Report for:

Geology and Field Reconnaissance Portsmouth Bypass

SCI-823-6.81

Phase 1 – Stage I

Prepared for:

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November 29, 2006

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1.0 INTRODUCTION

This report presents the findings of the field reconnaissance performed by DLZ Ohio, Inc. for the Phase 1 section of the Portsmouth Bypass in Scioto County, Ohio. The Phase 1 section of the project begins at Station 352+00 and ends at Station 537+50. The proposed alignment extends in a northwesterly direction for approximately 3 miles from the existing Shumway Hollow Road (TR 234) and approximately 0.25 mile west of the existing SR 335 to the existing Lucasville Minford Road (SR 728). The location of proposed alignment is illustrated on the location map in Appendix A.

This work was performed in conjunction with the subsurface investigation for the project performed by DLZ Ohio, Inc. The information contained in this report was complied from conversations with property owners, field observations, GPS data collection, and an examination of available literature, aerial photos, and maps.

2.0 TOPOGRAPHY

The topography along the proposed alignment in Scioto County, Ohio is characterized by the steep dissected topography of the uplands and the low relief, relatively level areas in the lowlands. This erosional topography is located in the Shawnee-Mississippian Plateau of the unglaciated portion of the Appalachian Plateau.

The area along the proposed alignment is not highly developed and contains limited secondary roadways. The majority of roads are two-lane county roads. The major existing roads near or crossing the proposed alignment are State Route 728, State Route 139, and State Route 335. Most of the roads are located within the stream valleys with occasional roads running between ridgelines.

3.0 GEOLOGY

3.1 Regional Geology

The lithology of central Scioto County is primarily composed of Mississippian aged rocks including shale, siltstone, and sandstone. The middle to upper Devonian aged rocks of the Ohio Shale and Olentangy Shale are found within deeper portions of the Scioto River valley. The upper Devonian aged rocks are undivided from the lower Mississippian aged rocks in previous mapping efforts within the county. The undivided Devonian and Mississippian aged rocks are located within portions of the Ohio River valley, Scioto River valley, and some of the deeper tributary valleys of the major drainages. Overlying the Devonian aged rocks; the full Mississippian aged stratigraphic column is present throughout much of Scioto County. Some of the best exposures of the Mississippian aged Logan Formation are found in Scioto County. Along the higher ridgelines in the eastern and east central portions of Scioto County, Pennsylvanian aged rocks cap the higher hilltops with residual soils overlying the rock.

The geology is affected by both regional and local bedrock structural features. The controlling regional feature is the Cincinnati Arch, which is located to the west of the proposed alignment. Generally, the rock strata of the region vary in thickness towards the Arch and the beds appear at increasingly higher elevations. There are two local structural features evident that affect the bedrock seen near the proposed alignment, a low dome and a monoclinal arch. The low dome is located west of Sciotoville on the north bank of the Ohio River, resulting in a reversal of the local dip seen in the bedrock adjacent to the dome. The low monoclinal arch is located in the western portion of the county trending north-northeast and crossing Scioto Brush Creek near Otway. This structural feature may increase the dip of the bedrock in and adjacent to the northern portion of the proposed alignment. The regional dip of the bedding within Scioto County ranges between 13 and 43 feet per mile to the east southeast (approximately E15°S to E20°S)[1].

3.2 Geology Along the Proposed Alignment

The following sections describe the general characteristics of the lithology found within the proposed limits of construction. The descriptions are organized by age of formation: Pennsylvanian, Upper Mississippian, and Lower Mississippian and Upper Devonian – Undivided.

Pennsylvanian Rocks

Pennsylvanian aged rocks from the Pottsville Group are found capping the higher ridgelines seen throughout the proposed alignment, except to the north in Valley Township. This unit is mapped as the Pennsylvanian Breathitt Formation on the open-file bedrock geology maps compiled by the Ohio Department of Natural Resources – Division of Geological Survey (ODNR – DGS). This name originated from mapping efforts of the Pennsylvanian Pottsville and Allegheny Groups in Kentucky.[2] The Pottsville Group members found within the proposed limits of construction will be referred to as the Breathitt Formation in this report to be consistent with bedrock geology maps prepared by ODNR – DGS.

The Breathitt Formation is found as thin bands generally following the topographic contours of the higher ridgelines. Due to the regional dip, the Pennsylvanian Breathitt Formation is generally absent or found above an

[1] Hyde, J.E. (1953), *Mississippian Formation of Central and Southern Ohio*, Bulletin No. 51, Ohio Division of Natural Resources Division of Geologic Survey, Columbus, Ohio.

[2] Verbal communication with Ohio Department of Natural Resources Division of Geological Survey.

elevation of 1000 feet within the northern and northwestern portion of the proposed alignment, above an elevation of 850 feet in the central portion of the alignment, and above an elevation of 760 feet in the southern portion of the proposed alignment. The top of the underlying Mississippian aged Maxville Limestone is associated with an erosional unconformity and the contact is probably undulating and non-uniform. The Breathitt Formation consists of conglomerate, coal, shale, thin limestone, sandstone, and iron ores. Generally, shale and sandstone are the dominant lithologies with occasional thin, bony coal beds or blossoms.

The predominate marker beds found within the Breathitt Formation are the Harrison Ore, located immediately overlying the Mississippian aged Maxville Limestone, the Sciotoville Clay, the Sharon Ore, and the Anthony Coal. Of these members, the Harrison Ore is the only marker bed that is relatively continuous within proposed limits of construction. The Harrison Ore is described as being closely associated with the underlying Mississippian aged Maxville Limestone, sometimes described as being an alteration of the underlying limestone.[3] Even when the Maxville Limestone is absent, the Harrison Ore is generally found. The ore is often brecciated or conglomeratic and is described as being sedimentary in origin as opposed to an alteration product. Consequently, the material comprising the Harrison Ore varies greatly from place to place, but it is commonly interpreted as the basal unit of the Pennsylvanian rocks. The Sciotoville Clay is relatively continuous throughout the alignment, whereas the Sharon Ore and the Anthony Coal are reported within the proposed limits of construction but neither are continuous or well developed.

Upper Mississippian Rocks

Upper Mississippian aged rocks from the Waverly Series, Cuyahoga and Logan Formations comprise the majority of the rocks within the proposed limits of construction. These two formations are not divided on the bedrock geology maps compiled by ODNR – DGS. However, formal subdivisions do exist and are used in the following descriptions. These rocks represent the middle and upper portion of the Mississippian System within the region.

The Maxville Limestone, overlying the Logan Formation, marks the contact with the overlying Pennsylvanian aged Breathitt Formation. The Maxville Limestone consists of isolated, discontinuous pockets of limestone that can range from very pure to cherty and is discontinuous due to an erosional unconformity at its upper surface. Where the Maxville Limestone is absent, the Logan Formation marks the upper contact with the overlying Pennsylvanian aged Breathitt Formation.

The underlying Logan Formation varies in thickness in part due to the erosional unconformity at its upper boundary and consists primarily of gray to brown fine-grained sandstone, siltstone, and sandy shale, but is characterized by the

[3] Stout, W., (1916), *Geology of Southern Ohio*, Bulletin No. 20, Ohio Department of Natural Resources Division of Geologic Survey, Columbus, Ohio

dominance of sandstone. Three members of the Logan are identified within Scioto County. Working up the stratigraphic column, they are the Byer Sandstone, the Allensville Conglomerate, and the Vinton Sandstone. Occasional iron ores are present within the Logan Formation, but are usually thin, isolated, and nodular. Generally, the Vinton member is a fine-grained sandstone which can be finely interbedded with sandy shale and often contains zones of fossils and ironstone concretions. The Allensville member is a fine-grained sandstone that can be finely interbedded with sandy shale with small pebbles beds (1 to 2 inches) throughout. This member is not easily distinguishable from the Byer member and is often missing within the sequence. The Byer member is generally a fine grained sandstone which can be finely interbedded sandstone and sandy shale or massive sandstone.

The Logan Formation is the dominant rock strata found within the proposed limits of construction. The hillsides in the southern and central portion of the proposed alignment are composed of sandstones of the Logan Formation with the exception of the Pennsylvanian Breathitt Formation capping the higher ridgelines as discussed in Section 2.2.1 of this report. Within the northern portion of the proposed alignment, the upper half to one third of the hillsides are composed of the Logan Formation. The Logan Formation gradually descends eastward until it passes under cover at the approximate eastern boundaries of Porter, Harrison, and Madison Townships to the east of the proposed alignment. Examples of the rock strata can be seen within several rock cuts throughout the area along the Ohio River and the lower Little Scioto River in which the cuts are composed entirely of the Logan Formation. Field observations of road cuts within the Logan Formation indicate that two regional joint set orientations are found within the proposed limits of construction. The main joint set is near vertical and trends east-west. A secondary joint set is near vertical and trends north-south.

The Cuyahoga Formation, underlying the Logan Formation, contains gray to brown shale interbedded with minor amounts of sandstone and siltstone with occasional massive sandstone beds. Two sandstone members of the Cuyahoga Formation are reported on the current stratigraphic column[4] as the Black Hand Sandstone and Buena Vista Sandstone. The Cuyahoga Formation, however, is characterized by the dominance of shale. Stout[3] reported three members within Scioto County. Working up the stratigraphic column, the members are the Henly siliceous shale, Buena Vista Sandstone member, and the Portsmouth Shale. The Buena Vista sandstone member dips below cover just east of the Scioto River and almost the entire visible portion of the Cuyahoga near the proposed alignment is composed of Portsmouth Shale. The Portsmouth Shale member of the Cuyahoga Formation is generally composed of blue to gray sandy shale with occasional thin sandstones or layers of concretionary ironstone, seldom over an inch or two in thickness. The shale readily weathers to buff colored flaky fragments and subsequently to clay. Areas within the northwestern portion of the proposed

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[4] Hull, D., (1990), Larsen, G., (2000), Slucher, E., (2004). *Generalized Column of Bedrock Units in Ohio*, Ohio Department of Natural Resources Division of Geological Survey, Columbus, Ohio.

alignment underlain by the Portsmouth Shale of the Cuyahoga Formation exhibit undulating, hummocky terrain indicative of landslides and earth flow due to the high clay content of the weathered shale. The contact between the Logan and Cuyahoga Formations is generally transitional and may be up to 25 feet in thickness.[1] The Cuyahoga Formation gradually descends eastward from the Scioto River, and is estimated to pass under cover approximately 1 mile west of Clarktown in the central part of the county and at Sciotoville in the south.

Lower Mississippian and Upper Devonian Rocks - Undivided

Along portions of the Ohio River and Scioto River valley the Lower Mississippian and Upper Devonian rocks have not been divided in previous mapping efforts. Previous mapping efforts combine the Mississippian aged Sunbury Shale, Berea Sandstone, and Bedford Shale with the upper Devonian aged rocks. However, formal subdivisions do exist and are used in the following descriptions. These rocks are poorly exposed at the ground surface due primarily to burial by glacial outwash, lacustrine soils, and alluvial deposits. The Sunbury Shale may be exposed in the lower slopes of the hills immediately east of the Scioto River, but is under cover throughout the rest of the alignment.

Generally, these rocks not seen outcropping within the near or within the limits of construction and are primarily found beneath the overburden of the larger stream channels. The Mississippian aged Sunbury Shale is located at the contact with the overlying Mississippian Cuyahoga Formation. Generally, the Sunbury is a brown to black carbonaceous shale that is thin, fissile, and planar, often containing small pyritic concretions. The Sunbury ranges in thickness from 10 to 50 feet. Underlying the Sunbury Shale, the Mississippian Berea Sandstone consists of gray sandstone and minor shale and ranges in thickness from 10 to 50 feet with thin to thick bedding. The bottom of the group is composed of the Mississippian and Devonian aged Bedford Shale. The Bedford contains gray to brown shale with interbedded sandstone beds up to two to three feet in thickness. The sandstone beds consists of thin platy sandstones seldom over a fraction of an inch thick and separated by thinner shale partings. The Bedford shale overlies the Devonian aged Ohio Shale.

Quaternary Geology

Soils found within the limits of construction can be divided into three groups. First, residual and colluvial soils derived from weathering of underlying rock and downslope transport. Second, there are lacustrine and outwash deposits of glacial origin and finally soils consisting of recent alluvial deposits. The residual and colluvial soils are found along the ridge tops and hillsides, glacial soils are typically found within the major stream valley and their tributaries, and recent alluvial deposits are found along and within stream channels and valleys.

Residual and Colluvial Soil
Residual and colluvial soils are found on the ridgetops and the hillsides within the proposed limits of construction. Along the proposed alignment, residual and colluvial soils are generally thin to moderately deep, covering moderate to very steep slopes. Residual and colluvial soils on the hillsides are prone to landslides. Landslide susceptibility within the proposed limits of construction is addressed in Section 7.0 of this report.

Four soil complexes are reported along the hillsides consisting of: Shelocta-Brownsville, Shelocta-Wharton-Latham, Latham-Wharton-Shelocta, and Shelocta-Steinburg-Latham. These complexes combined make up approximately 80 percent of the soils found within the county having slopes ranging from 8 to 70 percent and are composed of residuum and colluvium derived from shale, siltstone, and sandstone.

Lacustrine Soils and Glacial Outwash
The two types of glacial soils encountered within the proposed limits of construction are lacustrine deposits and glacial outwash deposits.

The lacustrine soils are commonly known as the 'Minford Silts' or the Minford Complex. The soils within this group will be referred to as the Minford Complex in this report. These deposits are primarily found within the Little Scioto River Valley and its tributaries in the central and southern portions of the proposed alignment. The Minford Complex soils are generally found between elevations of 650 to 780 feet. These deposits were formed during the early to middle Pleistocene Aged when the northward flowing Teays River system was blocked by the southward advance of the Kansan aged ice sheets. As the glaciers advanced, the course of the Teays River was blocked south of Chillicothe and a large lake was formed from the impoundment of the waterways. As a result of the impoundment, vast quantities of sediments were deposited ranging from 10 to 80 feet in thickness, thinning towards the margins.

The deposits range from a basal lag deposit, consisting of sands with pebbles and cobbles, to very plastic clays that usually have a high water content. The Minford Complex soils vary considerably throughout the area of the proposed alignment, partially due to original deposition and change since the time of formation. When present, these materials lie on or near bedrock. The Minford Complex soils have no regular succession, but typically sands and sandy silts are found near the bedrock and fine laminated silts and clays are found at the higher levels of the sequence. Occasionally, the Minford Complex contains sandstone cobbles and boulders and quartz pebbles in the lower parts of the sequence. These cobbles, boulders, and pebbles within the sequence are believed to be of local origin. However, the silt and clay deposits are peculiar for Ohio in that they typically contain up to 50 percent sericitic mica, indicating that they are probably derived from a metamorphic schist terrane such as the Piedmont province within the

Appalachian Mountains[5]. Most lacustrine deposits within Ohio are glacial, consisting of “rock flour” derived from the movement of glaciers or are composed of materials derived from weathered sandstones, shales, and calcareous rocks which dominate the lithology of the rocks within Ohio. Thin alluvial and/or glacial outwash deposits are frequently found overlying the Minford Complex soils. The type section for the Minford Complex soils is located in a rail cut on the outskirts of the Village of Minford, Ohio.

Glacial outwash deposits are found along the Scioto River valley occupying the valley of the preglacial Teays-aged Portsmouth River and within the Ohio River valley. The glacial deposits are late Wisconsinan in age and consist of sand and gravel deposits with small isolated peat deposits. Generally, these deposits are saturated at shallow depths with high recharge rates. Several sand and gravel pits can be seen along existing US 23; where these sand and gravel deposits have been or are currently being extracted.

Four soil complexes are reported along the preglacial valleys and on flood plains, terraces, and fans consisting of Omulga-Monongahela-Haymond, Weinbach-Wheeling-Elkinsville, Nolin-Shelocta-Omulga, and Tioga-Sardinia-Fitchville. These complexes combine to make up approximately 15 percent of the soils found within the county having slopes ranging from 0 to 40 percent (majority are between 0 and 15 percent) and are formed in colluvium, lacustrine sediments, flood plains, fans, and in preglacial valleys.

Alluvial Soils

Generally, the largest deposits of alluvial soils are found along the Little Scioto River and the Ohio River. These deposits are usually granular with high fines (clay and silt) content. Alluvial soils, to some extent, are found along all of the creeks and rivers within the proposed limits of construction. Generally alluvial deposits range from silty clay to coarse sand. Where bedrock is shallow, alluvial deposits may contain coarse sand, gravel, and cobbles.

Two soil complexes are reported along the flood plains consisting of Nolin-Genessee and Stendal-Cuba-Tioga. These complexes combine to make up approximately 5 percent of the soils found within the county having slopes ranging from 0 to 3 percent and are formed in alluvium within the flood plains.

4.0 LAND USE

Land use along the project varies from managed forests and wooded areas, to agricultural and residential usage. Generally, road access and topography determine the use, with the steeper, more remote terrain forested or used as pasture. Along the roads, the valley and low relief lowlands are maintained as residential areas or utilized as cultivated fields.

[5] Stout, W. and Schaaf D., (1931), *Minford Silts of Southern Ohio*, Bulletin of the Geological Society of America, Vol. 42, pp. 663-672.

The following is a detailed discussion of the land use along the proposed alignment of the project.

4.1 Phase 1 Mainline

Sta. 352+00 to Sta. 366+00
A wooded area that has had all but the smallest trees removed by logging. There are several rough logging access roads crossing the alignment. Tree debris is present throughout the area. The vegetation now consists mainly of brush with young deciduous and coniferous trees. The logging and associated roads have resulted in extensive erosion throughout the area. The terrain is hummocky with numerous intermittent and ephemeral streams.

Sta. 366+00 to Sta. 375+50
A low to moderate relief area consisting of a mowed field, a residential structure and three associated outbuildings. Shumway Hollow Road (TR 234) crosses the alignment near Sta. 375+50. Some junk and debris piles can be found in the area.

Sta. 375+74 to Sta. 380+86
A low-relief residential use area with a residential structure about 55 feet to the right of Sta. 379+50. A pond is located near the centerline at Sta. 380+00. A hay field crosses the project centerline near Sta. 376+25 and continues to the centerline of the northbound Shumway Hollow / SR 335 exit ramp (TR234 Ramp B) near Sta. 380+50.

Sta. 380+86 to Sta. 407+50
This gently sloped land is utilized for agriculture and is bordered on the west by steep wooded terrain and on the east by a rock cut constructed for the CSX railroad. The area within the limits of construction generally has a gentle slope of 8H:1V to 4H:1V. A pond is located on the centerline at Sta. 410+50. A variety of junk and debris is located just south of the pond near Sta. 394+00. Natural and man-made drainage channels dissect the area and eventually drain into the CSX railroad cut to the east.

Sta. 407+50 to Sta.413+50
This is an area of gently rolling relief as the alignment turns west into the steep uplands. The hillside slopes range from flatter than 8H: 1V to steeper than 4H: 1V. The area is enclosed by livestock fencing and is used as a hay field or pasture. A pond exists 10 feet to the right of Sta. 410+50. The area has number of streams that cross the alignment and drain to the northeast.

Sta. 413+50 to Sta. 442+50
This is a steep wooded area with 250 feet of vertical relief. The hillside slopes range from 4H:1V to nearly 1H:1V. Most of the area has been selectively logged and access roads cross the alignment in several places. Several small streams drain this area and the steep topography has created deep stream channels with

steep banks. A beacon tower for the Portsmouth Regional Airport is located 200 feet left of Sta. 428+50. A large area has been recently clear-cut along the alignment and to the right from Sta. 430+00 continuing to Sta. 440+00. This hill is known locally as Sampson Hill, and the wooded area is known as Sampson's Woods.

Sta. 442+50 to Sta. 449+50
Swauger Valley Road crosses the alignment at Sta. 442+50. This area has been developed as residential use and four residential structures are near or within the limits of construction. A 0.17-acre pond is located at station 448+00. Several outbuildings and junk piles are present in the area.

Sta. 419+20 to Sta. 456+00
This area is relatively steep, wooded and partially utilized as a pasture. There is a private access road that crosses the alignment near station 453+50.

Sta. 456+00 to Sta. 481+00
This area consists of a low-density wooded section to the left of the proposed alignment and an open pasture field to the right. The entire area is used as pasture. Fences and private access roads exist along the alignment in this area and cross the centerline in several places. The terrain is somewhat hummocky and several streams cross the alignment. A 1.4-acre excavated embankment pond exists from approximately Sta. 465+00 to 467+00. An additional excavated sediment pond lined with perforated drainage tile exists to the south of the larger pond. A 0.2-acre embankment pond exists 240 feet to the left of Sta. 479+50.

Sta. 481+00 to Sta. 485+50
This mostly wooded area is very steep with slopes near 1H:1V. A small stream (Long Run) crosses the alignment from approximately Sta. 484+50 to Sta. 484+90. SR 139 crosses the alignment near Sta. 485+50.

Sta. 485+50 to Sta. 488+25
This low relief area has been developed as residential use. Two residential structures are near or within the limits of construction. Several areas of junk and debris are present.

Sta. 485+00 to Sta. 521+50
This is a low to high-density wooded area with vertical relief of nearly 300 feet. It has been timbered and logging roads cross the alignment at several locations. The streams in this area drain along the alignment into a stream that crosses the centerline near Sta. 504+50.

Sta. 521+50 to Sta. 537+50 and Lucasville-Minford Road Interchange
This area was once utilized for agriculture. The fields are mostly open and the terrain ranges from steep to gently rolling with several perennial streams. There

is an abandoned residential structure and several associated outbuildings near Lucasville-Minford road. There are several piles of debris and junk in this area.

4.2. Shumway Hollow Road relocation and SR 335 Interchange

Sta. 10+0.00 to Sta. 26+00
This area is wooded and has been selectively logged. Logging roads exist along the alignment and cross the centerline in several places. A residential structure exists about 130 feet to the left of Sta. 13+50. Some junk and debris can also be found in this area.

Sta. 26+00 to Sta. 35+50
This area is utilized for agriculture as cultivated fields; a fence crosses the centerline near Sta. 31+30.

Sta. 35+50 to Sta. 39+00
The alignment crosses an active CSX railroad bed in a 20 foot deep cut from Sta. 37+00 to Sta. 38+00. An abandoned telegraph line crosses the alignment near Sta. 36+00.

5.0 BEDROCK EXPOSURES

Natural and man-made bedrock exposures exist at several locations along the alignment. Bedrock exposures within 500 feet of the centerline of the proposed alignment were considered for this section. Bedrock exposure locations are illustrated on the field notes and proposed centerline in Appendix A.

5.1 Shumway Hollow Road – Township Road 234

This road follows a natural drainage through an existing steep sided hollow. The ditches on both sides of the existing road have been excavated into bedrock. Bedrock is exposed near Sta. 377+00 of ramp T234C from an elevation of 635 feet to 655 feet. The bedrock is medium hard brown sandstone, fine-grained, moderately weathered, thin to medium bedded, and moderately fractured. The sandstone is a member of the Mississippian Logan Formation. A photo of this exposure can be seen in Appendix B.

5.2 CSX Railroad cut along SR 335

The proposed Shumway Hollow Road relocation crosses an existing CSX railroad cut from Sta. 36+00 to Sta. 38+00 from an elevation of approximately 627 feet to 650 feet. This cut was constructed with slopes ranging from .5H:1V to nearly vertical with slope heights of approximately 20 to 33 feet. The cut was likely constructed in the early 1900's. The bedrock is similar the exposed bedrock at Shumway Hollow, mostly a soft to medium hard brown sandstone, fine-grained, highly weathered, thin to medium bedded, and highly fractured. The sandstone is also likely a member of the Mississippian Logan Formation. The cut appears stable, but some rockfall is present on the western side of the cut. Seepage was observed in several locations on both sides of the cut. The ditches on both sides of the railroad beds contain water year round. Maintenance appeared minimal and maintenance records for this cut were not available. A log and photo of this exposure can be seen in Appendix B.

5.3 Long Run near SR 139

The valley associated with Long Run is nearly 350 feet wide, bordered by steep valley walls on both sides. Long run crosses the proposed alignment between Sta. 484+00 and Sta. 485+00 with a channel width of 30 to 40 feet and a depth of approximately 10 feet. The stream has a relatively clean bedrock bottom in at an elevation of approximately 625 feet within the limits of construction. The bedrock is hard gray sandstone, very fine to fine grained, slightly weathered, argillaceous, micaceous, and slightly to moderately fractured. This sandstone is a member of the Mississippian Logan Formation. A photo of the sandstone in Long Run can be seen in Appendix B.

6.0 DRAINAGE AND WATER CROSSINGS

6.1 Ponds

There are eight man-made ponds that are within or near the limits of construction. Some of the ponds are simple embankment ponds built across a valley to contain water from an existing stream. Several of the ponds were built by excavation and embankment construction, developing an existing spring as the primary source of water. The pond source, type of construction, and other details were determined from landowner conversations and field observations. Photos of several of the ponds are shown in Appendix B.

Sta. 380+00
A 0.50-acre excavated embankment pond is located near the centerline at Sta. 380+00. The primary source of water for this pond is surface runoff. This pond was constructed within the last 15 years. A private underground water line is plumbed from the bottom of this pond to an aboveground valve near the barn located at Sta. 378+00 of the proposed ramp D at the Shumway Hollow Road interchange. The depth of the pond is estimated to be 8 feet deep near the center.

Sta. 410+50
A 0.7-acre excavated embankment pond is located on the centerline at Sta. 410+50. The primary source of water for this pond is a spring, although is does receive some surface run off. The age of the pond is unknown, but is estimated to be 10 feet deep near the center of the pond.

Sta. 407+25
A 0.06-acre excavated embankment pond is located 175 feet left of Sta. 407+25. The primary source of water for this pond is surface run off. This pond appeared to contain a considerable amount of sediment and is less than 2 feet deep.

Sta. 410+50
A 0.3-acre excavated embankment pond exists to the right of Sta. 410+50. The water source for this pond is both spring and surface run off. The property owner maintains the pond for flood control purposes during heavy rainfall events. The embankment has been breached in the past during heavy rainfall events. The age of the pond is unknown and the depth is estimated to be approximately 5 feet deep.

Sta. 448+00
A 0.17-acre embankment pond is located at station 448+00. The pond's source is mainly surface run off. The pond is less than 10 years old and has a maximum depth of approximately 8 feet when full.

Sta. 465+50
A 1.4 acre-excavated embankment pond exists from approximately Sta. 465+00 to 467+00. An additional excavated sediment pond lined with perforated drainage tile exists to the south of the larger pond. The sediment pond normally did not contain standing water, but appeared soft and wet throughout the year. Both ponds receive water primarily from surface runoff. The age of the large pond is unknown and the depth is estimated to be about 10 feet. There is an 80 feet buried 1-inch diameter water line running from the Northeast corner of the pond to a float valve-controlled livestock water tank.

Sta. 479+50
A 0.2-acre embankment pond exists 240 feet to the left of Sta. 479+50. The pond is estimated to be about 5 feet deep and is filled by surface runoff. There is a 280' buried 1-inch diameter water line running from the Northeast corner of the pond to a float valve-controlled livestock water tank.

Sta. 531+00
A 0.14-acre excavated embankment pond is located at Sta. 531+00. The pond receives water from both surface runoff and a spring. The age of this pond is unknown and it is estimated to be about 5 feet deep.

6.2 Wetlands

Along the Phase 1 alignment, other than ponds, there are no areas that meet the definition of a true wetland. There are several areas that become very soft and wet during the winter months, but they usually dry during the summer. Most of these low wet areas are areas can be found from Sta. 381+00 to Sta. 413+00 or Sta. 527+00 to Sta. 537+50. These areas are indicated on the field notes and proposed centerline in Appendix A.

6.3 Streams

There are a large number of streams near or within the limits of construction in various locations. Three of the streams are perennial, normally flowing throughout the year. A number of streams are intermittent, flowing only during the wet season. All other streams are ephemeral, without a clearly defined channel and flowing only during heavy rainfall events. The streams are labeled as perennial, intermittent, or ephemeral on the field notes and proposed centerline in Appendix A.

6.4 Springs and Seepage

All of the known springs along the alignment that have been developed as a water source for ponds in Phase 1. Although no other undeveloped springs were observed, several areas produced seepage throughout the wet winter months and often into the spring. The areas of seepage in Phase 1 were Sta. 456+00 to Sta. 464+00 and Sta. 528+00 to Sta. 537+00. The locations of the areas of seepage are marked on the field notes and proposed centerline in Appendix A.

7.0 LANDSLIDES

The hillsides and natural slopes along the majority of the phase one alignment are generally very steep with a thin soil cover The dominant rock type in the along the proposed alignment is sandstone of the Mississippian aged Logan Formation. Siltstone and shale are commonly found interbedded with the sandstone. These siltstones and shales generally weather to clay with low shear strength. The steeper slopes are prone to gradual movement known as soil creep. The low shear strength of the residual and colluvial soils combined with the steep topography makes some of the hillsides within the proposed limits on construction prone to these shallow surficial landslides. Soil creep is generally easily corrected by removal of the slide mass. No deep-seated landslides were observed along the proposed Phase 1 alignment.

Four areas showed recent signs of significant instability near or within the limits of construction. All slope instability appeared to be relatively shallow soil creep contained within the overburden, though one of these areas showed signs of a past massive landslide. In the steep terrain of Scioto County, soil creep is common. Areas of slope instability were first identified using aerial photography and then verified during the fieldwork. All areas of slope instability are shown on the field notes and proposed centerline in Appendix A.

Sta. 352+00 to Sta. 356+00
The aerial photography and survey information showed hummocky terrain from Sta. 352+00 continuing to Sta. 356+00. This area exhibited signs of recent instability. This is most likely due to erosion and shallow soil creep along the steep drainage channels of intermittent streams in the area.

Sta. 423+00 to Sta. 425+00
The area from Sta. 423+00 to Sta. 425+00 exhibited signs of instability. This is most likely due to erosion and saturation of the steep, nearly 1H:1V slopes along steep intermittent stream channels during heavy rainfall events. The soil creep in this area appeared to be relatively massive. However, in this area, the current profile indicates

the alignment will be in a deep rock cut section and the unstable soils will be removed.

Sta. 432+00 to Sta. 442+00
Another area to exhibit signs of soil creep are the steep slopes from Sta. 432+00 to Sta. 442+00. This is most likely erosion from logging activities and the toes of these slopes being eroded by the intermittent streams that flow through the valley. The recent activity appears to be shallow soil creep and not a deep active landslide.

Sta. 482+00 to Sta. 484+25
Another area to exhibit signs of instability is the steep, nearly 1H: 1V slope from the Sta. 482+00 to Sta. 484+25. This is most likely due to the toe of the slope being eroded by Long Run. In the past there appears to have been a massive landslide in this location. However, the recent activity appears to be shallow soil creep and not a deep active landslide.

8.0 MINING AND PREVIOUSLY UNKNOWN WELLS

An examination of the Ohio Department of Natural Resources' Abandoned Underground Mine Database showed no known abandoned underground mines within 1000 feet of the proposed alignment. Conversations with property owners confirmed this. There was, however, possible surface and small "pit" mining of clay and iron-rich sandstone 450 feet to the left of Sta. 450+00. The disturbed area was small and the resulting mining pits were shallow. The locations of the surface pit mines are shown on the field notes and proposed centerline in Appendix A. In addition to the limited surface mining, one previously unknown gas well was discovered at approximately 60 feet right of Sta.534+00. This gas well is shown on the field notes and proposed centerline in Appendix A.

9.0 DUMPS AND DEBRIS

Many small dumps, junk, and other debris can be found along the alignment within the limits of construction. The dumps are generally small and are indicated on the field notes and proposed centerline in Appendix A. A representative photo of a dump can be found in the Appendix B.

10.0 EXISTING ACCESS ROADS AND TRAILS

There are a large number of access roads created by private property owners along the alignment. These roads could prove useful during construction. The access roads are labeled on the field notes and proposed centerline in Appendix A.

11.0 EXISTING EMBANKMENTS.

Existing embankments in the area are relatively rare and are usually less than ten feet high. Small embankments at SR 335 and SR 139 near the alignment were built less than five feet high and with slopes of 2:1 to 1:1. The tallest embankment is a ten-foot embankment constructed for SR 728 (Lucasville-Minford Road) near the intersection with Flowers-Ison Road. This embankment was constructed with slopes of 2:1 to 1:1. All of the embankments appeared stable.

12.0 EXISTING PAVEMENTS

The existing pavement for Shumway Hollow Road, SR 335, Swauger Valley Road, SR 139, and SR 728 was evaluated as part of the field reconnaissance. Photos illustrating the pavement conditions of all of these roads are in the Appendix B. All existing pavements appeared to be performing well, with no serious signs of deterioration or rutting. SR 728, SR 139, and SR 335 showed minor signs of transverse cracking and raveling. Swauger Valley road and Shumway Hollow Road appeared to be in good condition throughout the duration of the investigation.

13.0 GEOTECHNICAL DESIGN CHECKLIST

The geotechnical design checklist applicable to this report is included in Appendix C.

14.0 CLOSING REMARKS

We appreciate the opportunity to be of service to on this project. Please do not hesitate to contact us with any questions or concerns regarding this report.

Sincerely,

DLZ OHIO, INC

Andrew M. Jalbrzikowski
Engineering Geologist

Pete Nix, P.E.
Geotechnical Division Manager

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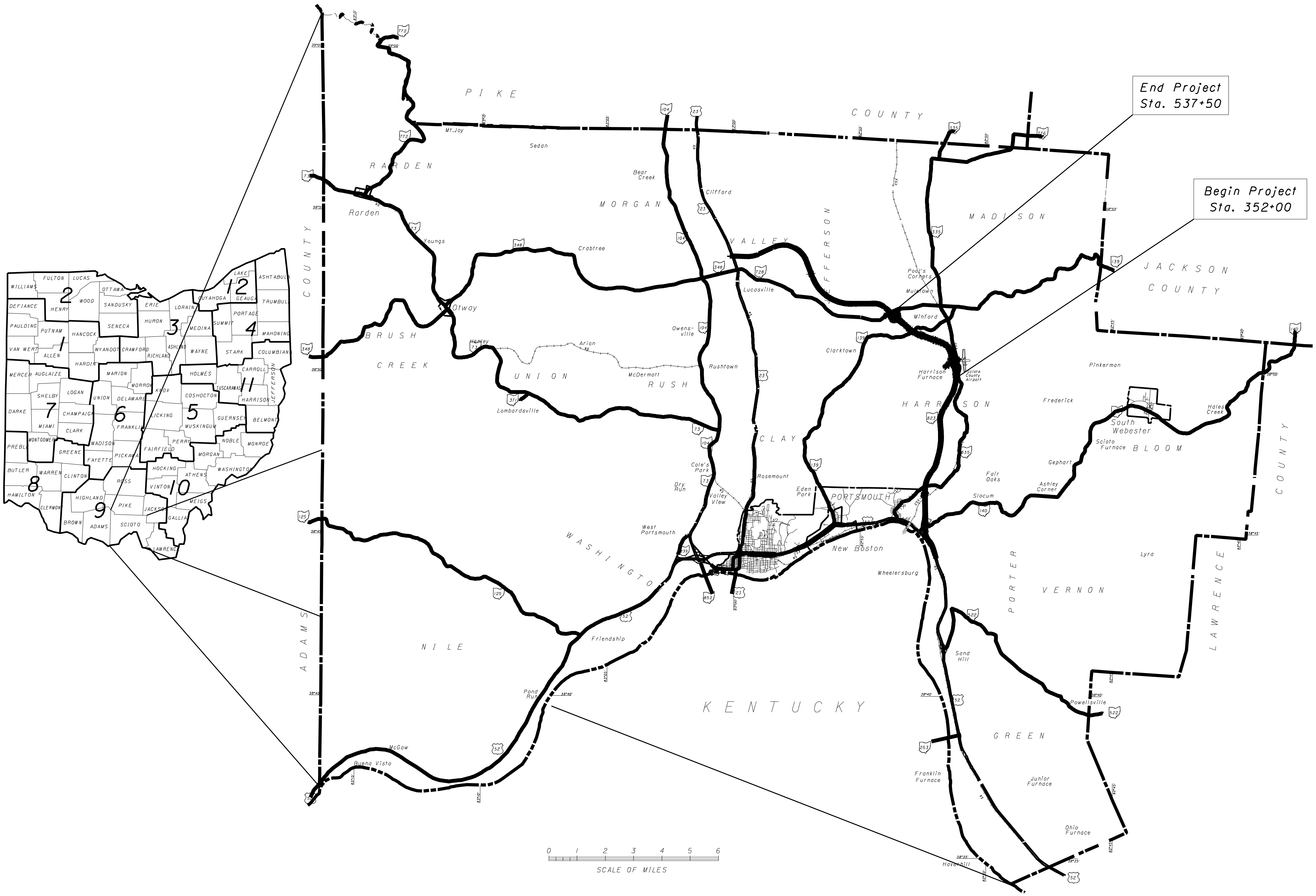
APPENDIX A

General Location Map
Reconnaissance Notes – Land Use and Proposed Centerline



DLZ
6121 Huntley Road
Columbus, Ohio
43229

DRAWN AMJ
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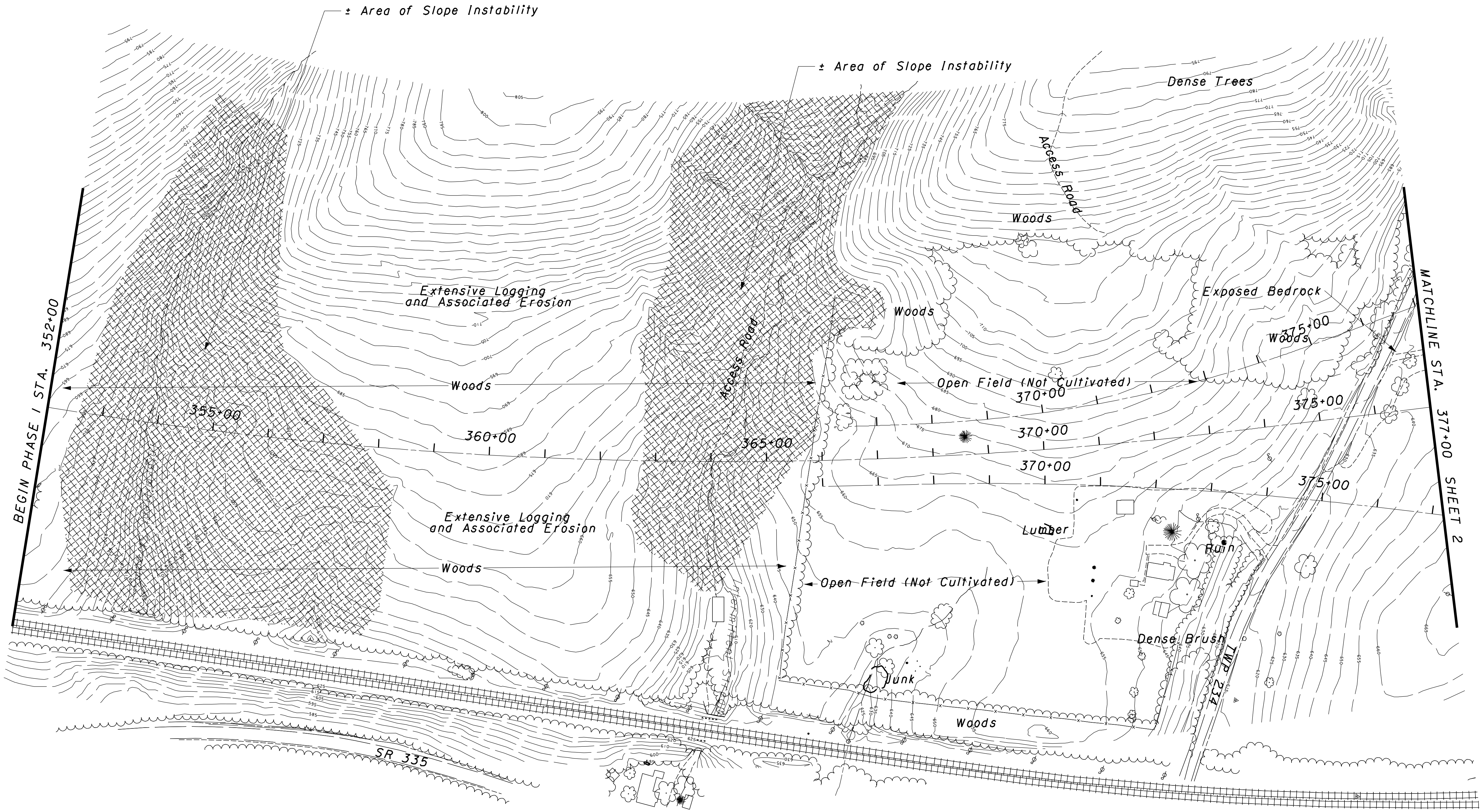
GENERAL LOCATION MAP
PORTSMOUTH BYPASS PHASE 1

SCI-823-6.81

1 / 1



HORIZONTAL SCALE IN FEET

0 50 100 200

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LAND USE AND RECONNAISSANCE NOTES
STA. 352+00 TO STA. 377+00

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1/8

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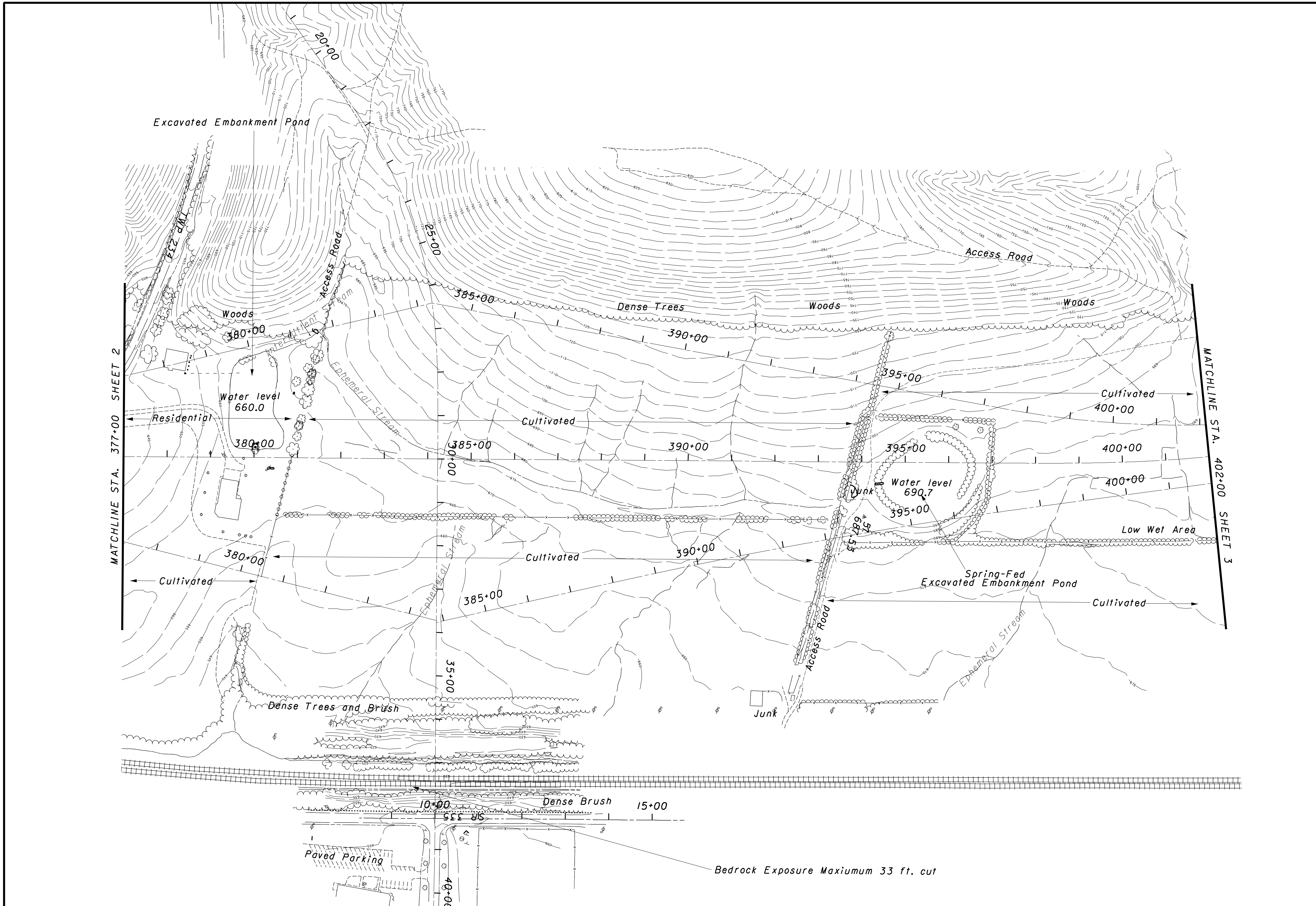
LAND USE AND RECONNAISSANCE NOTES
STA. 377+00 TO STA 402+00



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2/8

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LAND USE AND RECONNAISSANCE NOTES
STA. 402+00 TO STA. 427+00

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HORIZONTAL SCALE IN FEET
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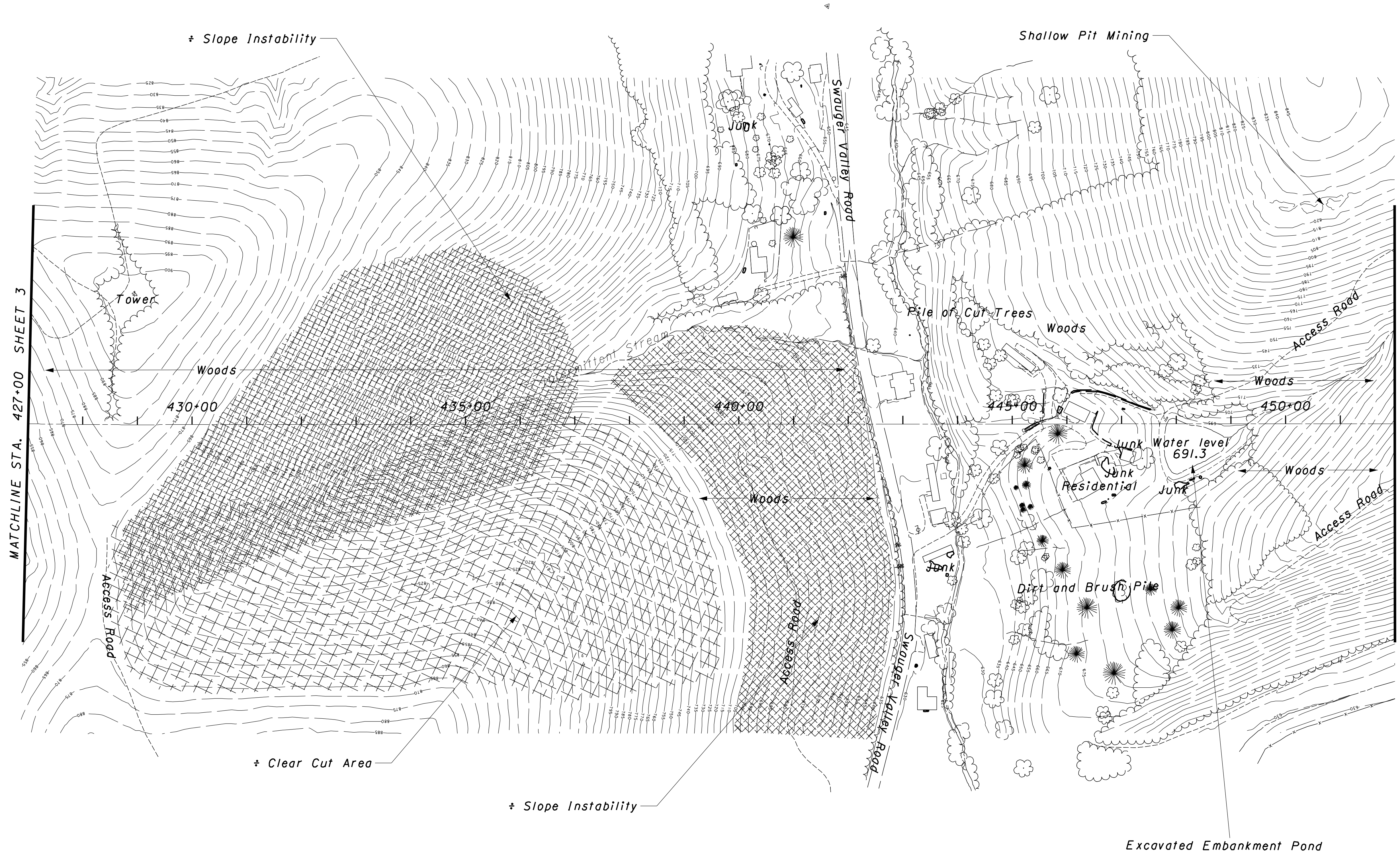

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LAND USE AND RECONNAISSANCE NOTES STA. 427+00 TO STA. 452+00

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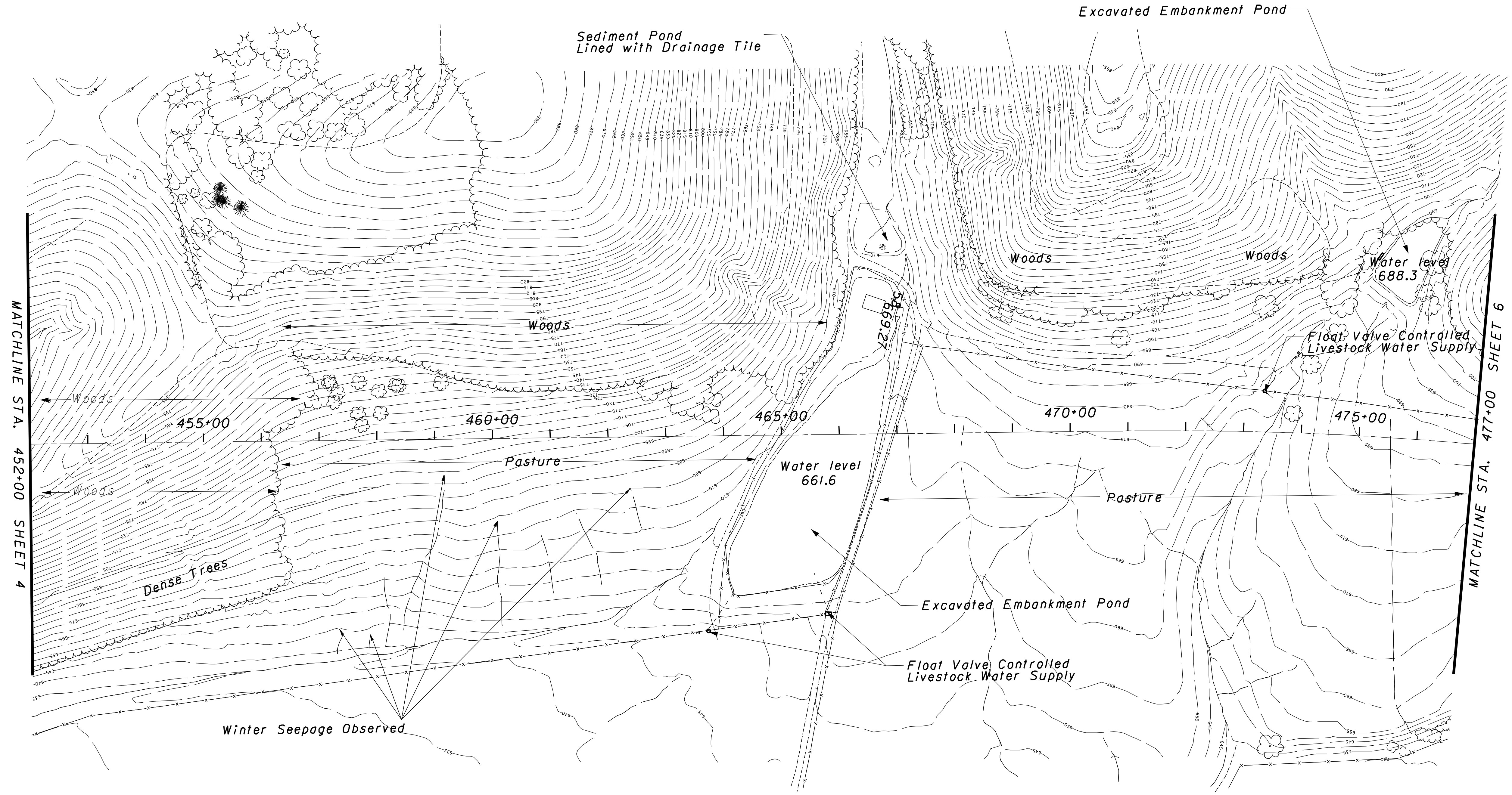

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LAND USE AND RECONNAISSANCE NOTES
STA. 452+00 TO STA 477+00

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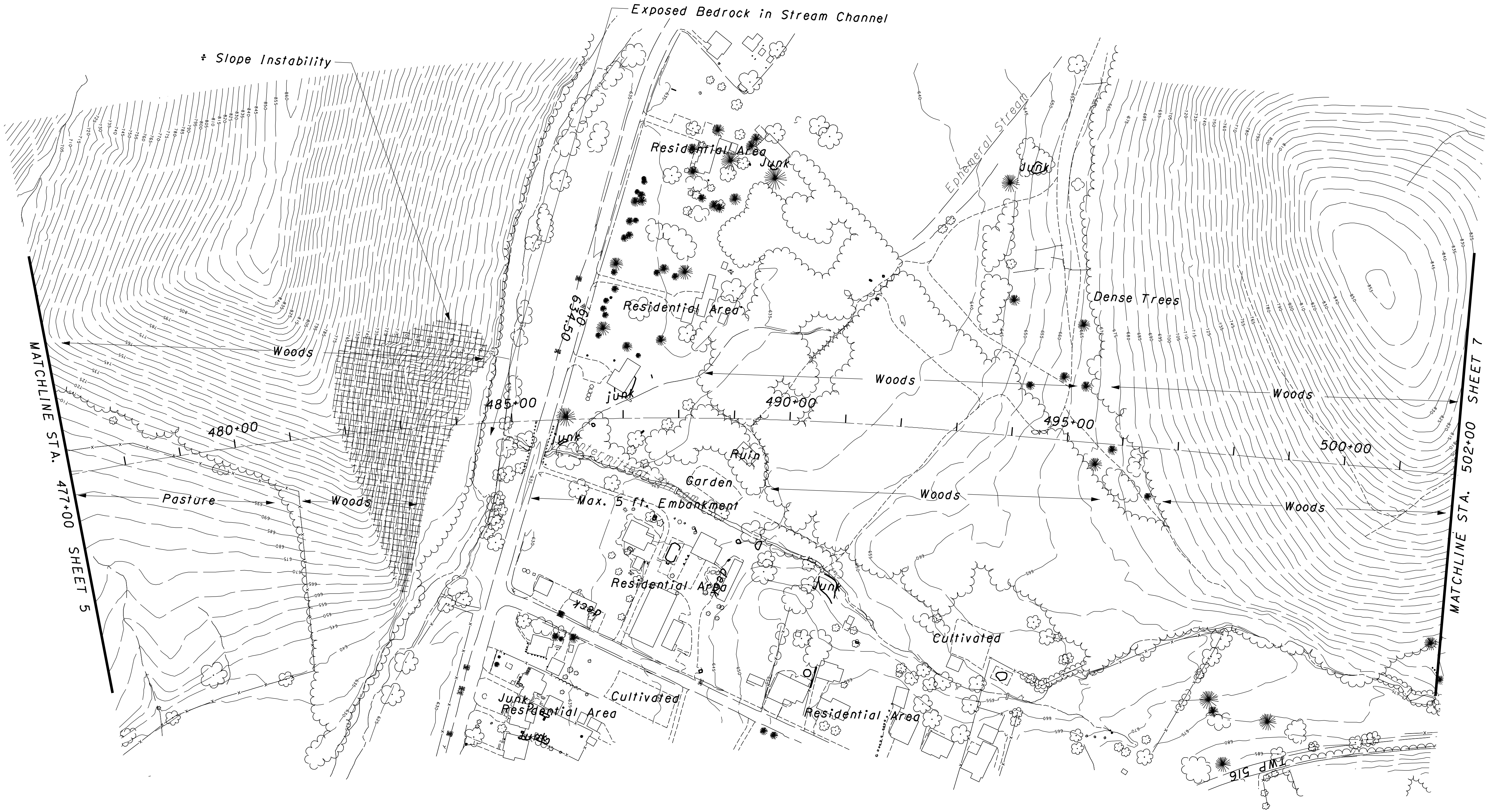

LAND USE AND RECONNAISSANCE NOTES STA. 477+00 TO STA. 502+00

SCI-823-6.81

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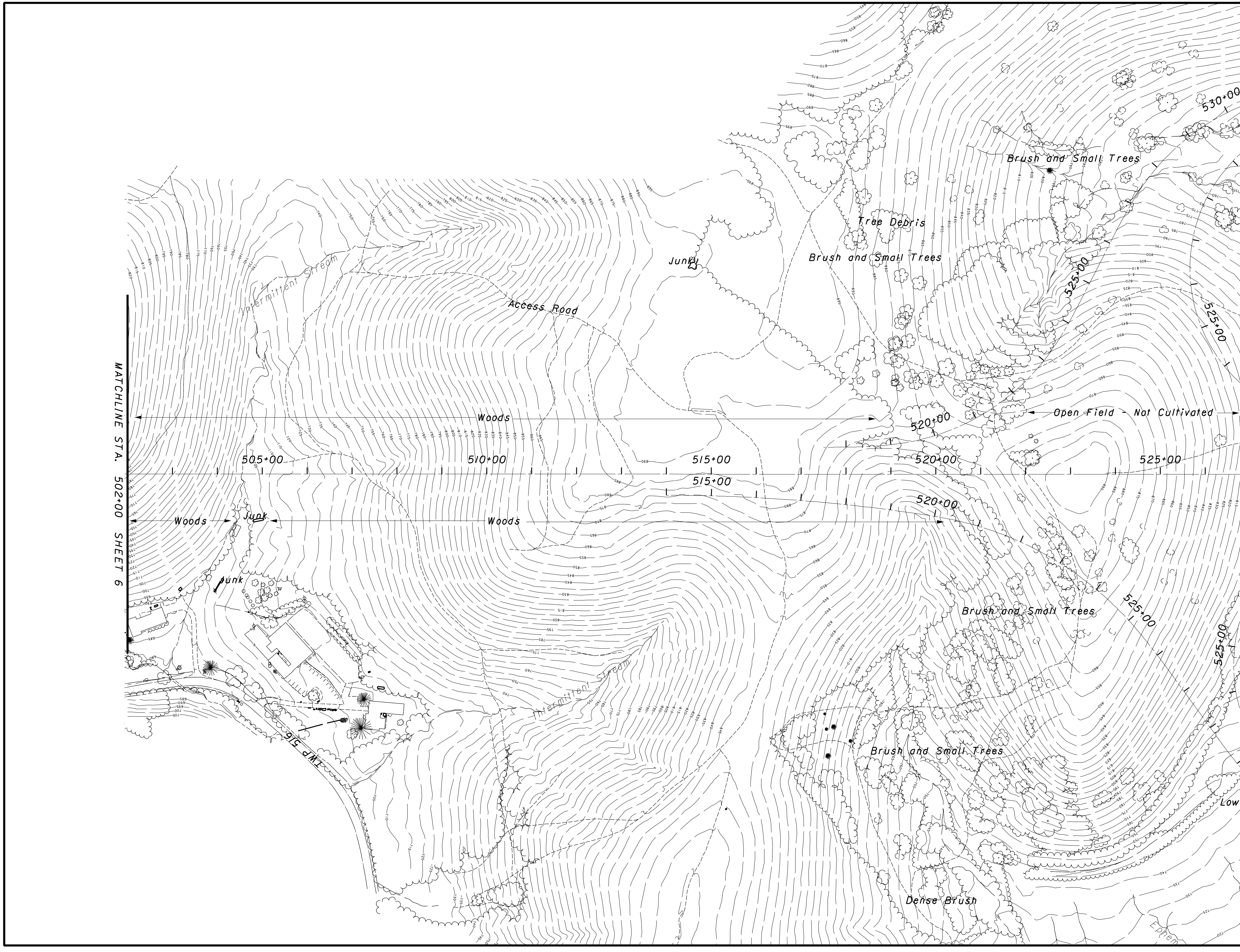

LAND USE AND RECONNAISSANCE NOTES
STA. 502+00 TO STA 527+00

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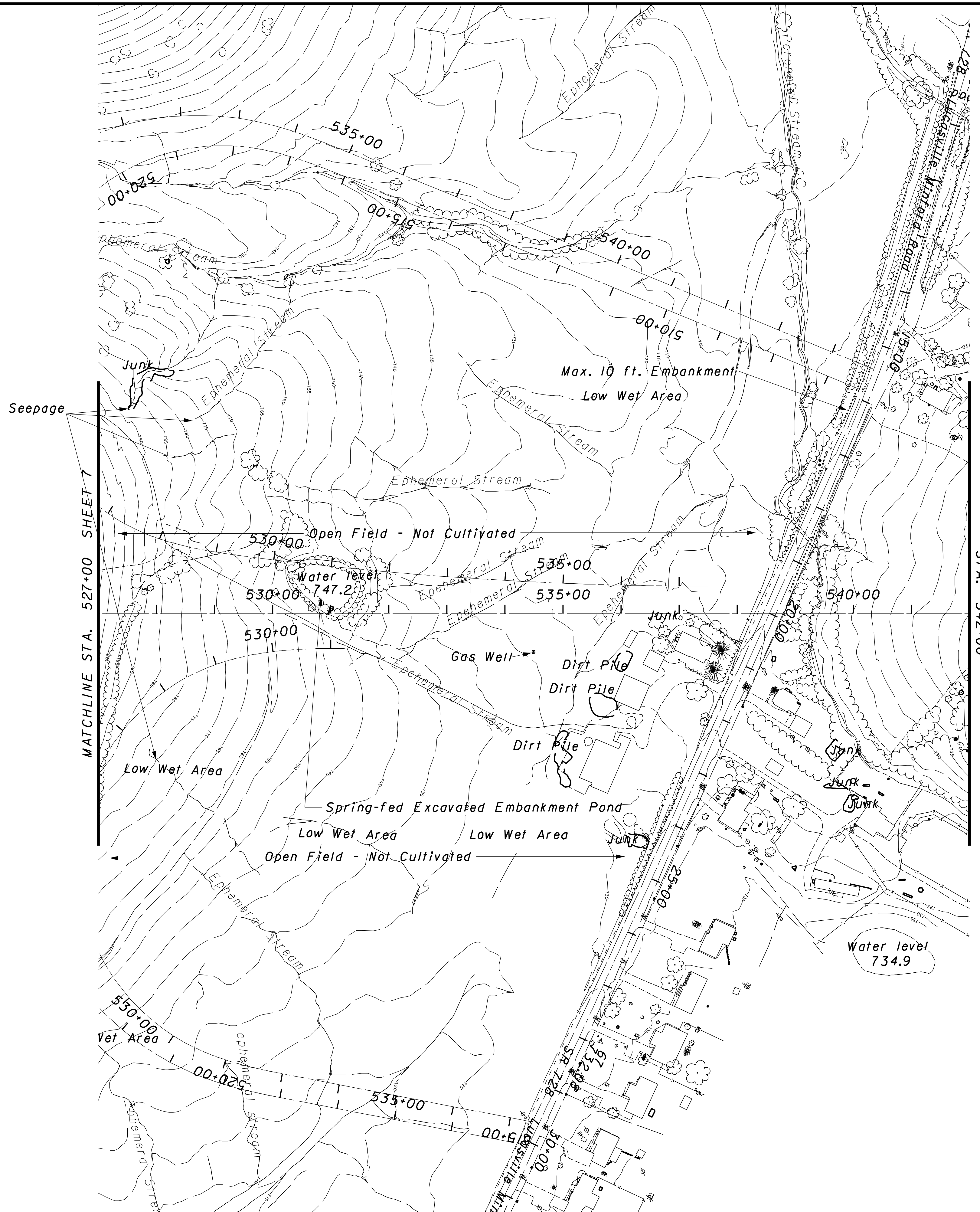

LAND USE AND RECONNAISSANCE NOTES
STA. 527+00 TO STA. 542

SCI-823-6.81

HORIZONTAL SCALE IN FEET
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APPENDIX B

CSX Bedrock Exposure Log

Bedrock Exposure Photos

Pond Photos

Pavement Photos


Photo 1. Bedrock Exposure: Shumway Hollow Road Ditch

Photo 2. Bedrock Exposure: CSX Railroad cut.

Photo 3. CSX Railroad Cut. View to the south towards Shumway Hollow.

Photo 4. Bedrock Exposure: Long Run.

Photo 5. Spring-fed excavated embankment pond near Sta. 410+50.

Photo 6. Pond near Sta. 410+50.

Photo 7. Excavated embankment pond near Sta. 531+00

Photo 8. Example of a dump.

Photo 9. Pavement: Shumway Hollow Road.

Photo 10. Pavement: SR 335

Photo 11. Pavement: Swauger Valley Road

Photo 12. Pavement: SR 139.

Photo 13. SR 728

APPENDIX C

Reconnaissance and Planning Checklist

II. Reconnaissance and Planning Checklist

C-R-S: SCI-823-6.81	PID: 19415	Reviewer: A. Jalbrzikowski	Date: 11-29-06

All projects must establish the geologic setting and identify possible geologic hazards that may exist in the project area prior to preliminary design. This Reconnaissance and Planning Checklist should be followed as a guide to establishing the above conditions.

(Y) N — 1. Has the "Planning and Reconnaissance" section of the ODOT Specifications for Subsurface Investigations been followed?

2. Have the following ODOT sources of geotechnical information been reviewed:

- (Y) N X — a. past construction plans, including soil profile sheets from District
- Y (N) X — b. past project construction diaries
- (Y) N X — c. interviews with people knowledgeable of the project site
- (Y) N X — d. archived boring logs on file with the OGE
- (Y) N X — e. past District and County Garage maintenance records

(Y) N — 3. Has ODNR geotechnical information been reviewed?

Indicate which references were reviewed:

- ☒ "Bedrock Geologic Map(s)"
- ☒ "Bedrock Structure Map(s)"
- ☒ "Bedrock Topography Map(s)"
- ☒ "Geologic Map of Ohio"
- ☒ "Known and Probable Karst in Ohio"
- ☒ "Quaternary Geology of Ohio"
- ☒ "Soil Survey(s)"
- ☒ National Wetland Inventory Map
- ☒ Ohio Wetland Inventory Map
- ☒ Report of Investigations
- ☒ "Landslides and Related Features"
- ☒ aerial photographs
- ☐ measured geologic section(s)
- ☒ boring logs
- ☒ water well logs
- ☐ Bulletins
- ☐ Information Circulars
- ☐ Other

List Other items:

(Y) N — 4. Has information regarding the possible existence of geologic hazards in, or adjacent to, the project area been requested and obtained from individuals in the project area?

Indicate which individuals were consulted:

- ☒ ODOT construction and maintenance employees
- ☐ ODOT employees (active or retired) who were involved with the original construction?
- ☒ current, former, adjacent landowner(s)
- ☐ County Engineer / County employees
- ☐ Township Trustees and employees
- ☐ local planning and zoning officials

II. Reconnaissance and Planning Checklist

		☐ City or Village officials	
		☐ Other List Other items:	
(Y) N X	5	Has information pertaining to the existence of underground mines within, or adjacent to, the project area (requested from the District AUMIRA Coordinator, DMRM, and DGS) been reviewed?	
(Y) N X	6	Has the information from DMRM and DGS been reviewed regarding the existence of active, reclaimed, or abandoned surface mines within, or adjacent to, the project areas?	
(Y) N X	7	Has any of the geotechnical information gathered in Question 3, indicated the potential presence of lake bed sediments, organic soil, or peat deposits?	
	8	Identify the geologic features that may influence the design on this project:	

☒ Landslide	☐ Wetland or Peat	☐ Fractures / Faults in exposed rock faces	☒ Other
☒ Rockfall	☐ Karst	☐ Underground Mine	☐ Surface Mine

Notes

Stage 1: