0 to 1 percent slopes, occasionally flooded	121.4	13.1%
Ps	Ashport-Oscar complex, 0 to 1 percent slopes, occasionally flooded	32.2	3.5%
VeD	Vernon-Knoco complex, 3 to 12 percent slopes	11.5	1.2%
W	Water	3.9	0.4%
Totals for Area of Interest		**926.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Comanche County, Oklahoma

FsA—Foard-Hinkle complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2w5qh
Elevation: 1,000 to 2,000 feet
Mean annual precipitation: 22 to 32 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 185 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Foard and similar soils: 65 percent
Hinkle and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Foard

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Granitic clayey alluvium derived from granite over clayey alluvium derived from shale and siltstone

Typical profile

A - 0 to 9 inches: silt loam
Btss - 9 to 22 inches: silty clay
Btknss - 22 to 48 inches: silty clay loam
BCnss - 48 to 56 inches: silty clay loam
Cn - 56 to 66 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 25.0
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Ecological site: R078CY096TX - Clay Loam 23-30" PZ

Hydric soil rating: No

Description of Hinkle

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Saline clayey alluvium derived from shale and siltstone and/or residuum weathered from granite

Typical profile

Anp - 0 to 6 inches: silt loam
Btn - 6 to 16 inches: silty clay
Btnss - 16 to 33 inches: silty clay
Btknss - 33 to 60 inches: silty clay
C - 60 to 80 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 35.0
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Ecological site: R078CY091OK - Slickspot
Hydric soil rating: No

Minor Components

Hollister

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Tillman

Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Indiahoma

Percent of map unit: 1 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Roscoe

Percent of map unit: 1 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R080AY025OK - Depressional Upland
Hydric soil rating: No

FsB—Foard-Hinkle complex, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: dtp8
Elevation: 900 to 2,250 feet
Mean annual precipitation: 22 to 30 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 185 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Foard and similar soils: 70 percent
Hinkle and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Foard

Setting

Landform: Pediments on paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium derived from granite over residuum weathered from shale and siltstone

Typical profile

A - 0 to 9 inches: silt loam
Bt - 9 to 22 inches: clay
Btk - 22 to 48 inches: clay
BCk - 48 to 56 inches: clay
C - 56 to 80 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 25.0
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Description of Hinkle

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Saline clayey alluvium derived from sedimentary rock and/or residuum weathered from granite

Typical profile

An - 0 to 6 inches: silt loam
Btn - 6 to 16 inches: silty clay
Btnss - 16 to 33 inches: silty clay
Btknss - 33 to 60 inches: silty clay
C - 60 to 80 inches: silty clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 25.0
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Ecological site: R078CY091OK - Slickspot
Hydric soil rating: No

Minor Components

Tillman

Percent of map unit: 5 percent
Landform: Pediments on paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Gc—Brico-Rock outcrop complex, 5 to 40 percent slopes

Map Unit Setting

National map unit symbol: dtpb
Elevation: 500 to 2,200 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Brico and similar soils: 50 percent
Rock outcrop: 45 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brico

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey colluvium derived from granite

Typical profile

A - 0 to 11 inches: very cobbly loam

Bt - 11 to 40 inches: very cobbly clay loam
BC - 40 to 80 inches: extremely cobbly clay loam

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R082BY004OK - Boulder Ridge Savannah
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Granite

Typical profile

R - 0 to 24 inches: bedrock

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Lawton

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R082BY056OK - Loamy Prairie PE 38-48
Hydric soil rating: No

LaB—Lawton loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w5q5
Elevation: 1,000 to 2,000 feet
Mean annual precipitation: 22 to 32 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 180 to 230 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lawton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lawton

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Granitic outwash and loamy alluvium

Typical profile

Ap - 0 to 11 inches: loam
BA - 11 to 18 inches: clay loam
Bt - 18 to 47 inches: clay loam
BC - 47 to 80 inches: gravelly clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R082BY056OK - Loamy Prairie PE 38-48
Hydric soil rating: No

Minor Components

Farry

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R078CY110TX - Sandy Loam 23-31" PZ
Hydric soil rating: No

Foard

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Tillman

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

LaC—Lawton loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w5q8
Elevation: 1,000 to 2,000 feet
Mean annual precipitation: 22 to 32 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 185 to 230 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lawton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lawton

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Granitic outwash and loamy alluvium

Typical profile

Ap - 0 to 11 inches: loam
BA - 11 to 18 inches: clay loam
Bt - 18 to 47 inches: clay loam
BC - 47 to 80 inches: gravelly clay loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R082BY056OK - Loamy Prairie PE 38-48
Hydric soil rating: No

Minor Components

Foard

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Tillman

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Vernon

Percent of map unit: 5 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R078CY112TX - Red Clay (South) 23-30" PZ

Hydric soil rating: No

LaC2—Lawton loam, 3 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2w5q9
Elevation: 1,000 to 2,000 feet
Mean annual precipitation: 22 to 32 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 180 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Lawton, eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lawton, Eroded

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Granitic outwash and loamy alluvium

Typical profile

Ap - 0 to 5 inches: loam
Bt - 5 to 62 inches: clay loam
BC - 62 to 80 inches: gravelly clay loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R082BY056OK - Loamy Prairie PE 38-48
Hydric soil rating: No

Minor Components

Tillman, eroded
Percent of map unit: 10 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Foard, eroded
Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Farry, eroded
Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R078CY110TX - Sandy Loam 23-31" PZ
Hydric soil rating: No

Po—Ashport loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting
National map unit symbol: 2tq77
Elevation: 700 to 1,500 feet
Mean annual precipitation: 31 to 40 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 185 to 230 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Ashport, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ashport, Occasionally Flooded

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

Ap - 0 to 5 inches: loam
A - 5 to 16 inches: loam
Bw - 16 to 36 inches: silty clay loam
Ab - 36 to 52 inches: loam
Bwb - 52 to 79 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: R080AY050OK - Loamy Bottomland
Hydric soil rating: No

Minor Components

Pulaski, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R084AY050OK - Loamy Bottomland
Hydric soil rating: No

Easpur, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R080AY050OK - Loamy Bottomland
Hydric soil rating: No

Ps—Ashport-Oscar complex, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2yh69
Elevation: 1,070 to 1,290 feet
Mean annual precipitation: 29 to 35 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 181 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ashport, occasionally flooded, and similar soils: 60 percent
Oscar, saline, occasionally flooded, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ashport, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium derived from sedimentary rock

Typical profile

Ap - 0 to 6 inches: silt loam
Bw - 6 to 31 inches: silty clay loam
C - 31 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: R080AY050OK - Loamy Bottomland

Hydric soil rating: No

Description of Oscar, Saline, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Saline loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 5 inches: loam
Btnz - 5 to 12 inches: silty clay loam
BCkn - 12 to 24 inches: silty clay loam
C - 24 to 63 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 80.0
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: R080AY001OK - Alkali Bottomland
Hydric soil rating: No

Minor Components

Port, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R080AY050OK - Loamy Bottomland
Hydric soil rating: No

Miller, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Ecological site: R080AY045OK - Clay Bottomland
Hydric soil rating: No

Lela, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R080AY045OK - Clay Bottomland
Hydric soil rating: No

VeD—Vernon-Knoco complex, 3 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2t027
Elevation: 1,000 to 1,800 feet
Mean annual precipitation: 26 to 34 inches
Mean annual air temperature: 60 to 65 degrees F
Frost-free period: 200 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Vernon and similar soils: 60 percent
Knoco and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vernon

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from claystone

Typical profile

A - 0 to 5 inches: clay
Bk - 5 to 25 inches: clay
Cd - 25 to 80 inches: clay

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: 20 to 40 inches to densic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to moderately saline (1.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 25.0
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R078CY112TX - Red Clay (South) 23-30" PZ
Hydric soil rating: No

Description of Knoco

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from claystone

Typical profile

A - 0 to 9 inches: clay
C - 9 to 19 inches: clay
Cd - 19 to 60 inches: clay

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: 3 to 20 inches to densic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Gypsum, maximum content: 15 percent
Maximum salinity: Nonsaline to moderately saline (1.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 8.0
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R078CY114TX - Shallow Red Clay 23-31" PZ
Hydric soil rating: No

Minor Components

Tilvern

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Tillman

Percent of map unit: 3 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY096TX - Clay Loam 23-30" PZ
Hydric soil rating: No

Badland

Percent of map unit: 2 percent
Landform: Pediments
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Mangum

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R078CY094TX - Clayey Bottomland 23-30" PZ
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: dtqc
Elevation: 250 to 4,000 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 190 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform: Valleys

Typical profile

W - 0 to 80 inches: water

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

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FEMA's National Flood Hazard Layer (NFHL) Viewer

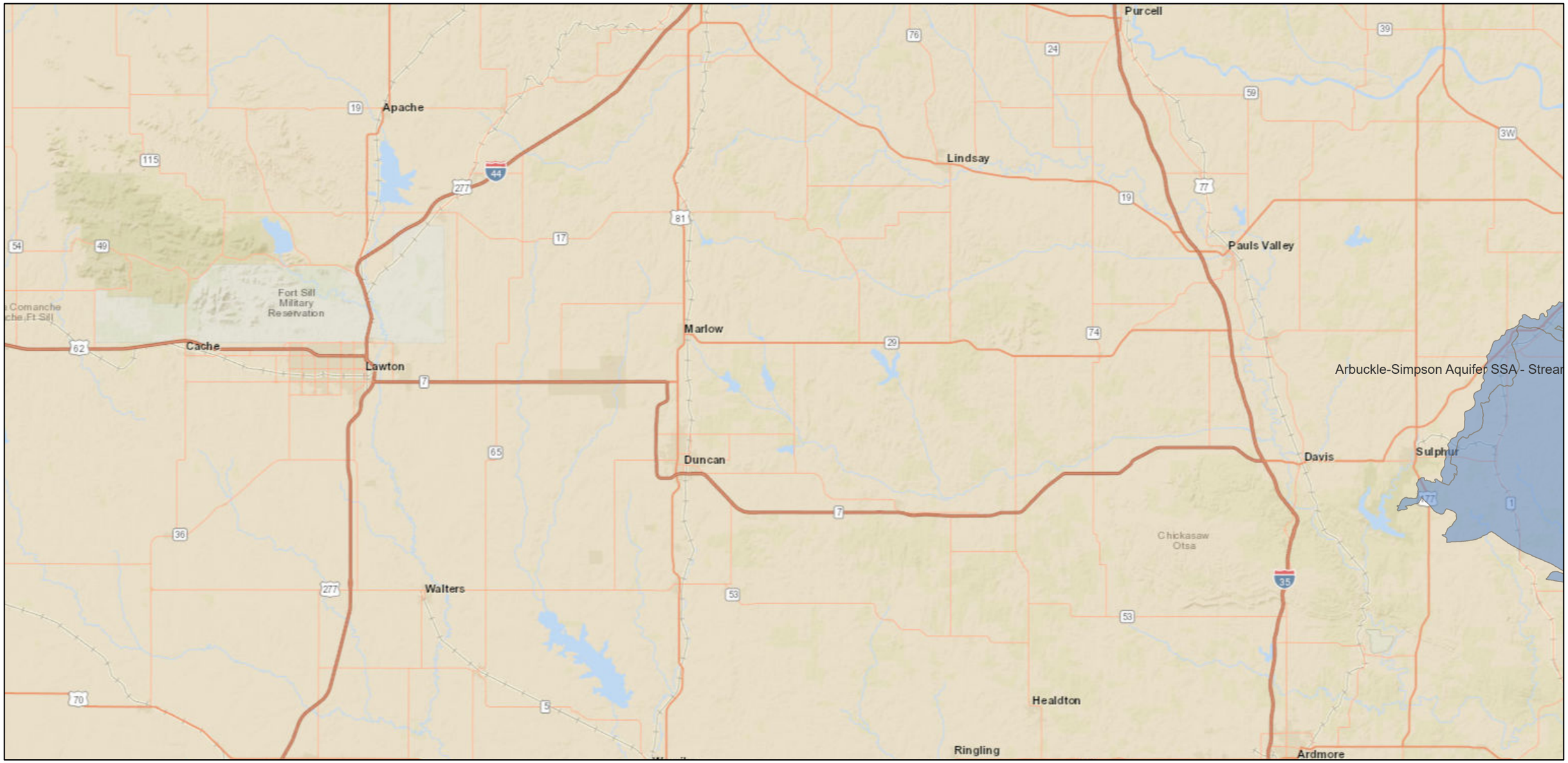
with Web AppBuilder for ArcGIS

Find address or place

1271.9
1272
Zone AE
1270
V
1266
1264
1264
1264.5
U
1262
1263.0
T
1262
Zone AE
S
1260
1260.9
1258
1256
R
Zone AE
1254
1252.0
1250
1248
1247.5
Q
1247
1247.2
1246
1246.5
1244
1244.0
Zone AE
N
1243
1242.3
M
1242
1237
1235.9
1234
Zone AE
L
1232
1230
1229.3
J
1228
1227.5
I
1226.3
1226
1224
1234.6
C
1232.4
D
Zone A
Zone A
COMANCHE COUNTY 400489
TOWN OF CACHE 400048
TOWN OF CACHE 400048
Zone AE
600ft
-98.575 34.642 Degrees

Appendix "D"

ArcGIS Web AppBuilder



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Sole_Source_Aquifers

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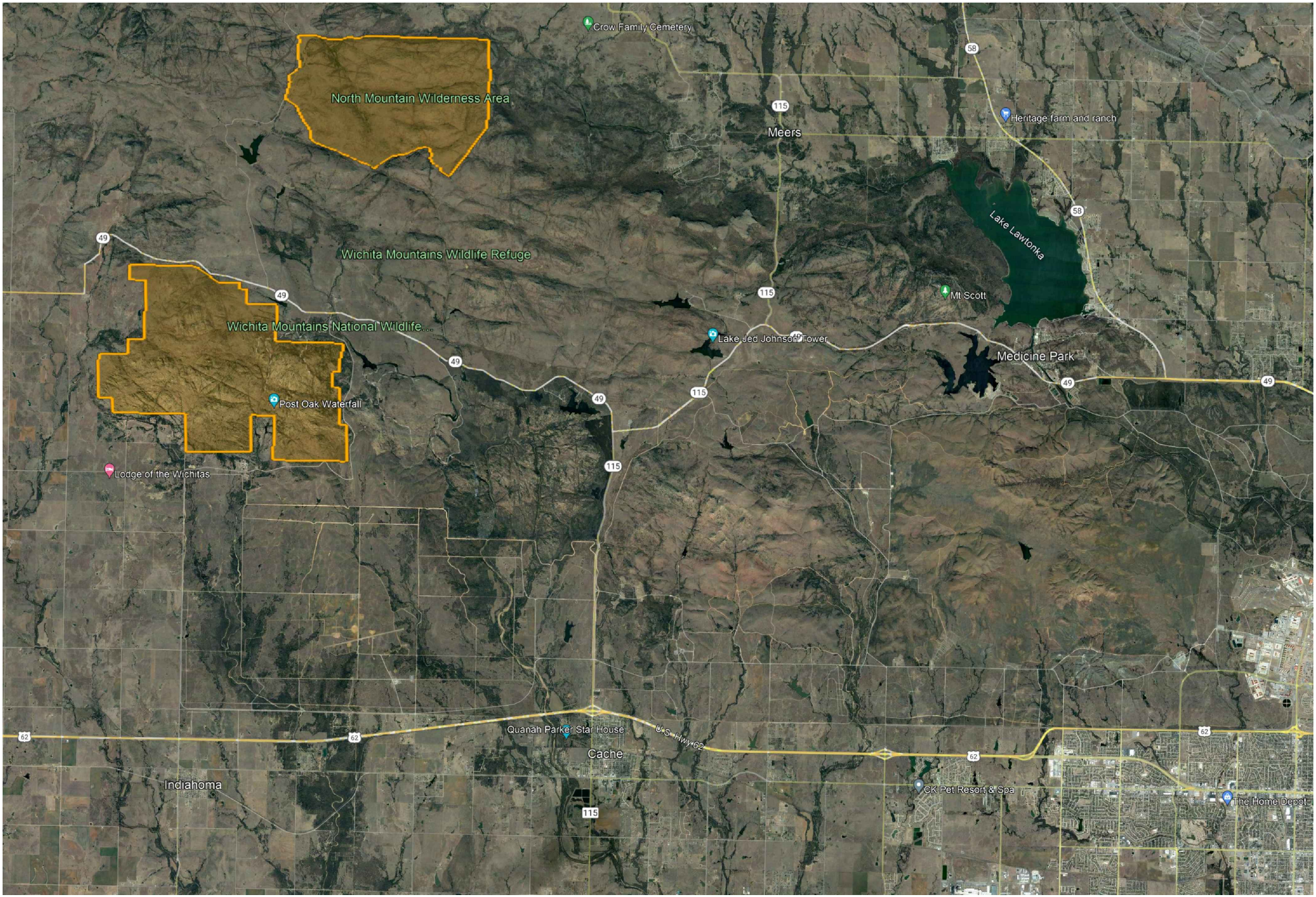
0 5 10 20 mi

0 5 10 20 km

Esri, HERE, Garmin, NGA, USGS, NPS

U.S. Environmental Protection Agency

Appendix "E"

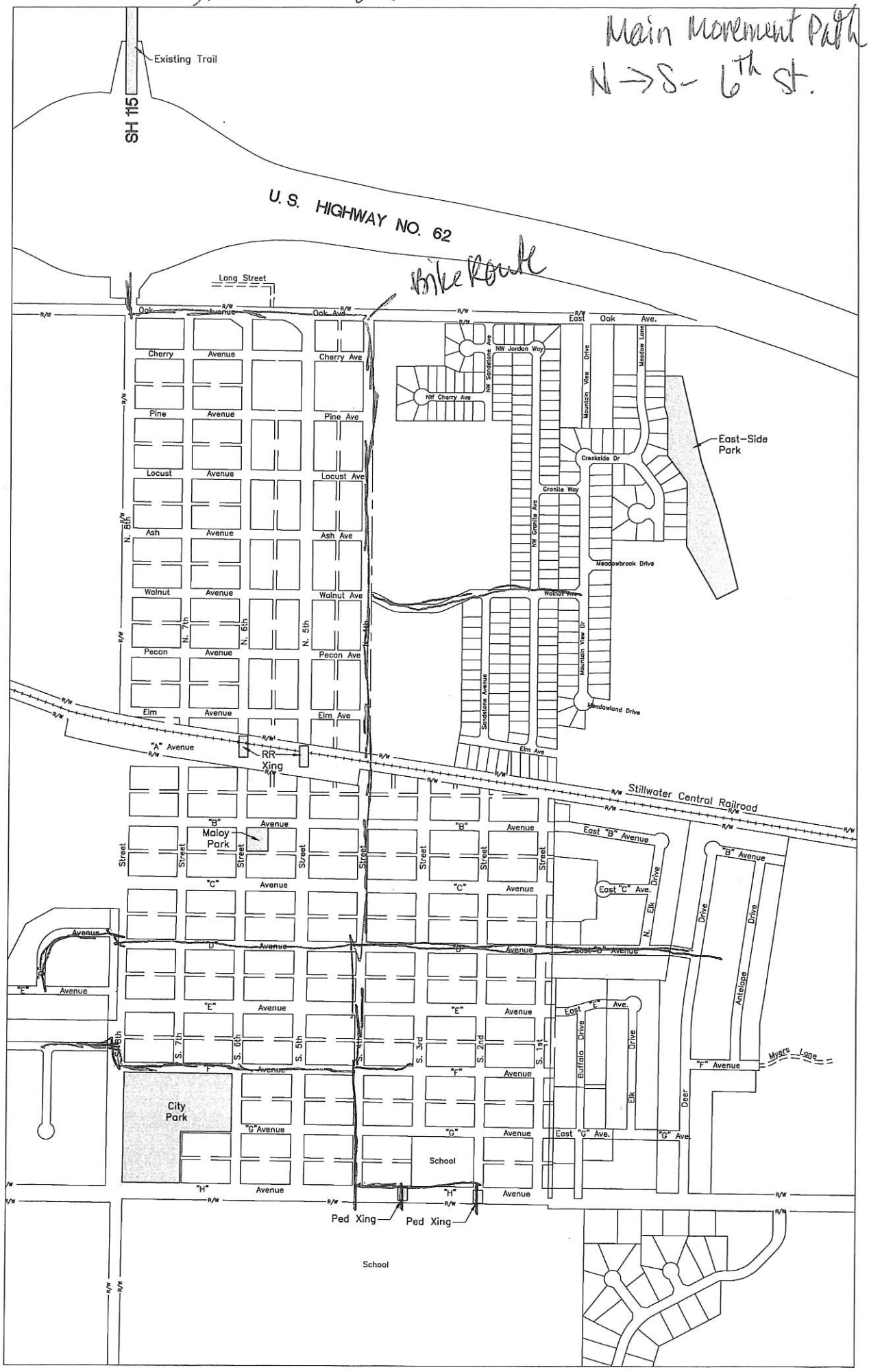


City of Cache Alternative Transportation Master Plan
Wilderness Areas

Appendix "F"

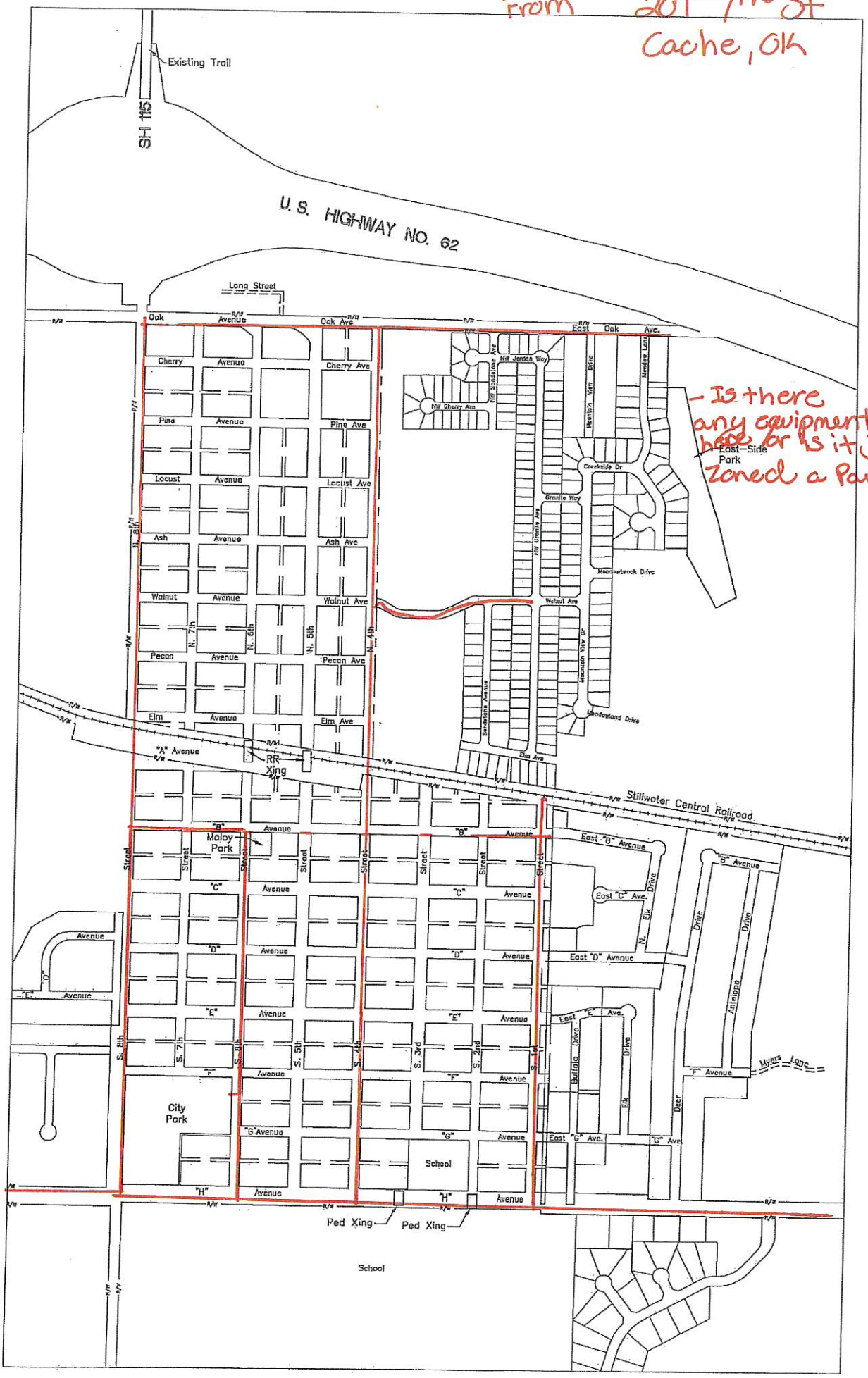
B. Martine 678-6552

Main Movement Path
N → S - 6th St.



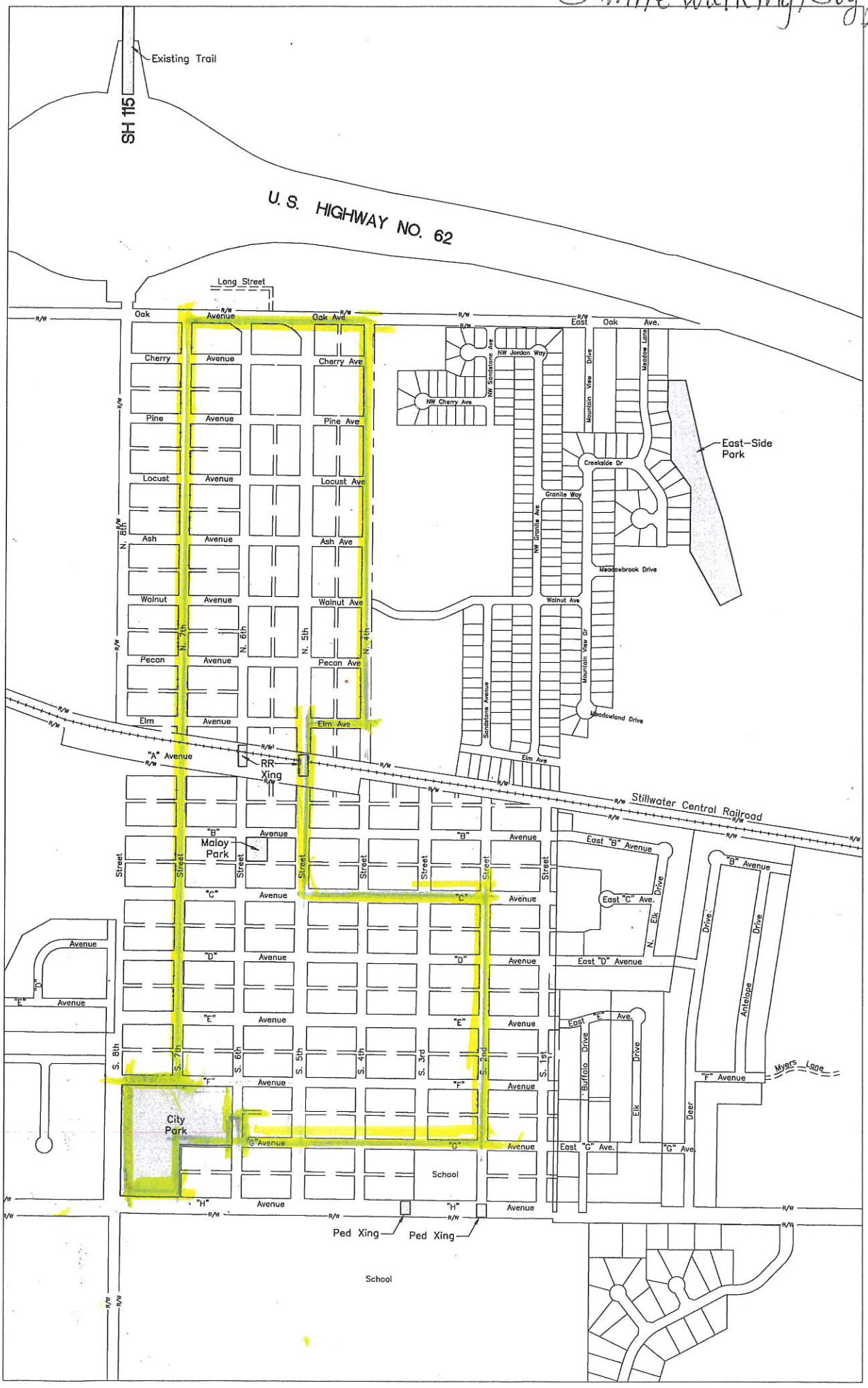
Appendix "G"

Misty & Dan Rollans
From 201 7th St
Cache, Ok

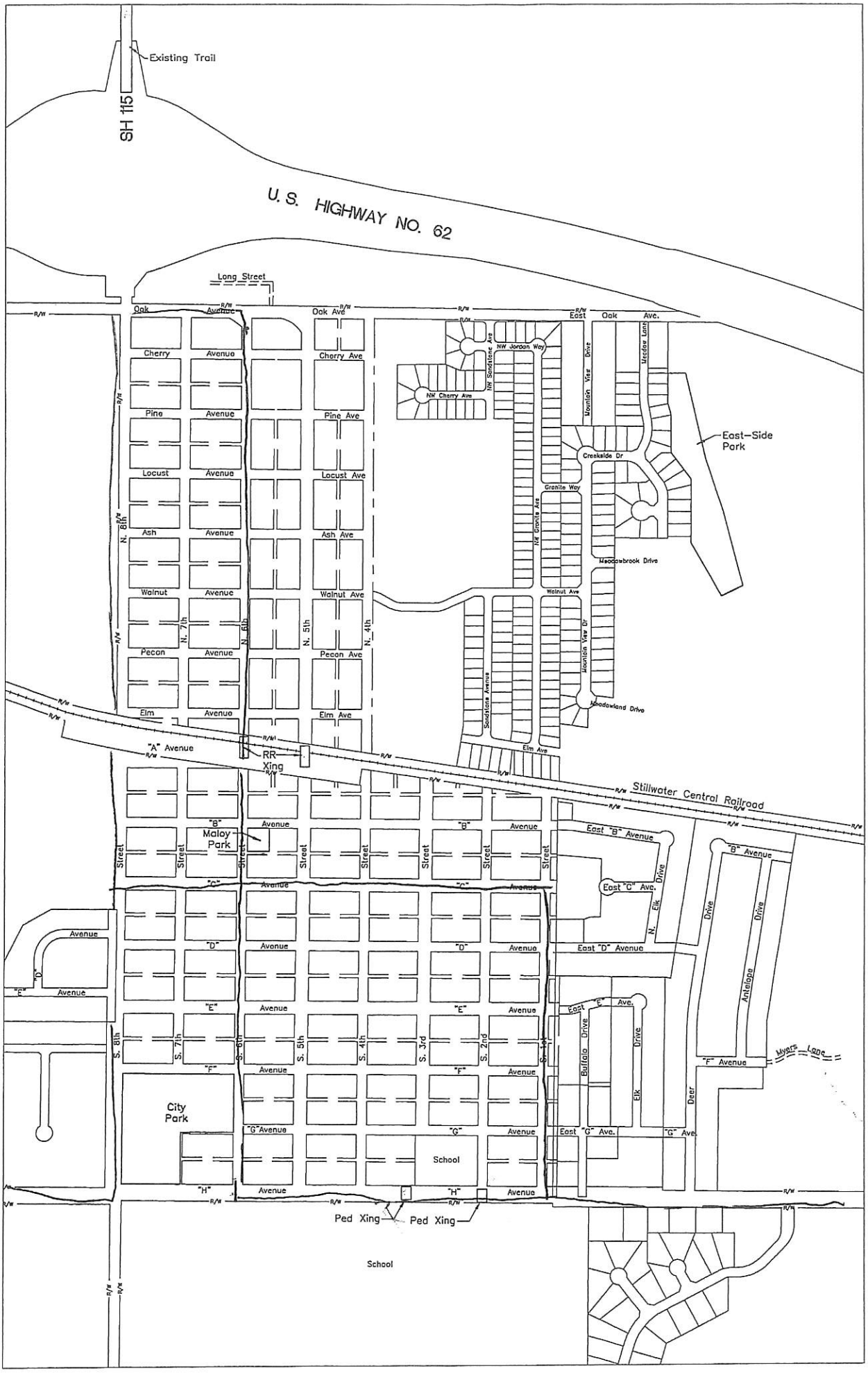


- Is there any equipment here or is it just zoned a Park?

3-Mile Walking/Jogging Trail




P Morales
1004 W E
913-568-2650
Existing Trail
SH 115
U. S. HIGHWAY NO. 62
Long Street
Oak Avenue
Cherry Avenue
Pine Avenue
Locust Avenue
Ash Avenue
Walnut Avenue
Pecan Avenue
Elm Avenue
East Oak Ave.
NW Jordon Way
NW Sandstone Ave
NW Cherry Ave
Mountain View Drive
Meadow Lane
East-Side Park
Creekside Dr
Granite Way
NW Granite Ave
Meadowbrook Drive
Meadowland Drive
Sandstone Avenue
Mountain View Dr
N. 8th
N. 7th
N. 6th
N. 5th
N. 4th
"A" Avenue
RR Xing
Stillwater Central Railroad
"B" Avenue
Maloy Park
East "B" Avenue
"C" Avenue
East "C" Ave.
N. Elk Drive
"D" Avenue
East "D" Avenue
"E" Avenue
East "E" Ave.
Buffalo Drive
Elk Drive
Deer Drive
Antelope Drive
"F" Avenue
Myers Lane
S. 8th
S. 7th
S. 6th
S. 5th
S. 4th
S. 3rd
S. 2nd
S. 1st
City Park
"G" Avenue
East "G" Ave.
"G" Ave.
School
"H" Avenue
Ped Xing
Ped Xing
School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SH 115
U. S. HIGHWAY NO. 62
Long Street
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Oak Ave
East Oak Ave.
Cherry Avenue
Cherry Ave
Pine Avenue
Pine Ave
Locust Avenue
Locust Ave
Ash Avenue
Ash Ave
Walnut Avenue
Walnut Ave
Pecon Avenue
Pecon Ave
Elm Avenue
Elm Ave
N. 8th
N. 7th
N. 6th
N. 5th
N. 4th
NW Cherry Ave
NW Sandstone Ave
NW Jordan Way
Mountain View Drive
Meadow Lane
Creekside Dr
Granite Way
NW Granite Ave
Meadowbrook Drive
Sandstone Avenue
Mountain View Dr
Meadowland Drive
East-Side Park
"A" Avenue
RR Xing
Stillwater Central Railroad
"B" Avenue
Maloy Park
East "B" Avenue
East "C" Ave.
N. Elk Drive
"C" Avenue
"D" Avenue
East "D" Avenue
"E" Avenue
East "E" Ave.
Buffalo Drive
Elk Drive
Deer Drive
Antelope Drive
"F" Avenue
Myers Lane
"G" Avenue
East "G" Ave.
"H" Avenue
City Park
School
Ped Xing
Ped Xing
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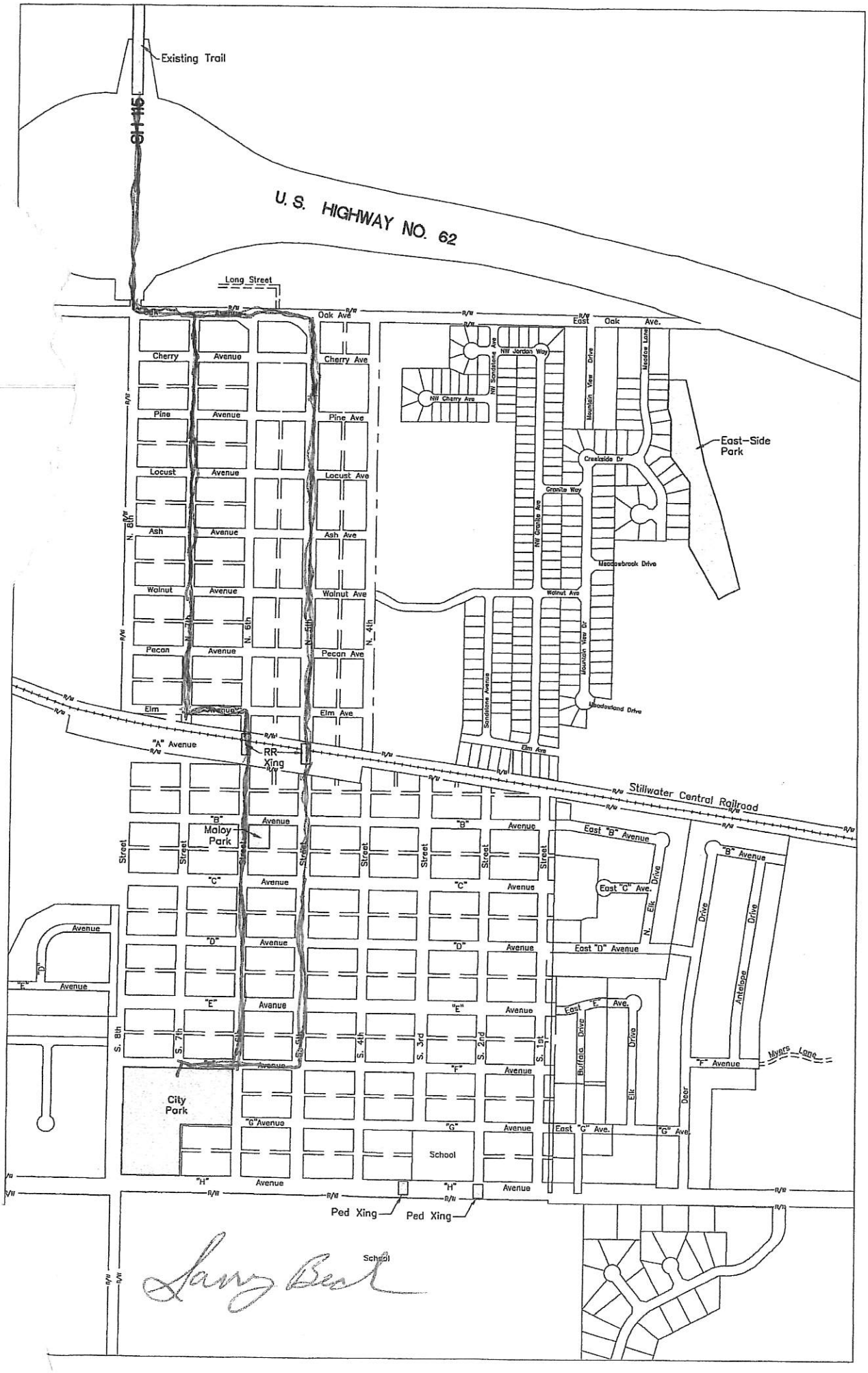
S. 2nd
S. 1st
Street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CH 115
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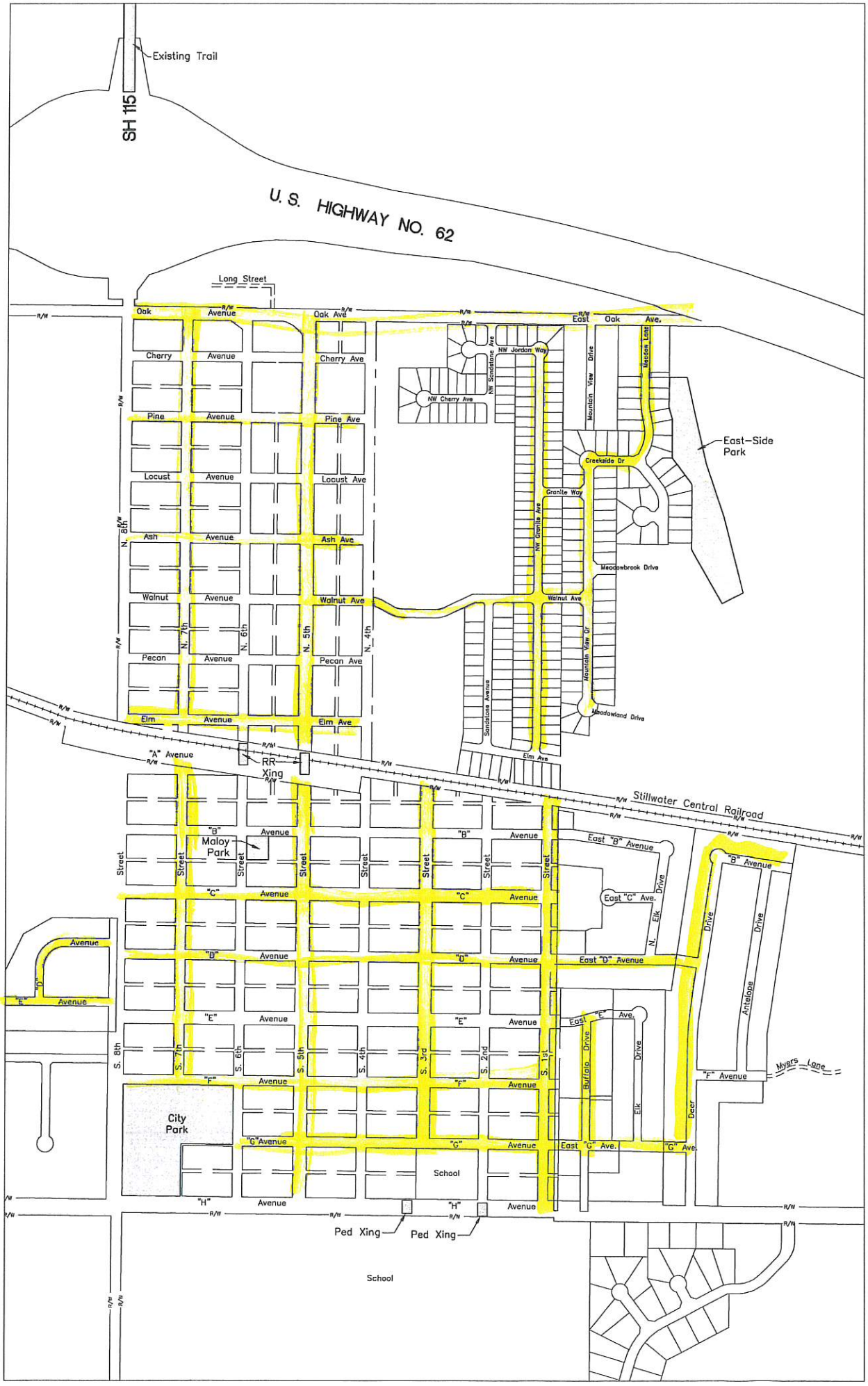
Pine Ave
Locust Ave
Ash Ave
Walnut Ave
Pecan Ave
Elm Ave
Cherry Avenue
Pine Avenue
Locust Avenue
Ash Avenue
Walnut Avenue
Pecan Avenue
Elm Avenue
N. 8th
N. 7th
N. 6th
N. 5th
N. 4th
NW Sandstone Ave
NW Jordan Way
NW Cherry Ave
Mountain View Drive
Meadow Lane
East-Side Park
Creekside Dr
Granite Way
NW Granite Ave
Meadowbrook Drive
Sandstone Avenue
Mountain View Dr
Meadowland Drive
"A" Avenue
RR Xing
Stillwater Central Railroad
"B" Avenue
Maloy Park
East "B" Avenue
"C" Avenue
East "C" Ave.
N. Elk Drive
"D" Avenue
East "D" Avenue
"E" Avenue
East "E" Ave.
Buffalo Drive
Elk Drive
Deer Drive
Antelope Drive
"F" Avenue
Myers Lane
"G" Avenue
East "G" Ave.
"H" Avenue
City Park
School
Ped Xing
Ped Xing
Street
S. 8th
S. 7th
S. 6th
S. 5th
S. 4th
S. 3rd
S. 2nd
S. 1st
School
Larry Best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NW Cherry Ave
NW Sandstone Ave
NW Granite Ave
Mountain View Drive
Meadow Lane
East-Side Park
Creekside Dr
Granite Way
Meadowbrook Drive
Meadowland Drive
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Sandstone Avenue
"A" Avenue
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East "D" Avenue
East "E" Ave.
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N. Elk Drive
Antelope Drive
Buffalo Drive
Elk Drive
Deer Drive
Myers Lane
S. 8th
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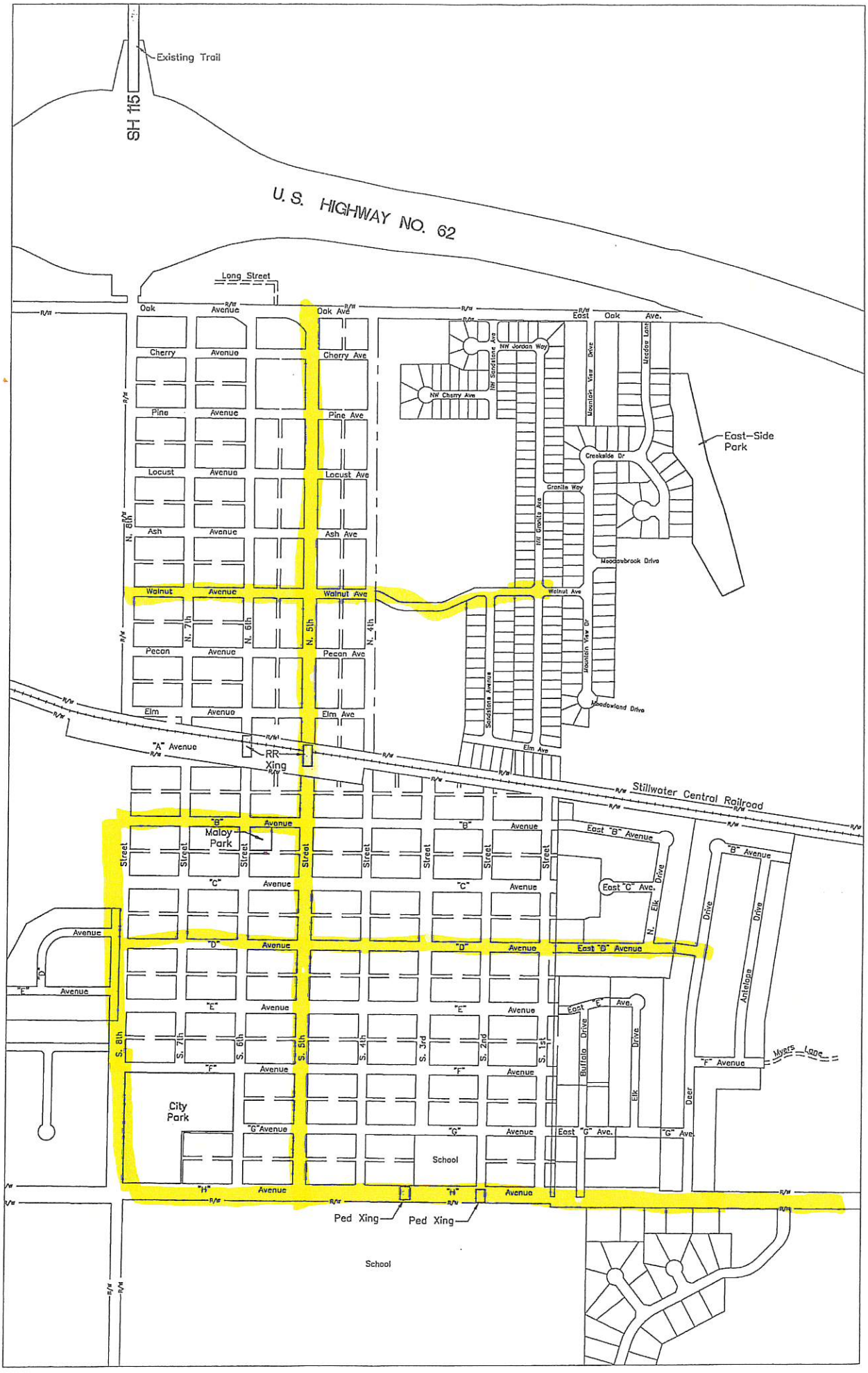
City Park
School
Ped Xing
Ped Xing
School


Existing Trail
SH 115
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Long Street
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Cherry Avenue
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Pine Ave
Locust Avenue
Locust Ave
Ash Avenue
Ash Ave
Walnut Avenue
Walnut Ave
Pecan Avenue
Pecan Ave
Elm Avenue
Elm Ave
N. 8th
N. 7th
N. 6th
N. 5th
N. 4th
NW Jordan Way
NW Sandstone Ave
NW Cherry Ave
NW Granite Ave
Granite Way
Mountain View Drive
Meadow Lane
East-Side Park
Creekside Dr
Meadowbrook Drive
Meadowland Drive
Sandstone Avenue
"A" Avenue
RR Xing
Stillwater Central Railroad
"B" Avenue
Maloy Park
East "B" Avenue
"C" Avenue
East "C" Ave.
N. Elk Drive
"D" Avenue
"E" Avenue
East "E" Ave.
Buffalo Drive
Elk Drive
Deer Drive
Antelope Drive
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S. 7th
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School
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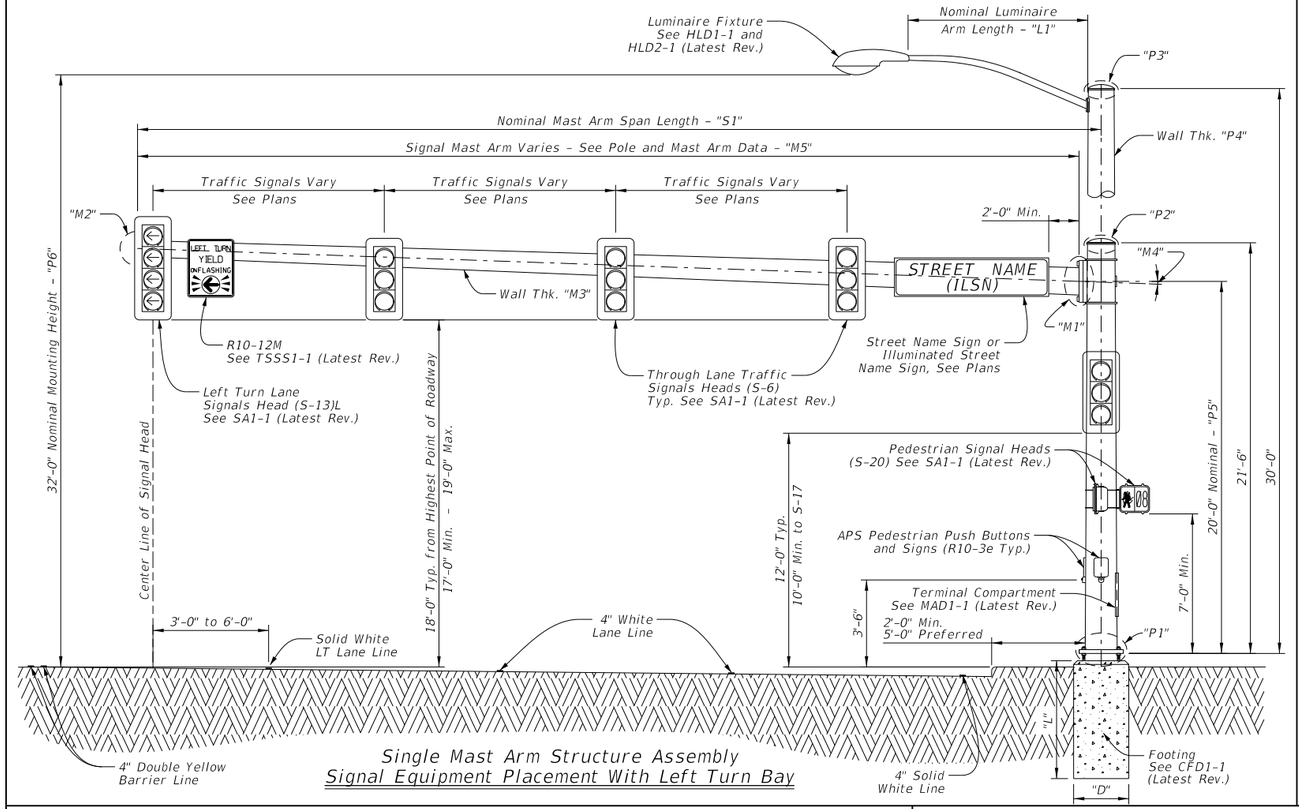
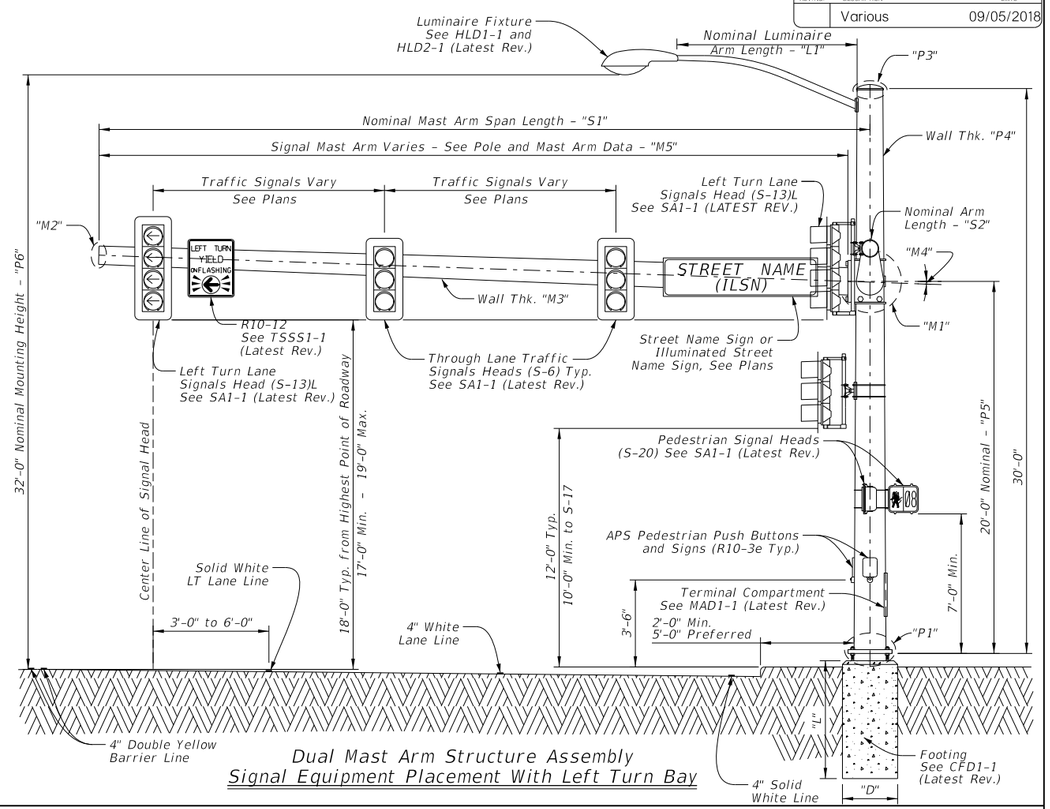
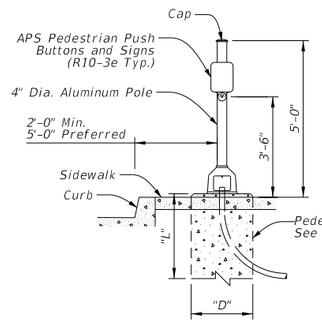


Single Mast Arm Structure Assembly
Signal Equipment Placement With Left Turn Bay

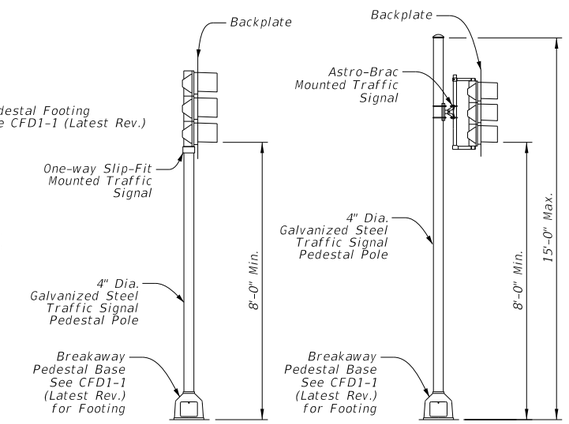
REVISIONS		
REV. NO.	DESCRIPTION	DATE
	Various	09/05/2018



Dual Mast Arm Structure Assembly
Signal Equipment Placement With Left Turn Bay



Pedestrian Push Button Post



Pedestal Mounted Signals

General Notes

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the Department such warranties or guarantees. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Erection and/or removal of signal pole assemblies located near overhead electrical lines shall be accomplished using established industry and utility safety practices and in accordance with laws governing such work. The Contractor shall consult with the appropriate utility company prior to beginning such work.

   A. Standard Steel Pole and Mast Arm Designs:
      Steel poles and mast arms fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings for standard designs are required for project records.

   B. Optional Steel Pole Designs:
      Optional Steel Poles shall be limited to: 1) aesthetic steel poles (architectural treatments or ornamental designs) approved in Traffic Engineering Division's Qualified Product List or 2) round steel poles not covered by these Standards. In the case of #2, design alternatives to round steel poles shall not be allowed except if called for in the Plans or the Contractor obtained pre-approval from Traffic Engineering Division. Optional Steel Poles shall meet the following requirements as outlined below:

      1. Shop Drawings.
         Optional designs require submission of shop drawings and design calculations bearing the seal of an Engineer registered in the State of Oklahoma, in accordance with Section 724, "Structural Steel." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the ODOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.

      2. Structural Design for Signal Poles:
         Designs conform to 2013 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications. Designed for 3-second wind gust speed equal to 90 MPH with a 1.14 gust factor. A wind importance factor of 0.87 is applied to adjust the wind speed to a 50 year recurrence interval. Design moments listed in tables assume base of pole is less than 33' above natural ground level. Fatigue importance Category II is used for fatigue design. Fatigue design loads applied include galloping, natural wind gust pressure range based on a yearly mean wind velocity of 11.2 MPH, and truck-gust pressure range based on a truck speed of 65 MPH. Unless otherwise noted, all steel parts shall be galvanized in accordance with Section 724.06, "Galvanizing." Steel poles shall be fabricated in accordance with Section 724, "Structural Steel." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with the ANSI/AWS Structural Welding Code D1.1. Two-section signal poles will not be permitted. Mast arms may be fabricated in two sections for lengths greater than 40 LF and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint. Ensure longitudinal seam welds that will be in contact at a slip joint splice are ground smooth for the length of splice plus a minimum of six inches.

      3. Mast Arm Attachments:
         All poles and attachments shall be structurally designed to support the maximum loading shown on Std. MDL1-1 or MDL2-1, latest revision. Poles shall be supplied with mast arm combinations as shown in the plans. All luminaire mast arms shall be designed for a 50-pound luminaire having an effective projected area of 2.0 square feet.

      4. Anchor Bolt Assembly:
         Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

   C. Has been removed.

Basis of Payment

Item No.	Item	Unit
806(A)	Traffic Signal Pole and Mastarm	EA
806(B)	Traffic Signal Pedestal Pole	EA

Approved By Bridge Engineer: Steven Fe Date: 9-19-18

Approved By Traffic Engineer: Date: 9/20/18

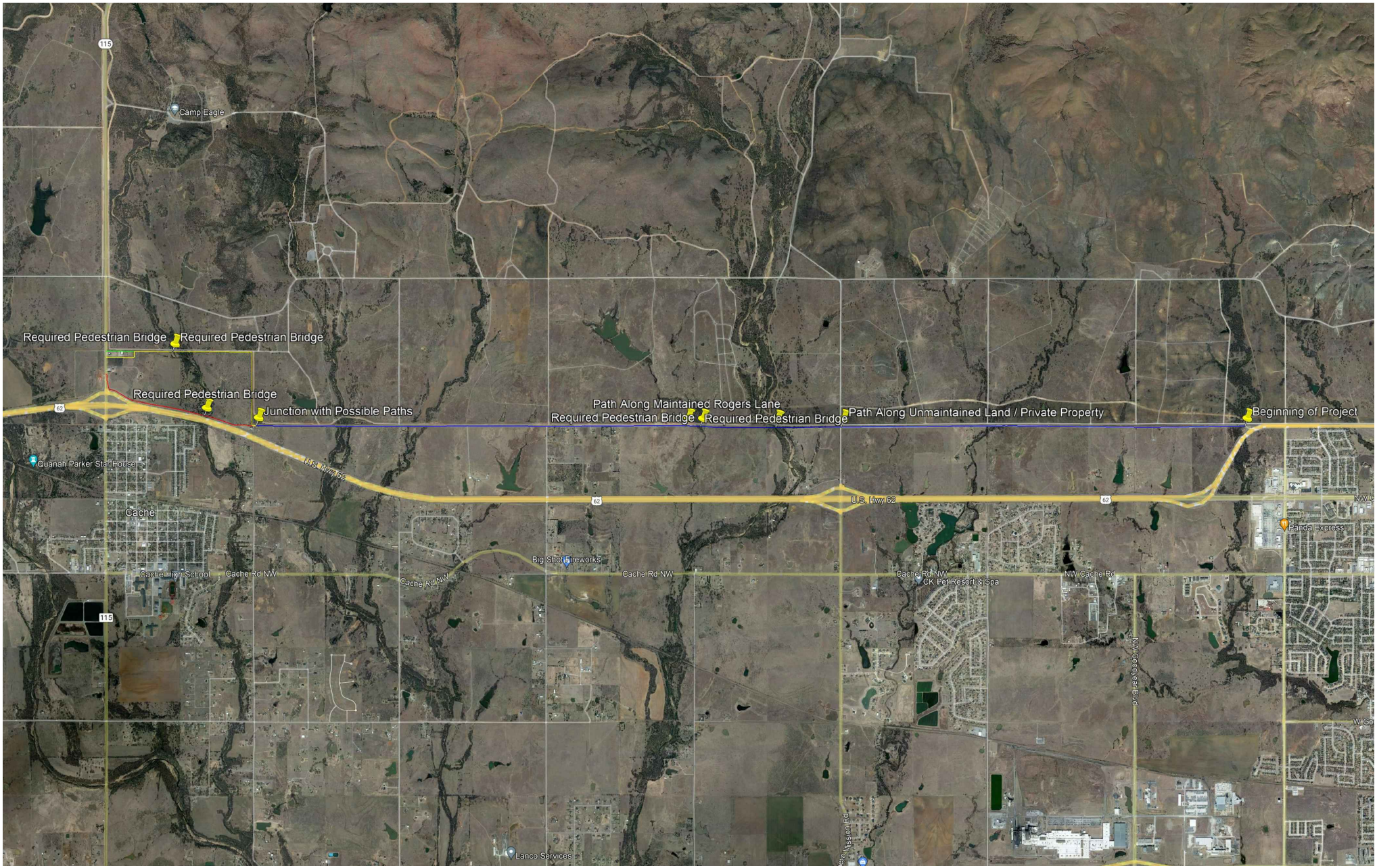
Traffic Standard

Traffic Signal Support Structures Signal Pole and Mast Arm Details

2009 Specifications

PMAP1-2	01
T-200	

Appendix "H"

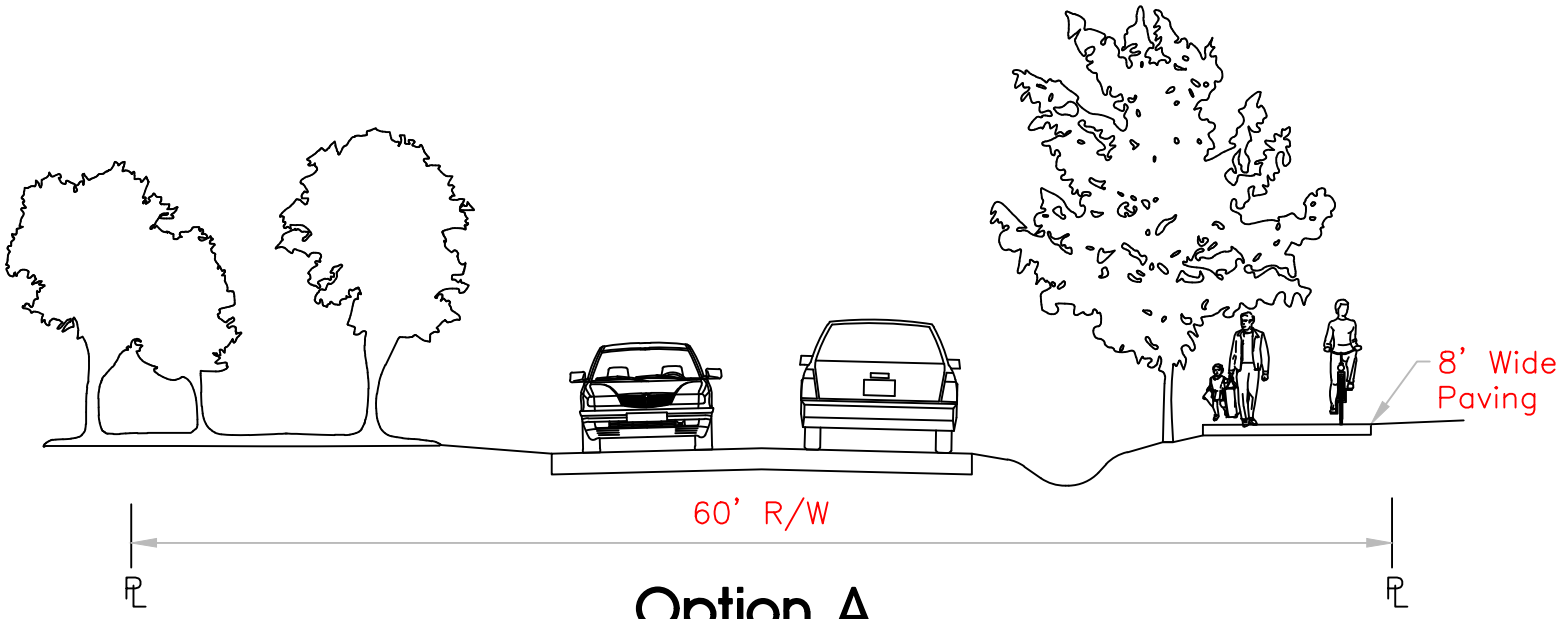


City of Cache Alternative Transporation Master Plan
ODOT Bike Path Routing
West Lawton to S.H. 115

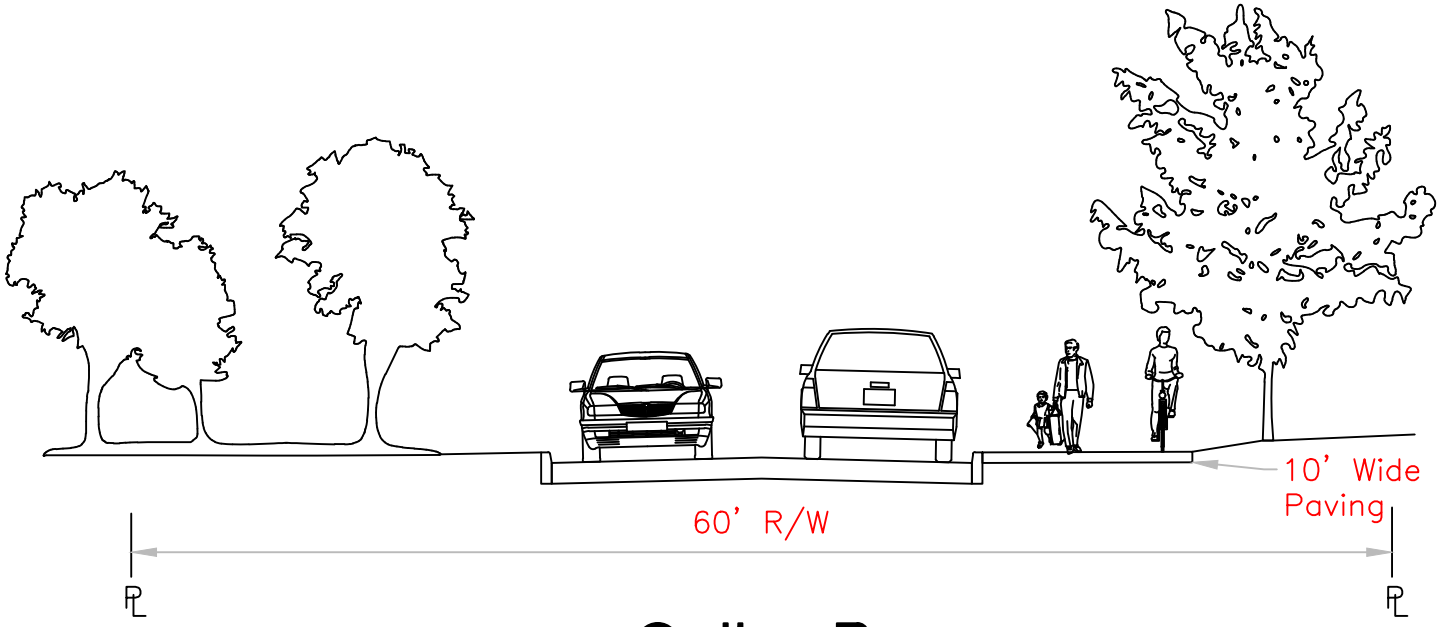
Appendix "I"

City of Cache Alternative Transportation Master Plan
Master Plan Map

Appendix "J"



Option A



Option B

City of Cache Alternative Transportation Plan
Paving Options

Pedestrian and Bicycle Funding Opportunities
U.S. Department of Transportation Transit, Highway, and Safety Funds

Updated January 21, 2021

This table indicates potential eligibility for pedestrian and bicycle projects under U.S. Department of Transportation surface transportation funding programs. Additional restrictions may apply. See notes and basic program requirements below, and see program guidance for detailed requirements. Project sponsors should fully integrate nonmotorized accommodation into surface transportation projects. Section 1404 of the Fixing America's Surface Transportation (FAST) Act modified 23 U.S.C. 109 to require federally-funded projects on the National Highway System to consider access for other modes of transportation, and provides greater design flexibility to do so.

Pedestrian and Bicycle Funding Opportunities: U.S. Department of Transportation Transit, Highway, and Safety Funds

Key: $ = Funds may be used for this activity (restrictions may apply). ~$ = Eligible, but not competitive unless part of a larger project. $* = See program-specific notes for restrictions.

Activity or Project Type	BUILD	INFRA	TIFIA	FTA	ATI	CMAQ	HSIP	NHPP	STBG	TA	RTP	SRTS	PLAN	NHTSA 402	NHTSA 405	FLTTP
Access enhancements to public transportation (includes benches, bus pads)	$	~$	$	$	$	$		$	$	$						$
ADA/504 Self Evaluation / Transition Plan									$	$	$		$			$
Bicycle plans				$					$	$		$	$			$
Bicycle helmets (project or training related)									$	$SRTS		$		$*		
Bicycle helmets (safety promotion)									$	$SRTS		$				
Bicycle lanes on road	$	~$	$	$	$	$	$	$	$	$		$				$
Bicycle parking	~$	~$	~$	$	$	$		$	$	$	$	$				$
Bike racks on transit	$	~$	$	$	$	$			$	$						$
Bicycle repair station (air pump, simple tools)	~$	~$	~$	$	$	$			$	$						$
Bicycle share (capital and equipment; not operations)	$	~$	$	$	$	$		$	$	$						$
Bicycle storage or service centers (example: at transit hubs)	~$	~$	~$	$	$	$			$	$						$
Bridges / overcrossings for pedestrians and/or bicyclists	$	~$	$	$	$	$*	$	$	$	$	$	$				$
Bus shelters and benches	$	~$	$	$	$	$		$	$	$						$
Coordinator positions (State or local)						$ 1 per State			$	$SRTS		$				
Crosswalks (new or retrofit)	$	~$	$	$	$	$*	$	$	$	$	$	$				$
Curb cuts and ramps	$	~$	$	$	$	$*	$	$	$	$	$	$				$
Counting equipment				$	$		$	$	$	$	$	$	$*			$
Data collection and monitoring for pedestrians and/or bicyclists				$	$		$	$	$	$	$	$	$*			$
Historic preservation (pedestrian and bicycle and transit facilities)	$	~$	$	$	$				$	$						$
Landscaping, streetscaping (pedestrian and/or bicycle route; transit access); related amenities (benches, water fountains); generally as part of a larger project	~$	~$	~$	$	$			$	$	$						$
Lighting (pedestrian and bicyclist scale associated with pedestrian/bicyclist project)	$	~$	$	$	$		$	$	$	$	$	$				$
Maps (for pedestrians and/or bicyclists)				$	$	$			$	$		$	$*			
Paved shoulders for pedestrian and/or bicyclist use	$	~$	$			$*	$	$	$	$		$				$
Pedestrian plans				$					$	$		$	$			$
Recreational trails	~$	~$	~$						$	$	$					$
Road Diets (pedestrian and bicycle portions)	$	~$	$				$	$	$	$						$
Road Safety Assessment for pedestrians and bicyclists							$		$	$			$			$
Safety education and awareness activities and programs to inform pedestrians, bicyclists, and motorists on ped/bike safety									$SRTS	$SRTS		$	$*	$*	$*	
Safety education positions									$SRTS	$SRTS		$		$*		

Appendix "L"

Pedestrian and Bicycle Funding Opportunities: U.S. Department of Transportation Transit, Highway, and Safety Funds

Key: $ = Funds may be used for this activity (restrictions may apply). ~$ = Eligible, but not competitive unless part of a larger project. $* = See program-specific notes for restrictions.

Activity or Project Type	BUILD	INFRA	TIFIA	FTA	ATI	CMAQ	HSIP	NHPP	STBG	TA	RTP	SRTS	PLAN	NHTSA 402	NHTSA 405	FLTTP
Safety enforcement (including police patrols)									$SRTS	$SRTS		$		$*	$*	
Safety program technical assessment (for peds/bicyclists)									$SRTS	$SRTS		$	$*	$		
Separated bicycle lanes	$	~$	$	$	$	$	$	$	$	$		$				$
Shared use paths / transportation trails	$	~$	$	$	$	$*	$	$	$	$	$	$				$
Sidewalks (new or retrofit)	$	~$	$	$	$	$	$	$	$	$	$	$				$
Signs / signals / signal improvements (including accessible pedestrian signals)	$	~$	$	$	$	$	$	$	$	$		$				$
Signed pedestrian or bicycle routes	$	~$	$	$	$	$		$	$	$		$				$
Spot improvement programs	$	~$	$	$			$	$	$	$	$	$				$
Stormwater impacts related to pedestrian and bicycle projects	$	~$	$	$	$		$	$	$	$	$	$				$
Traffic calming	$	~$	$	$			$	$	$	$		$				$
Trail bridges	$	~$	$			$*	$	$	$	$	$	$				$
Trail construction and maintenance equipment									$RTP	$RTP	$					
Trail/highway crossings and intersections	$	~$	$			$*	$	$	$	$	$	$				$
Trailside and trailhead facilities (includes restrooms and water, but not general park amenities; see program guidance)	~$*	~$*	~$*						$*	$*	$*					$
Training						$	$		$	$	$	$	$*	$*		
Training for law enforcement on ped/bicyclist safety laws									$SRTS	$SRTS		$			$*	
Tunnels / undercrossings for pedestrians and/or bicyclists	$	~$	$	$	$	$*	$	$	$	$	$	$				$

Abbreviations

ADA/504: Americans with Disabilities Act of 1990 / Section 504 of the Rehabilitation Act of 1973
BUILD: Better Utilizing Investments to Leverage Development Transportation Discretionary Grants
INFRA: Infrastructure for Rebuilding America Discretionary Grant Program
TIFIA: Transportation Infrastructure Finance and Innovation Act (loans)
FTA: Federal Transit Administration Capital Funds
ATI: Associated Transit Improvement (1% set-aside of FTA)
CMAQ: Congestion Mitigation and Air Quality Improvement Program
HSIP: Highway Safety Improvement Program
NHPP: National Highway Performance Program
STBG: Surface Transportation Block Grant Program
TA: Transportation Alternatives Set-Aside (formerly Transportation Alternatives Program)
RTP: Recreational Trails Program
SRTS: Safe Routes to School Program / Activities
PLAN: Statewide Planning and Research (SPR) or Metropolitan Planning funds
NHTSA 402: State and Community Highway Safety Grant Program
NHTSA 405: National Priority Safety Programs (Nonmotorized safety)
FLTTP: Federal Lands and Tribal Transportation Programs (Federal Lands Access Program, Federal Lands Transportation Program, Tribal Transportation Program, Nationally Significant Federal Lands and Tribal Projects)

Cross-cutting notes

- FHWA Bicycle and Pedestrian Guidance: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/
- **Applicability of 23 U.S.C. 217(i) for Bicycle Projects:** 23 U.S.C. 217(i) requires that bicycle facilities "be principally for transportation, rather than recreation, purposes". However, sections 133(b)(6) and 133(h) list "recreational trails projects" as eligible activities under STBG. Therefore, the requirement in 23 U.S.C. 217(i) does not apply to recreational trails projects (including for bicycle use) using STBG funds. Section 217(i) continues to apply to bicycle facilities other than trail-related projects, and section 217(i) continues to apply to bicycle facilities using other Federal-aid Highway Program funds (NHPP, HSIP, CMAQ). The transportation requirement under section 217(i) is applicable only to bicycle projects; it does not apply to any other trail use or transportation mode.
- There may be occasional DOT or agency incentive grants for specific research or technical assistance purposes.
- Aspects of DOT initiatives may be eligible as individual projects. Activities above may benefit safe, comfortable, multimodal networks; environmental justice; and equity.

Program-specific notes: Federal-aid funding programs have specific requirements that projects must meet, and eligibility must be determined on a case-by-case basis.

- BUILD: Subject to annual appropriations. See https://www.transportation.gov/BUILDgrants for details.
- INFRA: See https://www.transportation.gov/buildamerica/infragrants for details. Focus on projects that generate national or regional economic, mobility, and safety benefits.
- TIFIA: Program offers assistance only in the form of secured loans, loan guarantees, or standby lines of credit, but can be combined with other grant sources, subject to total Federal assistance limitations.
- FTA/ATI: Project funded with FTA transit funds must provide access to transit. See Bicycles and Transit and the FTA Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements under Federal Transit Law.
  - Bicycle infrastructure plans and projects funded with FTA funds must be within a 3-mile radius of a transit stop or station, or if further than 3 miles, must be within the distance that people could be expected to safely and conveniently bike to use the particular stop or station.
  - Pedestrian infrastructure plans and projects funded with FTA funds must be within a ½ mile radius of a transit stop or station, or if further than ½ mile, must be within the distance that people could be expected to safely and conveniently walk to use the particular stop or station.
  - FTA funds cannot be used to purchase bicycles for bike share systems.
  - FTA encourages grantees to use FHWA funds as a primary source for public right-of-way projects.
- CMAQ projects must demonstrate emissions reduction and benefit air quality. See the CMAQ guidance at www.fhwa.dot.gov/environment/air_quality/cmaq/ for a list of projects that may be eligible for CMAQ funds. Several activities may be eligible for CMAQ funds as part of a bicycle and pedestrian-related project, but not as a highway project. CMAQ funds may be used for shared use paths, but may not be used for trails that are primarily for recreational use.
- HSIP projects must be consistent with a State's Strategic Highway Safety Plan and (1) correct or improve a hazardous road location or feature, or (2) address a highway safety problem.
- NHPP projects must benefit National Highway System (NHS) corridors.
- STBG and TA Set-Aside: Activities marked "$SRTS" means eligible only as an SRTS project benefiting schools for kindergarten through 8th grade. Bicycle transportation nonconstruction projects related to safe bicycle use are eligible under STBG, but not under TA (23 U.S.C. 217(a)).
- RTP must benefit recreational trails, but for any recreational trail use. RTP projects are eligible under TA and STBG, but States may require a transportation purpose.
- SRTS: FY 2012 was the last year for SRTS funds, but SRTS funds are available until expended.
  - Planning funds must be used for planning purposes, for example: Maps: System maps and GIS; Safety education and awareness: for transportation safety planning; Safety program technical assessment: for transportation safety planning; Training: bicycle and pedestrian system planning training.
- Federal Lands and Tribal Transportation Programs (FLTTP) projects must provide access to or within Federal or tribal lands:
  - Federal Lands Access Program (FLAP): Open to State and local entities for projects that provide access to or within Federal or tribal lands.
  - Federal Lands Transportation Program: For Federal agencies for projects that provide access within Federal lands.
  - Tribal Transportation Program: available for federally-recognized tribal governments for projects within tribal boundaries and public roads that access tribal lands.
- NHTSA 402 project activity must be included in the State's Highway Safety Plan. Contact the State Highway Safety Office for details: http://www.ghsa.org/html/about/shsos.html
- NHTSA 405 funds are subject to State eligibility, application, and award. Project activity must be included in the State's Highway Safety Plan. Contact the State Highway Safety Office for details: http://www.ghsa.org/html/about/shsos.html

City of Cache Alternative Transporation Plan "Typical" Block Project Estimate					
Item Description	*Notes*	*Quantity*	*Units*	*Unit Price*	*Total Price*
Option "A"					
Concrete Paving - 8' wide	1	310	SY	80.00	24,800
Asphalt Street Paving Removal	2	40	SY	9.00	360
Asphalt/Concrete Driveway Removal	3	30	SY	11.00	330
Traffic Bound Surface Course	4	30	Tons	45.00	1,350
Asphalt Street Paving Repair	5	5	Tons	300.00	1,500
Concrete Drive - 5" Thick P.C. Concrete	6	15	SY	100.00	1,500
Salvaged Topsoil	7	700	SY	2.50	1,750
Respred Topsoil	8	430	SY	3.25	1,398
Solid Slab Sod	9	430	SY	7.00	3,010
Earthwork	10	200	CY	7.00	1,400
CGMPA Culvert	11	5	Ea	3,325.00	16,625
Remove/Replace Existing Firehydrant	12	1	Ea	7,500.00	7,500
Silt Fence		600	L.F.	4.50	2,700
Subtotal					64,223
Contingency		20%			12,845
Engineering		10%			6,422
Total Option "A" (Per Block)					$83,489
Round Off					$85,000

City of Cache Alternative Transporation Plan "Typical" Block Project Estimate					
Item Description	*Notes*	*Quantity*	*Units*	*Unit Price*	*Total Price*
Option "B"					
Concrete Paving - 10' wide	1	390	SY	80.00	31,200
Asphalt Street Paving Removal	2	810	SY	9.00	7,290
Asphalt/Concrete Driveway Removal	3	30	SY	11.00	330
Traffic Bound Surface Course	4	30	Tons	45.00	1,350
Asphalt Street Paving Repair	5	0	Tons	300.00	0
Concrete Drive - 5" Thick P.C. Concrete	6	15	SY	100.00	1,500
Salvaged Topsoil	7	700	SY	2.50	1,750
Respred Topsoil	8	430	SY	3.25	1,398
Solid Slab Sod	9	430	SY	7.00	3,010
Earthwork	10	200	CY	7.00	1,400
CGMPA Culvert	11	5	Ea	3,325.00	16,625
Remove/Replace Existing Firehydrant	12	1	Ea	7,500.00	7,500
Concrete Curb & Gutter	13	690	LF	36.50	25,185
6" Thick Compacted Subgrade	14	1300	SY	3.50	4,550
Aggregate Base, Type A	15	200	CY	65.00	13,000
Asphaltic Concrete	16	230	Tons	110.00	25,300
Silt Fence		600	L.F.	4.50	2,700
Subtotal					144,088
Contingency		20%			28,818
Engineering		10%			14,409
Total Option "B" (Per Block)					$187,314
Round Off					$190,000

City of Cache Alternative Transporation Plan "Typical" Block Project Estimate					
Item Description	*Notes*	*Quantity*	*Units*	*Unit Price*	*Total Price*
Pedestrian-Actuated Traffic Signal	17	1	L.S.		76,000
Contingency		20%			15,200
Engineering		10%			7,600
Total					$98,800
Round Off					$100,000

Notes:

1) 5" thick over 2" screenings over 6" compacted subgrade.
2) Asphalt street paving removal at intersections where new concrete paving crosses. 18' wide by 20' long.
3) Asphalt or concrete driveway paving removal where new concrete paving crosses. 18' wide by 15' long.
4) To be used to repair gravel drives damaged by new concrete paving construction.
5) Repair street crossed by new concrete paving. 4" thick asphaltic concrete by 10' wide by 20' long.
6) Repair asphalt or concrete driveway paving with 5" thick by 8' wide by 15' long P.C. concrete paving.
7) Strip & stockpile topsoil from edge of existing road to street R/W line.
8) Respred stripped topsoil over disturbed area.
9) Apply sold slab sod to disturbed area.
10) Excavate borrow ditch and reshape earthen slopes within street R/W.
11) 35"x24"x40' CGMPA w/ 4:1 miters
12) Remove existing firehydrant & valve and replace with new firehydrant & valve at new location.
13) 24" wide by 6" tall P.C. concrete curb & gutter - both sides of street
14) 27' wide street
15) 6" thick under asphalt paving; 4" thick under concrete curb & gutter
16) 4" thick Type S4 Asphaltic Concrete
17) Traffic signal on "H" Avenue at existing school crossing. Light would be button-actuated by pedestrians.