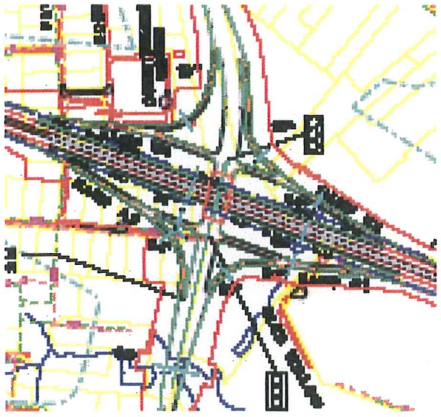
The Eastern Corridor

Technical Memorandum:
PRELIMINARY INPUT FOR ASSESSMENT OF FEASIBLE ALTERNATIVES
(Step 6 ODOT PDP - PART)

BACH-BUXTON INTERCHANGE ALTERNATIVES
State Route 32 Corridor – Segment IVa



Task B.1. (HE) – SR 32: Eastgate Phase 2 Improvements, Gleneste-Withamsville to Olive Branch-Stonelick Road (Segment IVa - Part)
EASTERN CORRIDOR MULTI-MODAL PROJECTS
HAMILTON AND CLERMONT COUNTIES, OHIO
ODOT PID 22970

Prepared for:

The Hamilton County Transportation Improvement District,
The Clermont County Engineer's Office, and
The Ohio Department of Transportation – District 8

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September 29, 2006

Table of Contents

INTRODUCTION

This document addresses preliminary engineering and environmental factors pertinent to alternatives evaluation for a new interchange, including required connector roads north and south, in the vicinity of Bach-Buxton Road on State Route 32, east of the existing Eastgate Boulevard interchange and west of the existing Olive Branch-Stonelick interchange.

The information in this submittal, including appendices, as described by the Hamilton County Transportation Improvement District in its work authorization of May 2005, addresses part (but not all) of the Step 6 information requirement of ODOT's Project Development Process. Similarly, this document addresses part (but not all) of the geographic limits of new highway capacity Segment IVa as established for the Eastern Corridor Multi-Modal Projects.

The descriptions of interchange and connector road alternatives in this document are consistent with actions described in the Tier 1 FEIS for the Eastern Corridor. A primary goal of this advanced Part B/Tier 2 task for this segment of the Eastern Corridor Project is determination of the preliminary right-of-way limits for the proposed action. The general project limits along State Route 32 are from 1000 feet west of the Glen Este-Withamsville Road signalized intersection to 1000 feet east of the existing Elick Lane signalized intersection and from north to south from the vicinity of Bach Buxton/ Elick Lane to Tealtown Road/ Old SR 74 intersections.

The new Bach-Buxton interchange will require that the existing Glen Este-Withamsville Road and Elick Lane signalized intersections on SR 32 be removed. This is because of interference from the ramps of the new interchange, which will extend through and beyond the location of both of these intersections.

GENERAL DESCRIPTION OF ALTERNATIVES

All design and existing information is based on GIS mapping obtained from the Clermont County Engineer's Office. All alternatives were developed in coordination with and considering input from the engineer's office.

In this report, basic interchange alternatives for Bach-Buxton at SR 32 are designated with an "A" prefix. Required connector road alternatives are designated by a "B" or a "C" prefix, respectively, for elements north and south of SR 32. The "B" and "C" connector road alternatives link to the "A" interchange alternatives to make a make a complete functional system connecting logical local termini.

An overall schematic plan (Figure 1) is located in Appendix A showing all Alternatives "B" and "C". To simplify the drawing, Alternative A1 is the only A" Alternative shown on Figure 1. All "A" Alternatives can be found in Appendix A at a more detailed scale. Each Alternative has 2 Figures. For clarity, the first drawing (Figures 4 though 9) has no aerial mapping. The second (Figures 4A through 9A) is identical to the first but has the aerial mapping to identify existing features.

BASIC FEATURES OF INTERCHANGE ALTERNATIVES A1, A2, A3 AND A4

General

Four different interchange alternative configurations have been developed for the proposed Bach Buxton interchange with SR 32, identified as A1, A2, A3 and A4 in this document. Alternatives A1, A2 and A3 are variations on a basic diamond interchange configuration, with progressively wider spacing between the ramp termini on Bach Buxton. Alternative A4 is a single point urban interchange.

Basic limits of work: The north-south limits of the "A" interchange alternatives are from the ends of the Bach Buxton tapers or ramps, whichever is longest. East-west limits are to the ends of the ramps tapers on SR 32.

Basic elements of work: The "A" Alternatives include the basic interchange elements and proposed Bach Buxton road, including an overpass at SR 32, within the limits of the interchange. Proposed Bach Buxton Road is the connector road crossing SR 32 and connecting to existing Bach Buxton on the south and Old SR 74 on the north.

The "A" alternatives include the Bach Buxton approach and cross-section tapers to the interchange, but do not include connecting roadway elements north and south. These elements outside the basic interchange (identified as alternatives B1, B2, C1 and C2) are addressed separately in this document under their respective titles.

Typical Section: The typical section assumed for SR 32 within the limits of the proposed Bach Buxton interchange matches the width and cross slopes of programmed SR 32 improvements immediately to the west in the adjacent ODOT IR 275 interchange upgrade project currently under design. The typical section used for ramps are 3' inside and 6' outside shoulders, with 16 to 24' in ramp width (see Figures 3 and 4 for illustrative details).

Ramp Identification: For purposes of ramp locations described in this document, the following ramp identification convention is used: Ramps are named with alpha-numeric designations. The alpha character indicates interchange quadrant, starting with "A" in the southwest quadrant and progressing counterclockwise to "D" in the northwest quadrant for left-turn ramps, and starting with "E" in the southwest quadrant and progressing counterclockwise to "H" in the northwest quadrant for right-turn ramps. Number suffixes are used to identify alternative. For example, the northeast left-turn ramp for Alternative A3 is Ramp C3.

Mapping and Topographic Data: All topographic data used in design is based on Clermont County GIS. The design and resulting construction limits should not be considered final.

Geologic Hazards: No geologic hazards are apparent within the interchange footprint area. Soil mapping from USDA Soil Surveys for Hamilton and Clermont county show Rossmoyne Silt Loam for the majority of the area affected. Rossmoyne is described as good building material if drained properly. An area of cut/fill material is shown in the soils mapping in the vicinity of Tidewater

Trace. Depending on final project footprint, this material may require special inspection before construction to determine its characteristics. Borings for basic embankment and structure foundation conditions will be required within the core project area.

Railroads: No railroads are located in the project vicinity.

Utilities: The project area is urbanized with a mix of underground and overhead utilities. These are discussed individually for each alternative.

Roadway Design Criteria

Design Speeds: Preliminary design of proposed Bach Buxton Road has been developed using 45 mph ODOT criteria. SR 32 (current and future) is designed for 60 mph ODOT criteria. Ramps for the proposed interchange are designed with a lower speed of 30 mph near the Bach Buxton terminals and a higher speed of 50 mph at the SR 32 terminals.

Traffic Volumes: Traffic volume forecasts are currently under development and certification. The individual Alternative concepts can be carried forward in the next step once the forecasts are complete. Pending receipt of forecast data, reasonable conservative assumptions about required capacity and lane assignments, in consultation with the Clermont County Engineer's Office, have been made for the purposes of this report.

Basic Lane and Capacity Assignments: The following basic capacity assignments have been made for preliminary design development:

- Bach Buxton Road: four through lanes plus double LH turns lanes to ramps, with a LH turn storage length of 300' at ramp terminals.
- Ramps: preliminary design layout provides for two-lane ramps in all quadrants (single lane likely to be built in initial construction), with provision for dual left turns at ramp terminals.

Ramp Design Classification: High Speed Ramp Design has been used for connecting SR 32 exit ramps to Bach Buxton left turns and connecting left turns from Bach Buxton to SR 32 entrance ramps (Ramps A through D). Low Speed Ramp Design has been used for ramps connecting the high speed exit ramps to right turns to Bach Buxton and right turns from Bach Buxton to the high speed entrance ramps (Ramps E through H).

Single Lane High Speed Entrance Ramps – Based on ODOT criteria, required acceleration length for single lane high speed entrance ramps is 180 feet, this using 60 mph for SR 32 and 50 mph for the last ramp curve. With a 200-foot spiral, the required parallel length (ramp to mainline) is reduced to zero. A taper length of 650 feet was used in the layouts illustrated. The required entrance ramp length is 1450 feet measured from the ramp gore to the intersection of the edge of SR 32 mainline pavement and the ramp outside edge of pavement. All lengths and conditions are based on Table 503-2c of the ODOT L&D Manual, Revised January 2004.

Two-Lane High Speed Entrance Ramps –The required acceleration length is 180 feet, based on the same assumptions as applied for Single Lane Entrance Ramp conditions. However, a 350-foot

taper with a 500-foot minimum Gap Acceptance Length yields a required minimum acceleration length of 850 feet; therefore, the 850 foot length has been used. The extra lane is assumed to be dropped at SR 74. Two 600-foot ramp taper sections are needed, as well as a 2000-foot parallel length. The 2-lane ramp length is 4050' measured from the pavement gore (9' from edge of pavement to edge of pavement) to the edge of SR 32 pavement. Lengths are based on Figure 505-1b.

Single Lane Exit Ramps – Deceleration Length is 240' per Table 503-3a. Adjusted length is 800'. Total exit ramp length is 900' with taper measured from the PCC to the edge of SR 32 pavement. Lengths are based on Table 503-3a Revised October 2004

Transition from Single Lane to Two-lane High Speed Exit Ramp – Adjusted deceleration length is 800' based on same information as single lane exit ramp. Length of ramp is the same as Single Lane Exit Ramp unless traffic volumes dictate the need for more storage. Lengths are based on Table 503-5a.

Ramp Limits - The limits of the ramps are based on single lane ramps or on the location where the 2 lane ramp lies inside the existing R/W. The limits of the 2-lane ramps east and west would be 4050' measured from the pavement gore. Measured along SR 32 the total length ramp end-to-ramp end is 8100' not including the interchange.

Two lane ramps are shown; single lane ramps are anticipated to be built initially. Should a dual entrance ramp from Bach Buxton to west-bound SR 32 be considered, it would be long enough to be deemed an auxiliary lane to connect to Ramp F, which exits SR 32 to access the Eastgate Blvd. area.

Considerations at Old SR 74 intersection: The dual entrance ramp to eastbound SR 32 ties into SR 32 just before the Old SR 74 intersection with SR 32. If no interchange is planned for this area, no auxiliary lane is needed and the ramp can taper back to SR 32 edge of pavement. If Old 74 is carried over SR 32, the ramp taper is preferable to keep the bridge span length as short as possible.

Cross section elements - Superelevation was based on High Speed Rural Highways Table 202-7E dated January 2006 from ODOT L&D Manual Volume 1.

Side slopes were based on Common and Barrier Grading Sections Figure 307-4E dated November 2002 from ODOT L&D Manual Volume 1.

Shoulder treatments - Paved shoulders were used for ramps and SR 32. Curb was used on Bach Buxton and on ramps past the ramp noses.

Drainage Considerations

Existing conditions - Existing streams are shown on the drawings. Dry Run and Clough Creek are the nearest named streams but are not within the limits of the drawings. The streams that are shown are tributaries to both.

No FEMA flood zones are located within the study area.

Design Conditions - A 25-year design storm was used to size culverts. Existing culverts were checked for size and material. Sizes for proposed culverts took into account the size of the existing culvert upstream or downstream.

Ditches were checked to ensure positive drainage and kept trapezoidal with a 4' bottom.

Water Quality - For post construction, vegetated biofilter ditches could be used. These ditches have a wider bottom than 4'. A generous construction limit was shown and could be used for that purpose, where needed. For the closed system, exfiltration trenches could be used with the curb and 4' paved shoulder.

Structures Considerations

Bridge - Bridge Clearances were held at 22' allowing 17' for the opening and 5' for the structure depth. Horizontal clearance on the bridge was held at 12' from the edge of pavement to the curb/ parapet. Under the bridge the horizontal clearance was held at 30' for SR 32.

Retaining Walls – The need for retaining wall were based on the preliminary cross sections.

Development of Construction Cost Opinion

General - Based on the pertinent information, costs were developed for each Alternative. Unit costs were derived from ODOT Bid Item History. Five major items were considered when calculating construction quantities: Earthwork, pavement, structures, traffic control and drainage. Unit costs for all items but structures are the same as in the B and C Alternatives. Structure unit costs are shown below in this section.

Earthwork - Earthwork volumes were derived from cross sections that were developed from the preliminary engineering and GIS existing ground. Individual ramps were cross sectioned separately. So as to not overlap the ramps with the adjacent roadway pavement, volumes of each ramp were taken from nose to nose. Volumes were quantified for cut and for fill. The difference of the cut and fill determined the need for Borrow. Cut volumes were set equal to the fill volumes if borrow was needed. No shrink or swell factors were used. SR 32 earthwork volumes were taken from the beginning of the 2-lane ramp taper to the nose of the ramp. Earthwork between noses for SR 32 was not included.

Pavement - Pavement quantities were separated into travel lane and shoulder. Travel lane quantities were based on a 21" thick pavement structure including a 6" aggregate base, 12" black base and 3" asphalt surface. The individual layers were assigned unit costs and the unit volume was prorated. The prorated cost was used to determine the unit cost of pavement. Shoulders were based on volume and the same unit cost of pavement was used to determine the shoulder cost. Curbs, where applicable, were quantified per linear foot.

Structures - Separate items were quantified for bridge and retaining wall. Square footage was calculated for both and a unit cost of $150 per square foot and $60 per square foot applied to the bridges and retaining walls, respectively.

Traffic Control - Signal systems, striping and signing were quantified for each Alternative. A lump sum for each signal system was assigned. The striping was based on a unit length of edge line and prorated to include signing.

Drainage - Culverts and storm sewers were quantified for each Alternative. Culvert lengths were based on the width of nearest cross section. Headwalls are shown in the drawing and are included in the quantities. Storm sewers are based on the length of curb. Every 150' a catch basin was assumed to be needed. Additional catch basins that were needed with some of the infield culverts were counted in addition to the storm sewer catch basins.

Contingency - The aforementioned items were summed for the construction cost. A 20% contingency was added for other items.

Utility Relocation

Level of Detail - Utility relocation included water line and sanitary sewer. Neither the sizes nor the exact locations of existing utilities were known. Using this level of detail, any existing water or sewer line that was near the construction was assumed to need relocating.

Assumptions - Water line and sanitary sewer relocations were assumed to be 8" in diameter. Water line costs were based on 8" ductile Iron pipe Class 52. Sanitary sewer was assumed to be 8" but the cost was set equal to the 24" culvert to account for manholes and other appurtenances.

Right of Way

Existing Information - Existing R/W shown for SR 32 was based on existing plans but not based on monumentation. Existing R/W for other local roads were base on a 50' width.

Existing parcel information is based on GIS mapping.

Proposed R/W - Preliminary R/W is based on construction limits including temporary and permanent construction plus 40' at proposed drainage structures and 20' elsewhere. For locations where the construction limit or the Proposed R/W coincided with a residential building, the construction limits were reviewed for minimization. If the construction limits could not be moved, the property was shown as a total take. If a property was denied access due to a relocation of a road and most of the same property was taken, the property was shown as a total take.

To maintain consistency between the A, B and C Alternatives, common limits were used on each end of Bach Buxton. The limits were based on Bach Buxton tapers and the low-speed right turn ramp taper ends.

Limits for SR 32 R/W are based on the individual ramp ends for each Alternative. Single lane ramps were checked for end of ramp taper and compared to the location where the two-lane ramp's limit of construction intersected the existing R/W. The longer limit was used in the R/W area estimate.

Areas of Proposed R/W outside the limits of the existing R/W ignore drainage easements. For example, if a channel easement exists and the proposed R/W takes it, no reduction in the area is made.

Service Road Justification

See Alternatives B and C for descriptions.

Alternative A1

A1 - Location

Alternative A1 is located at the intersection of SR 32 and Proposed Bach Buxton. Ramp termini on Proposed Bach Buxton are 250' apart. Proposed Bach Buxton spans over SR 32. See Figure 4 or Figure 4A in Appendix A for plan view.

Limits of Alternative A1 are from the intersection of Bach Buxton/ SR 32 to the end of the tapers north 1342'and south 1433' for the widening of Bach Buxton's approach to the Interchange. Widening for the approach requires side by side left turn lanes. With two-lane left turns and 2 6-foot medians, the edge of pavement to edge of pavement width needed is 102'. Using a 45 mph design, the taper length is 709'.

Two-lane ramps provide left-turn access to and from SR 32A. Single-lane ramps provide right-turn access to and from Bach Buxton.

Based on single lane ramp lengths, limits along SR 32 extend east 1450'and west 1450' from the ramp gore to the ends of the entrance ramps. Measured along SR 32 the total length from ramp end -to-ramp end is 5000'

Based on 2-lane ramps, the limits along SR 32 are a total of 10500'. Around half of the length is within existing R/W. The length of R/W influence of the 2-lane ramps is 5600'. These limits are shown on the drawing and are used to estimate an area of R/W.

See Typical Section drawing for details of each roadway or ramp section.

A1 - Other Roads Affected

Fayard, Boundary and Courthouse Green currently access SR 32 via Fayard. Boundary and Courthouse Green will be connected by their existing north one way pair. Courthouse Green will be terminated by a cul-de-sac located 10' from Ramp D1's Right of Way. Proposed access to SR 32 from the north will be via Tidewater Trace to Proposed Bach Buxton. (See B1 for access location.)

Fayard to the south of the one way pair will be eradicated.

Clepper will be shortened and terminated by a cul-de-sac. Clepper will access SR 32 via Clepper to Glen Este Withamsville to Proposed Glen Este to Proposed Bach Buxton. This assumes that Glen Este Withamsville will not have access to SR 32.

Glen Willow will have access denied to SR 32 and will end in a cul-de-sac located 10' from Ramp B1's limits of construction. An access road will provide access to Elick south of SR 32, which will provide access to SR 32 via Proposed Glen Este to Proposed Bach Buxton. See Alternative B1 and C1 for Elick, Proposed Glen Este and access road locations.

North of SR 32, Elick will end in a Cul-de-sac.

A1 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Proposed Bach Buxton and ramps for the limits of each roadway. Two-lane widths were used on left turn ramps. Single lane widths were used on right turn ramps. Other roads that are terminated or relocated by SR 32 are considered "by others" and are not included in the cost of construction.

A1 - Bridge over SR 32

Two-lane-left turns are shown in both directions on the bridge. The bridge was sized for the 2 left-turn lanes and costs reflected as such.

In order to keep the 250' distance between ramp terminals, the bridge abutments are vertical. A 30' clearance is used off the edge of the SR 32 travel lanes. The resulting bridge length is 184'.

For Bach Buxton, using a 6' median, dual left-turn lanes in each direction , 2 through lanes in each direction, 12' clear outside the edge of travel lane and a 1.5' parapet, the resulting bridge width is 129'.

The resulting bridge area is approximately 23,800 square feet.

A1 - Retaining Walls

Due to the proximity of the ramps to SR 32, 17500 square feet of retaining walls are needed.

A1 - Traffic Control

Signals are placed at the two ramp terminals and are interconnected.

For Bach Buxton, a storage length of 300' for left-turns is placed ahead of the ramp terminals. Additional storage of about 100' between the ramp terminal and the actual left-turn is available on the bridge, but is reserved for those vehicles turning left from the ramp or those vehicles from Bach Buxton that are caught between signals.

Preliminary construction cost opinion includes 2 signals and an allowance for striping and signing.

A1 - Drainage

The drainage pattern in the vicinity of the interchange is generally to the south and flows to an unnamed, dammed stream.

The area north of the northwest ramp (Ramp D1) of the interchange is close enough to the ridge to drain water west along SR 32 and not need a culvert under ramp D1. See Ramp naming convention in the General section.

To drain the northwest infield, an 18" is needed under SR 32.

To drain the southwest quadrant, a 24" is needed under Ramp A1.

To maintain the original flow pattern, the area north of the northeast ramp (Ramp C1) needs a 24" under Ramp C1.

To drain the northeast infield, a 30" is needed under SR 32.

To drain the southeast infield, a 36" is needed under Ramp B1.

The proximity of Ramps B1 and C1 to SR 32 require catch basins in lieu of headwalls between the cross drains.

A 60" culvert is needed 1000' south of the intersection of SR 32 and Proposed Bach Buxton.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

A1 - Water and Sewer

Water and Sanitary lines exist south of SR 32 along the construction limits or edge of Ramps A1 and B1 as well as along Clepper Lane, Fayard and Elick. Alternative A1 impacts utility relocations the least of the interchange alternatives since the utilities are generally outside the construction. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on existing Old SR 74 and Proposed Bach Buxton.

A1 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 44 acres. The area takes into account the existing R/W on SR 32.

Alternative A2

A2 - Location

Alternative A2 is located at the intersection of SR 32 and Proposed Bach Buxton. Ramp termini on Proposed Bach Buxton are 400' apart. Proposed Bach Buxton spans over SR 32. See Figure 5 or Figure 5A in Appendix A for plan view.

Limits of Alternative A2 are from the intersection of Bach Buxton/ SR 32 to the end of the tapers north 1342'and south 1433' for the widening of Bach Buxton's approach to the Interchange. Widening for the approach requires side by side left turn lanes. With two-lane left turns and 2 6 foot medians, the edge of pavement to edge of pavement width needed is 102'. Using a 45 mph design, the taper length is 709'.

Two-lane ramps provide left-turn access to and from SR 32A. Single-lane ramps provide right-turn access to and from Bach Buxton.

Based on single lane ramp lengths, limits along SR 32 extend east 1450'and west 1450' from the ramp gore to the ends of the entrance ramps. Measured along SR 32 the total length from ramp end -to-ramp end is 5200'

Based on 2-lane ramps, the limits along SR 32 are a total of 10600'. Around half of the length is within existing R/W. The length of R/W influence of the 2-lane ramps is 5600'. These limits are shown on the drawing and are used to estimate an area of R/W.

See Typical Section drawing for details of each roadway or ramp section.

A2 - Other Roads Affected

The same roads affected with Alternative A1 are affected similarly with Alternative A2 with the exception of the cul-de-sac locations. With the ramp configuration being farther from SR 32, the cul-de-sac locations will be pushed farther from SR 32. Cul-de-sac locations are shown on the drawing.

A2 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Proposed Bach Buxton and ramps for the limits of each roadway. Two-lane widths were used on left turn ramps. Single lane widths were used on right turn ramps. Other roads that are terminated or relocated by SR 32 are considered "by others" and are not included in the cost of construction.

A2 - Bridge over SR 32

Two-lane-left turns are shown in both directions on the bridge. The bridge was sized for the 2 left-turn lanes and costs reflected as such.

Bridge abutments are on a 2:1 slope. A clearance of 30' is kept along SR 32. The resulting bridge length is 256'.

For Bach Buxton, using a 6' median, dual left-turn lanes in each direction , 2 through lanes in each direction, 12' clear outside the edge of travel lane and a 1.5' parapet, the resulting bridge width is 129'.

The total area of the bridge is approximately 33,100 square feet.

A2 - Retaining Walls

No retaining walls are needed for this alternative.

A2 - Traffic Control

Signals are placed at both ramp terminals and are interconnected.

For Bach Buxton, a storage length of 300' for left-turns is needed to equal the storage length assumed. With the Ramp terminals farther apart than Alternative 1, 100' more storage length is available with Alternative A2 between the ramp terminals. The 200' storage remainder was placed ahead of the ramp terminals. That storage length is available in the bridge vicinity, but still some length is reserved for those vehicles turning left from the ramp or those vehicles from Bach Buxton that are caught between signals.

Preliminary construction opinion includes 2 signals and an allowance for striping and signing.

A2 - Drainage

The drainage pattern for the interchange is generally to the south and virtually matches the patterns in Alternative A1. Therefore, the same sizes of cross drains were used under the respective ramps and SR 32. Catch basins were not required in the infield as on Alternative A1 since the ramps are farther from SR 32 on Alternative A2.

A 60" culvert is needed 1200' north of Proposed Bach Buxton/ Proposed Glen Este intersection.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

A2 - Water and Sewer

Water and Sanitary lines exist south of SR 32 along Ramps A2 and B2 as well as along Clepper Lane, Fayard and Elick. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on existing SR 32 and Proposed Bach Buxton.

A2 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 46 acres. The area takes into account the existing R/W on SR 32.

Alternative A3

A3 - Location

Alternative A3 is located at the intersection of SR 32 and Proposed Bach Buxton. Ramp termini on Proposed Bach Buxton are 600' apart. Proposed Bach Buxton spans over SR 32. See Figure 6 or Figure 6A in Appendix A for plan view.

Limits of Alternative A3 are from the intersection of Bach Buxton/ SR 32 to the end of the tapers north 1342'and south 1433' for the widening of Bach Buxton's approach to the Interchange. Widening for the approach requires side by side left turn lanes. With two-lane left turns and 2 6 foot medians, the edge of pavement to edge of pavement width needed is 102'. Using a 45 mph design, the taper length is 709'.

Two-lane ramps provide left-turn access to and from SR 32A. Single-lane ramps provide right-turn access to and from Bach Buxton.

Based on single lane ramp lengths, limits along SR 32 extend east 1450'and west 1450' from the ramp gore to the ends of the entrance ramps. Measured along SR 32 the total length from ramp end -to-ramp end is 5300'

Based on 2-lane ramps, the limits along SR 32 are a total of 10600'. Around half of the length is within existing R/W. The length of R/W influence of the 2-lane ramps is 5600'. These limits are shown on the drawing and are used to estimate an area of R/W.

See Typical Section drawing for details of each roadway or ramp section.

A3 - Other Roads Affected

The same roads affected with Alternative A2 are affected similarly with Alternative A3 with the exception of the cul-de-sac locations. With the ramp configuration being farther from SR 32, the cul-de-sac locations will be pushed farther from SR 32. Cul-de-sac locations are shown on the drawing.

A3 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Proposed Bach Buxton and ramps for the limits of each roadway. Two-lane widths were used on left turn ramps. Single lane widths were used on right turn ramps. Other roads that are terminated or relocated by SR 32 are considered "by others" and are not included in the cost of construction.

A3 - Bridge over SR 32

Two-lane-left turns are shown in both directions on the bridge. The bridge was sized for the 2 left-turn lanes and costs reflected as such.

Bridge abutments are 2:1. A clearance of 30' clear is kept along SR 32. The resulting bridge length is 256'.

Using a 12' median, dual left-turn lanes in each direction for future development, 2 through lanes in each direction and 12' clear outside the edge of travel lane, the resulting bridge width is 129'.

The total area of the bridge is approximately 33,100 square feet.

A3 - Retaining Walls

No retaining walls are needed for this alternative

A3 - Traffic Control

Signals are placed at the ramp terminals and are interconnected.

For Bach Buxton, a storage length of 300' for left-turns is placed between the ramp termini.

Preliminary construction cost opinion includes 2 signals and an allowance for striping and signing.

A3 - Drainage

The drainage pattern for the interchange is generally to the south and virtually matches the patterns in Alternative A1. Therefore, the same sizes of cross drains were used under the respective ramps and SR 32.

A 60" culvert is needed 1200' north of Proposed Bach Buxton/ Proposed Glen Este intersection.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

A3 - Water and Sewer

Water and Sanitary lines exist south of SR 32 along Ramps A3 and B3 as well as along Clepper Lane, Fayard and Elick. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on existing SR 32 and Proposed Bach Buxton.

A3 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 54 acres. The area takes into account the existing R/W on SR 32.

Alternative A4

A4 - Location

Alternative A4 is located at the intersection of SR 32 and Proposed Bach Buxton and is a Single Point Urban Interchange (SPUI). Proposed Bach Buxton is bridged over SR 32. See Figure 7 or Figure 7A in Appendix A for plan view.

Limits of Alternative A4 are from the intersection of Bach Buxton/ SR 32 to the end of the tapers north 1342'and south 1433' for the widening of Bach Buxton's approach to the Interchange. Widening for the approach and therefore the length of taper for the widening will be less than Alternatives A1, A2 an dA3. Since the two-left turn lanes can oppose each other rather than necessarily being side by side, the width needed is 84' in lieu of 102'. Using a 45 mph design, the taper length is 405'.

Two-lane ramps provide left-turn access to and from SR 32A. Single-lane ramps provide right-turn access to and from Bach Buxton.

Based on single lane ramp lengths, limits along SR 32 extend east 1450'and west 1450' from the ramp gore to the ends of the entrance ramps. Measured along SR 32 the total length from ramp end -to-ramp end is 5700'

Based on 2-lane ramps, the limits along SR 32 are a total of 10600'. Around half of the length is within existing R/W. The length of R/W influence of the 2-lane ramps is 5600'. These limits are shown on the drawing and are used to estimate an area of R/W.

See Typical Section drawing for details of each roadway or ramp section

A4 - Other Roads Affected

The same roads affected with Alternative A3 are affected similarly with Alternative A3 with the exception of the cul-de-sac locations, which are offset 10' from the edge of R/W. Cul-de-sac locations are shown on the drawing.

A4 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Proposed Bach Buxton and ramps for the limits of each roadway. Two-lane widths were used on left turn ramps. Single lane widths were used on right turn ramps. Other roads that are terminated or relocated by SR 32 are considered "by others" and are not included in the cost of construction.

A4 - Bridge over SR 32

Two-lane left-turns are shown in both directions on the bridge and for each ramp approaching the intersection. The width of the turn lanes controls the width of the bridge. Using a regular shape, the bridge width is

Bridge abutments are vertical. A clearance of 30' clear is kept along SR 32. The resulting bridge length is 256'.

Using a dual left turn ramp for future development and 12' clear outside the edge of ramp edge of pavement, the resulting bridge width is 225'.

The total area of the bridge is approximately 41400 square feet.

A4 - Retaining Walls

Due to the proximity of the ramps to SR 32, 8500 square feet of retaining walls are needed.

A4 - Traffic Control

A signal is placed at the ramp terminal.

For Bach Buxton, a storage length of 300' for left-turns is used similarly to Alternatives A1, A2 and A3. The middle lanes are reserved for two-way left turns outside the limits of the left turn bay, so there is no need for widening for the left turn bays.

Preliminary construction cost opinion includes 1 signals and an allowance for striping and signing.

A4 - Drainage

The drainage pattern for the interchange is generally to the south and virtually matches the patterns in Alternative A1. Therefore, the same sizes of cross drains were used under the respective ramps and SR 32.

A 60" culvert is needed 1200' north of Proposed Bach Buxton/ Proposed Glen Este intersection.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

A4 - Water and Sewer

Water and Sanitary lines exist south of SR 32 along Ramps A4 and B4 as well as along Clepper Lane, Fayard and Elick. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on existing SR 32 and Proposed Bach Buxton.

A4 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 50 acres. The area takes into account the existing R/W on SR 32.

BASIC FEATURES OF ALTERNATIVES B1, B2, C1 AND C2

General

A connector road between Old SR 74 and Bach Buxton is needed to complete a loop in the Eastgate area to provide access for existing and future development. An extension of Bach Buxton from Elick/ Bach Buxton to either Tealtown Road or Old SR 74 would connect the north and south side of SR 32. The extension would be a 5-lane rural arterial with 4' shoulders and Type 6 curbs and would be approximately 1.5 miles long. No sidewalk or trees are proposed.

Basic Limits of work – North-south limits are from the general vicinity of the Tealtown Road and SR 74 intersection to the north and the Elick Lane and Bach Buxton intersection to the south. West limit is Glen Este Withamsville and the east limit is the intersection of Elick Lane and SR 32. The limits exclude the Bach Buxton Interchange described in the previous section.

Basic elements of work – The "B" Alternatives include the connection from the north end of taper of the Bach Buxton portion of the Interchange north to SR 74 and Tealtown Road. The "C" Alternatives include the connection from the south end of the Bach Buxton portion of the Interchange south to Bach Buxton and Glen Este Withamsville.

The connector road alternatives do not include the SR 32 interchange alternatives. The interchange alternatives are named A1, A2 A3 and A4. Their descriptions can be found in this document under their respective titles.

Alternatives B1, B2, C1 and C2 are separate, individual entities. Alternatives B1 and B2 are located to the north of SR 32 and C1 and C2 are to the south of SR 32. Although Alternatives B1 and C1 have been shown on the same drawing, it is not necessary to pair them together. The same applies to Alternatives C2 and B2

"Proposed Bach Buxton" is the connector road crossing SR 32. "Proposed Glen Este" is the name of the south connector road. "Relocated SR 74" is the name of the north connector Road, where applicable.

Distinctions of the proposed Alternatives are orientations of the termini, either westward I-275 with existing development or eastward for future development.

The captioned alternatives are variations of the connector roads and their ties to existing roads. See Figure 8 through 9A in Appendix A for plan view.

Typical Section – Tealtown Road, SR 74, Proposed Glen Este and Bach Buxton were developed as 5 lane section with 4' paved shoulder and curb. Other roads are 2 lanes with turn lanes as needed. See Figures 3 and 4 in Appendix A for Typical Section.

Mapping and Topographic Data - All topographic data used in design is based on Clermont County GIS. The design and resulting construction limits should not be considered final.

Geologic Hazards - No geologic hazards are apparent. Soil mapping from USDA Soil Surveys for Hamilton and Clermont county show Rossmoyne Silt Loam for the majority of the area affected. Rossmoyne is described as good building material if drained properly. An area of Cut/ fill material was shown in the Tidewater Trace vicinity. This material should be inspected before construction to determine its characteristics.

Soil borings have not been drilled.

Railroads - No existing railroads are in the vicinity.

Roadway Criteria

Design Speeds - Proposed Bach Buxton, Proposed Glen Este and Relocated Old SR 74 were developed using 45 mph ODOT criteria. The exception to the criteria is the Old SR 74 vertical curve at Bach Buxton in Alternative B1. To avoid an excessive amount of earthwork and a safety concern with unexpected geometry for the driver, a 35 mph design speed was used through the SR 74/ Bach Buxton intersection.

Local roads have a design speed of 35 mph.

Cross section elements - Superelevation was based on High Speed Rural Highways Table 202-7E dated January 2006 from ODOT L&D Manual Volume 1.

Side slopes were based on Common and Barrier Grading Sections Figure 307-4E dated November 2002 from ODOT L&D Manual Volume 1.

Shoulder Treatments - The edge treatments were originally 8' paved shoulders with a 2' graded shoulder on both sides. After a meeting with the Clermont County Engineer, the edge treatment was changed to a 4' shoulder with a Type 6 curb. The limits of construction are based on the 4' shoulder and curb.

Traffic Volumes: Traffic volume forecasts are currently under development and certification. The Alternatives will be updated as part of the next step to reflect the projected lanes assignments. Pending receipt of forecast data, reasonable conservative assumptions about required capacity and lane assignments, in consultation with the Clermont County Engineer's Office, have been made for the purposes of this report.

Basic Lane and Capacity Assignments: The following basic capacity assignments have been made for preliminary design development:

- Bach Buxton Road, Proposed Glen Este, Relocated SR 74 and Tealtown Road: four through lanes plus one LH turn lanes at intersections.
- Side Roads: two through lanes and one LH turn lane at intersections.

Drainage

Existing Conditions - Existing streams are shown on the drawings. Dry Run and Clough Creek are the nearest named streams but are not within the limits of the drawings. The streams that are shown are tributaries to both.

No FEMA flood zones are located within the study area.

Design Conditions - A 25-year design storm was used to size cross drains. Major existing culvert diameters were checked in the field and the sizes held or enlarged, depending on the resulting calculations. Those existing culverts were extended as necessary with the same diameter as existing.

A closed drainage system is needed with the curbed roadway. No inlet spacing or storm sewer sizing was calculated.

Even though a closed drainage system will be used, ditches were shown outside the proposed roadways. Ditches were checked to ensure positive drainage and kept trapezoidal with a 4' bottom.

Water Quality - For post construction, vegetated biofilter ditches could be used. These ditches have a wider bottom than 4'. A generous construction limit was shown and could be used for that purpose, where needed. For the closed system, exfiltration trenches could be used with the curb and 4' paved should.

Construction Cost Opinion

General - Based on the pertinent information, costs were developed for each Alternative. Unit costs were pulled from ODOT Item Bid History. Five major items were considered when calculating construction quantities: Earthwork, pavement, structures, traffic control and drainage.

Earthwork - Earthwork volumes were derived from cross sections that were developed from the preliminary engineering and GIS existing ground. Volumes were quantified for cut and for fill. The difference of the cut and fill determined the need for borrow. Cut volumes were set equal to the fill volumes if borrow was needed and a cost was applied to both. No shrink or swell factors were used. Borrow, Cut and Fill unit costs of $15, $10 and $10 were used, respectively.

Pavement - Pavement quantities were separated into travel lane and shoulder. Travel lane quantities were based on a 21" thick pavement structure including a 6" aggregate base, 12" black base and 3" asphalt surface. The individual layers were assigned unit costs and the unit volume was prorated. The prorated cost was used to determine the unit cost of Pavement. Shoulders were based on volume and the same unit cost of Pavement was used to determine the shoulder cost. Curbs, where applicable, were quantified per linear foot and a unit cost of $30 applied.

Traffic Control - Signal systems, striping and signing were quantified for each Alternative. A lump sum of $88,000 for each signal system was assigned. The striping was based on a 5-lane section

with a unit length of 4 edge lines and 4 lane lines and extrapolated 25% to include signing. The striping unit cost is $16,100/mile.

Drainage - Culverts and storm sewers were quantified for each Alternative. Culvert lengths were based on the width of nearest cross section. Headwalls are shown in the drawing and are included in the quantities. Storm sewers are based on the length of curb. Every 150' a $2500 catch basin was assumed to be needed. Additional catch basins that were needed in some of the infield culverts were counted in addition to the storm sewer catch basins. Unit costs of the conduits are shown in the Table below.

Contingency - The five aforementioned items were summed for the construction cost. A 20% contingency was added for other items.

Utility Relocation

Level of Detail - Utility relocation included water line and sanitary sewer. Neither the sizes nor the exact locations of existing utilities were known. Using this level of detail, any existing water or sewer line that was near the construction was assumed to need relocating.

Assumptions - Water line and sanitary sewer relocations were assumed to be 8" in diameter. Water line costs were based on 8" ductile Iron pipe Class 52 at $120 per linear foot. Sanitary sewer was assumed to be 8" but the cost was set equal to the 24" culvert at $120 per linear foot to account for manholes and other appurtenances.

Right of Way

Existing Information - Existing R/W for Old SR 74, Glen Este Withamsville and Elick shown on the drawings is based on an assumed 50' width. The 50' width was scaled from tax map information. The assumed existing R/W is subtracted from the total area of R/W needed.

Existing parcel information is based on GIS mapping.

Proposed R/W - Preliminary R/W is based on conceptual construction limits including temporary and permanent construction plus 40' at proposed drainage facilities and 20' elsewhere. R/W or Easement takes are based on tax map information. Property is based on aerial mapping.

Total takes are based on the location of the construction limit with reference to buildings, access or proportion taken. If the construction limits touched a building, the property was shown as a total take. If access was denied and a feasible alternative for access was not available, the property was shown a s total take. If the proportion taken was a majority of the usable property, the property was shown as a total take. See the Environmental Document for a list of the total takes.

Common limits were used on each end of Bach Buxton. The limits were based on Bach Buxton tapers and the ramp ends from the "A" Alternatives. The longest length of ramp or taper was chosen as the common limit.

Service Road Justification

There are two locations where service roads may be justified.

Location 1 - Two landlocked parcels lie in the northeast quadrant of the interchange. The larger parcel 413104B011 is 8.5 acres. The remainder that is still usable is 3.7 acres based on Alternative A1. The smaller abutting parcel 413104B012 to the southwest has 3.0 acres remaining of a 3.5 acre total based on Alternative A1. A service road accessing SR 74 is 630'. Cost for the service road was included in the construction cost for Alternative B1 and B2.

Location 2 - Two landlocked parcels lie in the southeast quadrant of the interchange. The larger parcel 4131031288 is 22.4 acres. Its remainder is 21.3 acres based on Alternative A1. The smaller parcel 4131031002 to the northwest has 3.3 acres remaining of a 10.0 acre total Based on Alternative A1. A service road accessing Elick Lane is 1300'. Cost for the service road was included in the construction cost for Alternative C1 and C2.

Noise Walls

Potential noise wall locations are noted in the individual Alternative Sections.

Relocations

Without knowledge of the individual property owners wishes, relocations are not known at this time.

Alternative B1

B1 - Location

Alternative B1 is located north of SR 32 in the vicinity of Tealtown Road and Old SR 74. Tealtown Road is relocated east and joins Proposed Bach Buxton at the intersection with Old SR 74. Proposed Bach Buxton runs south from the Teatown Road intersection to SR 32. See Figure 8 or Figure 8A in Appendix A for plan view.

North-south limits of Alternative B1 are from 250' west of the Old SR 74/ Proposed Bach SR 32 intersection to the end of the taper on existing Tealtown Road. A full width 5-lane section of Proposed Bach Buxton is taken from the south limit of Alternative B1 to 200' past Brookview Drive to the north.

A full width 5-lane section on Old SR 74 was taken from 400' east of the intersection with Proposed Bach Buxton to the relocated terminus of Tealtown Road to the west. Old SR 74 tapers to the existing pavement north and south, determining the east-west limits of Alternative B1.

See Typical Section drawing for details of each roadway section.

B1 - Other Roads Affected

Local roads that intersect Proposed Bach Buxton and Old SR 74 have a 50' left turn bay and a 125' taper for the left-turn lane widening.

Tidewater Trace currently accesses Old SR 74. It will be terminated by a cul-de-sac. Proposed access to Old SR 74 will be via a new access road to Proposed Bach Buxton.

Brookview Drive currently accesses Tealtown Road Access will remain to Tealtown Road north but access to Tealtown Road south will be via Proposed Bach Buxton and Old SR 74.

Cove Creek currently accesses Tealtown Road. That access will remain to the south but access to Tealtown Road north will be via Old SR 74 and Proposed Bach Buxton.

Tealtown Road intersection with Proposed Bach Buxton will be realigned.

B1 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Old SR 74 and Proposed Bach Buxton for the limits of each road. Other roads affected include pavement and curb for travel lanes, a turn lane and taper.

B1 - Traffic Control

Traffic volumes are unknown at this time. Assuming the heaviest traffic along Proposed Bach Buxton and Old SR 74, a signal is anticipated at that intersection. Other local intersections are anticipated to be stop-controlled.

With Proposed Bach Buxton and Old SR 74 having a 5 lane section, the center lane can be used for left turn storage at the signalized intersection. No additional widening for a left turn lane is necessary if the 5 lane section is used.

Local roads that intersect Proposed Bach Buxton and Old SR 74 have a 50' left turn bay and a 125' taper for the left-turn lane widening.

B1 - Drainage

A 36" culvert is proposed 600' north of the Bach Buxton / Old SR 74 intersection.

An 18" culvert is proposed 100' east of the Bach Buxton / Old SR 74 intersection.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

B1 - Water and Sewer

Water and Sanitary lines run along either side of existing Tealtown and OLD SR 74. Any work along these existing roads may involve a utility relocation. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on Tealtown Road and Old SR 74.

B1 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 29 acres. The total area takes into account an existing 50 R/W on Old SR 74.

B1 - Noise Walls

Potential noise wall locations are in the vicinity of Old SR 74 (Residences).

Alternative B2

B2 - Location

Alternative B2 is located north of SR 32 in the vicinity of Tealtown Road and Old SR 74. East of Proposed Bach Buxton, Old SR 74 is relocated to meet Tidewater Trace at the intersection of Proposed Bach Buxton and Relocated Old SR 74. Proposed Bach Buxton runs northwest to join Old SR 74. See Figure 9 or Figure 9A in Appendix A for plan view.

North-south limits of Alternative B2 are from SR 32 to the end of the taper to Old SR 74. A full width 5-lane section of Bach Buxton is taken from100' south of the Proposed Bach Buxton/ Old SR 74 intersection to Tealtown Road to the north.

A full width 5-lane section on Old SR 74 was taken from 400' east of and to the intersection with Bach Buxton. The new access road to Tidewater Trace is 3 lanes and tapers to the existing Tidewater Trace pavement. Relocated Old SR 74 tapers to the existing Old SR 74 pavement to the east, determining the east-west limits of Alternative B2.

See Figures 3 and 4 in Appendix A for Typical Sections.

B2 - Other Roads Affected

Local roads that intersect Proposed Bach Buxton and Old SR 74 have a 50' left turn bay and a 125' taper for the left-turn lane widening.

Tidewater Trace currently accesses Old SR 74. It will be terminated by a cul-de-sac. Proposed access to Old SR 74 will be via a new access road to Bach Buxton.

Bridlewood Drive currently accesses Old SR 74. Access exists to Old SR 74 via Schoolhouse Road and to Tealtown via Saddleback. Bridlewood will be extended to Relocated SR 74.

A portion of Old SR 74 will remain once the relocation occurs. This portion will be tied to the extension of Bridlewood.

B2 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Old SR 74 and Proposed Bach Buxton for the limits of each road. Costs for other roads affected include pavement and curb for travel lanes, a turn lane and taper. No costs are allotted for Cul-de-sacs since they will be constructed by others.

B2 - Traffic Control

Traffic volumes are unknown at this time. Assuming the heaviest traffic along Proposed Bach Buxton and Old SR 74, a signal is anticipated at that intersection. Other local intersections are anticipated to be stop-controlled.

With Proposed Bach Buxton and Old SR 74 having a 5 lane section, the center lane can be used for left turn storage at the signalized intersection. No additional widening are a left-turn lane is necessary if the 5 lane section is used.

Preliminary construction Cost Opinion includes a signal at Old SR 74/ Proposed Bach Buxton Intersection and an allowance for striping and signing.

B2 - Drainage

An 18" culvert is proposed 100' east of the Proposed Bach Buxton / Old SR 74 intersection.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

B2 - Water and Sewer

Water and Sanitary lines exist along existing Old SR 74 and Tealtown. Any work along these existing roads may involve a utility relocation. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on Old SR 74.

B2 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 20 acres. The total area takes into account an existing 50 R/W on Old SR 74.

B2 - Noise Walls

Potential noise wall locations are in the vicinity of Old SR 74 (Residences).

Alternative C1

C1 - Location

Alternative C1 is located south of SR 32 in the vicinity of Elick Lane and Bach Buxton. Glen Este Withamsville's east-west leg is extended to join Elick Lane at the Proposed Bach Buxton intersection. Existing Bach Buxton is extended to 400' north of the Proposed Glen Este/ Proposed Bach Buxton intersection. See Figure 8 or Figure 8A in Appendix A for plan view.

North-south limits of Alternative C1 are from the end of the taper for the widening of existing Bach Buxton to 400' north of the Proposed Glen Este/ Proposed Bach Buxton intersection. A full width 5-lane section of Bach Buxton is taken from the 600' south of the Glen Este/ Bach Buxton Intersection to the north limits. A full width 5-lane section on Proposed Glen Este was taken from Wuebold Lane to 600' east of the Elick/ Proposed Glen Este intersection. Proposed Glen Este tapers to the existing Glen Este pavement west and to the existing Elick Lane pavement to the east, determining the east-west limits of Alternative C1.

See Figures 3 and 4 for Typical Section.

C1 - Other Roads Affected

Local roads that intersect Proposed Bach Buxton and Old SR 74 have a 50' left turn bay and a 125' taper for the left-turn lane widening plus two lanes for the affected road length.

Elick Lane will be terminated in two locations and require 3 cul-de-sacs. Elick Lane currently accesses SR 32 to the north and to the south of SR 32. It will be terminated by a cul-de-sac on both sides of SR 32. Proposed access to SR 32 will be via Proposed Glen Este to Bach Buxton to the south and via Old SR 74 to the north. Proposed Glen Este is shown to extend to the last property in the vicinity of SR 32.

Elick Lane will also be terminated just north of the Bach Buxton/ Elick Lane intersection by the new connector road. The existing road will be realigned and extended to the last property owner.

Glen Willow currently accesses SR 32. It will be terminated by a cul-de-sac and be landlocked. Proposed access to SR 32 could be via a new access road to Elick Lane to Proposed Glen Este to Bach Buxton. See more discussion on this location in Alternative A Section under Service Road Justification.

Grovernors Square's main drive will be affected by the Proposed Glen Este construction. It is proposed to be relocated.

C1 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Proposed Glen Este and Proposed Bach Buxton for the limits of each road. Other roads affected include pavement, shoulder and curb for travel lanes and a turn lane with taper, as needed.

C1 - Traffic Control

Traffic volumes are unknown at this time. Assuming the heaviest traffic along Proposed Glen Este and Proposed Bach Buxton a signal is anticipated at the intersections of Proposed Glen Este/ Bach Buxton. Other local intersections are anticipated to be stop-controlled.

With Proposed Bach Buxton and Propsoed Glen Este having a 5 lane section, the center lane can be used for left turn storage at the signalized intersection. No additional widening is necessary for a turn lane if the 5 lane section is used.

Preliminary construction Cost Opinion includes a signal at Proposed Glen Este/ Proposed Bach Buxton Intersection and an allowance for striping and signing.

C1 - Drainage

A 72" culvert exists at the stream crossing located 1500' south of the existing Elick/ SR 32 intersection. The culvert will need to be extended.

A 36" culvert exists at the stream crossing located 600' south of the existing Elick/ SR 32 intersection. The culvert will need to be extended.

A 60" culvert exists at the stream crossing located 900' south of the Proposed Bach Buxton/ Proposed Glen Este intersection. The culvert will need to be extended.

An 18" culvert is needed just south of the Proposed Bach Buxton/ Proposed Glen Este intersection.

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

C1 - Water and Sewer

Water and Sanitary lines exist along Glen Este Withamsville, Elick and Bach Buxton. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on existing Elick Lane, Glen Este Withamsville and existing Bach Buxton.

C1 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 39 acres. The area takes into account a 50' existing R/W on Glen Este Withamsville and Elick Lane.

C1 - Noise Walls

Potential noise wall locations are in the vicinity of Grovesnor Square (Apartments).

Alternative C2

C2 - Location

Alternative C2 is located south of SR 32 in the vicinity of the Elick and Bach Buxton. Proposed Glen Este is an extension of Glen Este Withamsville's east-west leg and runs to existing Bach Buxton. Proposed Bach Buxton runs from Proposed Glen Este to 700' north. Elick is extended to the new intersection and is realigned. See Figure 9 or Figure 9A in Appendix A for plan view.

North-South limits of Alternative C2 are south, from the Proposed Bach Buxton/ Proposed Glen Este intersection to 700' north. A full width 5-lane section of Bach Buxton is taken from the Proposed Glen Este/ Bach Buxton Intersection to 700' north of the Proposed Glen Este/ Proposed Bach Buxton intersection.

A full width 5-lane section on Proposed Glen Este was taken from Wuebold Lane to 600' east of the Elick/ Proposed Glen Este intersection. Proposed Glen Este tapers to the existing Glen Este pavement west and to the existing Bach Buxton pavement to the east, determining the east-west limits of Alternative C1.

See Figure 3 and 4 for Typical Section.

C2 - Other Roads Affected

Local roads that intersect Proposed Bach Buxton and Proposed Glen Este have a 50' left turn bay, a 125' taper for the left-turn lane widening plus two lanes for the affected road length.

Elick Lane currently accesses SR 32. It will be terminated by a cul-de-sac on both sides of SR 32. Proposed access to SR 32 will be via Proposed Glen Este to Bach Buxton to the south and via Old SR 74 to the north. Elick Lane will be realigned from Proposed Glen Este to the cul-de-sac.

Glen Willow Lake Lane currently access SR 32. It will be terminated by a cul-de-sac. Proposed access to SR 32 will be via a new access road to Elick Lane to Proposed Glen Este to Bach Buxton. See more discussion on this location in Alternative A Section under Service Road Justification.

Grovernors Square's main drive will be affected by the Proposed Glen Este construction. It is proposed to be relocated.

C2 - Roadway Construction Cost Opinion

Costs for roadway improvements include pavement, curb and shoulder for Proposed Glen Este, Elick and Proposed Bach Buxton for the limits of each road. Other roads affected include pavement, shoulder and curb for travel lanes and a turn lane with taper as needed and taper.

C2 - Traffic Control

Traffic volumes are unknown at this time. Assuming the heaviest traffic along Proposed Glen Este and Proposed Bach Buxton, a signal is anticipated at that intersection. Other local intersections are anticipated to be stop-controlled.

With Proposed Bach Buxton and Old SR 74 having a 5 lane section, the center lane can be used for left turn storage at the signalized intersection. No additional widening is necessary for a left turn if the 5 lane section is used.

Preliminary construction Cost Opinion includes a signal at Proposed Glen Este/ Proposed Bach Buxton Intersection and an allowance for striping and signing.

C2 - Drainage

A 60" culvert exists 800' south of Proposed Bach Buxton/ Elick Lane intersection. This culvert will need to be extended. .

A 72" culvert exists at the stream crossing located 1500' south of the existing Elick/ SR 32 intersection. The culvert will need to be extended. .

A 36" culvert exists at the stream crossing located 600' south of the existing Elick/ SR 32 intersection. The culvert will need to be extended. .

Storm sewers will be needed with the curbed edge treatments. Construction costs include 24" pipe with an inlet every 150'.

C2 - Water and Sewer

Water and Sanitary lines exist along Glen Este Withamsville, Elick and Bach Buxton. Upon further development of this Alternative, the utility conflicts should be reviewed and avoided or relocated, as necessary.

Utility Reimbursement costs include relocation of water and sanitary sewer on existing Glen Este Withamsville, Elick Lane and Bach Buxton.

C2 - Right of Way

Right of Way area was calculated but no costs were assigned. The total area required of Preliminary R/W is 31 acres. The area takes into account a 50' existing R/W on Glen Este Withamsville and Elick Lane.

C2 - Noise Walls

Potential noise wall locations are in the vicinity of Grovesnor (Apartments).

BASIC FEATURES OF GLEN ESTE WITHAMSVILLE OVERPASS

General

The existing Glen Este Withamsville/ SR 32 intersection will be affected by ramps from the Bach Buxton/ SR 32 interchange. An overpass was developed to accommodate the ramps. See Figures 4 through 8 in Appendix A for plan view.

The overpass would require reconstruction of 1800' of Glen Este Withamsville. Reconstruction of Eastgate Drive North, Eastgate Drive South and 2 drives to the east would be need for the grade change. Ryan's Way and the drive opposite would close. Glen Este Withamsville would be a 4-lane facility with 4' shoulder with curbs for the length of the reconstruction. No sidewalk or trees are proposed.

Existing features in the area are as follows:

No geologic hazards are apparent. Soil mapping from USDA Soil Surveys for Hamilton and Clermont county show Rossmoyne Silt Loam for the majority of the area affected. Rossmoyne is described as good building material if drained properly.

Soil borings have not been drilled.

No existing railroads are in the vicinity.

All topographic data used in design is based on Clermont County GIS. The design and resulting construction limits should not be considered final.

Roadway Criteria

Glen Este Withamsville was developed using 45 mph ODOT criteria.

Side roads have a design speed of 35 mph.

Superelevation was based on High Speed Rural Highways Table 202-7E dated January 2006 from ODOT L&D Manual Volume 1.

Side slopes were based on Common and Barrier Grading Sections Figure 307-4E dated November 2002 from ODOT L&D Manual Volume 1. The edge treatments are a 4' shoulder with a Type 6 curb.

Drainage

Existing streams are shown on the drawings. Dry Run and Clough Creek are the nearest named streams but are not within the limits of the drawings. The streams that are shown are tributaries to both.

No FEMA flood zones are located within the study area.

A 25-year design storm was used to size cross drains. A 24" diameter cross drain is required on the north end of Glen Este Withamsville.

A closed drainage system is needed with the curbed roadway. No inlet spacing or storm sewer sizing was calculated.

Even though a closed drainage system will be used, ditches were shown outside the proposed roadways. Ditches were checked to ensure positive drainage and kept trapezoidal with a 4' bottom.

For post construction, vegetated biofilter ditches could be used. These ditches have a wider bottom than 4'. A generous construction limit was shown and could be used for that purpose, where needed. For the closed system, exfiltration trenches could be used with the curb and 4' paved should.

Construction Cost Opinion

Based on the pertinent information, costs were developed for each Alternative. Unit costs were pulled from ODOT Item Bid History. Five major items were considered when calculating construction quantities: Earthwork, pavement, structures, traffic control and drainage.

Earthwork volumes were derived from cross sections that were developed from the preliminary engineering and GIS existing ground. Volumes were quantified for cut and for fill. The difference of the cut and fill determined the need for borrow. Cut volumes were set equal to the fill volumes if borrow was needed and a cost was applied to both. No shrink or swell factors were used. Borrow, Cut and Fill unit costs of $15, $10 and $10 were used, respectively.

Pavement quantities were separated into travel lane and shoulder. Travel lane quantities were based on a 21" thick pavement structure including a 6" aggregate base, 12" black base and 3" asphalt surface. The individual layers were assigned unit costs and the unit volume was prorated. The prorated cost was used to determine the unit cost of Pavement. Shoulders were based on volume and the same unit cost of Pavement was used to determine the shoulder cost. Curbs, where applicable, were quantified per linear foot and a unit cost of $30 applied.

Structures were separated into bridge and retaining wall items. Square footage was calculated for both and a unit cost of $150 per square foot and $60 per square foot applied to the bridges and retaining walls, respectively.

Traffic control included a signal system, striping and signing. A lump sum of $88,000 for each signal system was assigned. The striping was based on a 5-lane section with a unit length of 4 edge lines and 4 lane lines and extrapolated 25% to include signing. The striping unit cost is $16,100/mile.

Drainage was separated into culverts and storm sewers. Culvert lengths were based on the width of nearest cross section. Headwalls are shown in the drawing and are included in the quantities.

Storm sewers are based on the length of curb. Every 150' a $2500 catch basin was assumed to be needed. Additional catch basins that were needed in some of the infield culverts were counted in addition to the storm sewer catch basins.

The five aforementioned items were summed for the construction cost. A 20% contingency was added for other items.

Utility relocation was summed separately from the construction Cost. Relocations included water line and sanitary sewer.

Utility Relocation

Utility relocation included water line and sanitary sewer. Neither the sizes nor the exact locations of existing utilities were known. Using this level of detail, any existing water or sewer line that was near the construction was assumed to need relocating.

Water line and sanitary sewer relocations were assumed to be 8" in diameter. Water line costs were based on 8" ductile Iron pipe Class 52 at $120 per linear foot. Sanitary sewer was assumed to be 8" but the cost was set equal to the 24" culvert at $120 per linear foot to account for manholes and other appurtenances.

Right of Way

Existing R/W for Glen Este Withamsville shown on the drawings is based on an assumed 50' width. The 50' width was scaled from tax map information. The assumed existing R/W is subtracted from the total area of R/W needed.

Proposed R/W Limits are based on conceptual construction limits including temporary and permanent construction plus 40' at proposed drainage facilities and 20' elsewhere. R/W or Easement takes are based on tax map information. Property is based on aerial mapping.

Total takes are based on the location of the construction limit with reference to buildings, access or proportion taken. If the construction limits touched a building, the property was shown as a total take. If access was denied and a feasible alternative for access was not available, the property was shown a s total take. If the proportion taken was a majority of the usable property, the property was shown as a total take. See the Environmental Document for a list of the total takes.

Service Road Justification

There are no locations where service roads may be justified.

Noise Walls

This vicinity should not require noisewalls.

Relocations

Without knowledge of the individual property owners wishes, relocations are not known at this time.

PRELIMINARY ENVIRONMENTAL IMPACTS

This section presents a preliminary assessment of environmental impacts associated with the alternatives developed to date for Segment IVa of the Eastern Corridor Multi-Modal Projects (Bach Buxton interchange alternatives), as depicted in Appendix A and as described previously in this technical memorandum. Impacts were determined for preliminary right-of-way developed for these alternatives, and were assessed based on a combination of secondary source information and environmental survey, as summarized below.

Sources of information for assessing preliminary environmental impacts included:

- Ecological Resources:
  - Level 1 Ecological Survey Report, CLE-275-10.40 (I-275/SR 32 Interchange); PID 22972; October 2004
  - Eastern Corridor Tier 1 DEIS; PID 22970; November 2004
  - For areas not covered in these documents (Tealtown Road area and south end of Bach Buxton) – Field surveys conducted in June-July 2006
  - Summary of ecological features in the Segement IVa Bach Buxton area are presented in Ecological Features Memorandum included in Appendix C

- Cultural Resources:
  - Cultural Resources Context Information in Support of the PE/EIS Part A Development and Identification of Feasible Alternatives; Gray & Pape; December 2002
  - Phase I History/Architecture Investigations for the Proposed Improvement of the I 275/SR 32 Interchange (CLE-275-10.40;PID 22972); Gray & Pape; September 2004
  - Phase I Archaeological Investigations for the Proposed Improvement of the I 275/SR 32 Interchange (CLE-275-10.40;PID 22972); Gray & Pape; September 2004
  - For areas not covered in these documents (Tealtown Road area and south end of Bach Buxton) – Research from OHPO Online Mapping Service

- Hazardous Materials:
  - Matrix includes hazmat database sites only as obtained from: Environmental Inventory Source Document; Eastern Corridor Part A PE/EIS; March 2002 (H.C. Nutting)

- Land Use
  - Clermont County GIS

- Displacements
  - Coordination with design engineers for expected displacements within preliminary right-of-way limits

Preliminary impacts associated with the Segment IVa Bach Buxton interchange alternatives are presented in the following table.

Eastern Corridor Segment IVa (Bach Buxton Interchange Alternatives)
Preliminary Environmental Impact Summary

Feature	Preliminary Impacts by Alternative								
	Alt A1	Alt A2	Alt A3	Alt A4	Alt B1	Alt B2	Alt C1	Alt C2	Glen-Este Over-pass
Ecological Features									
USGS Stream Impacts (#)	0	0	0	0	0	0	2	2	0
USGS Stream Lengths (in feet)	0	0	0	0	0	0	480	480	0
Floodplain (in acres)	0	0	0	0	0	0	0	0	0
Sole Source Aquifer (in acres)	0	0	0	0	0	0	0	0	0
Public Water Supplies (#)	0	0	0	0	0	0	0	0	0
Wetlands (in acres)	0.5	0.5	0.6	0.6	0.01	0	0.2	0.3	0
Known Fed/State Listed Species (#)	0	0	0	0	0	0	0	0	0
Parks and Greenspace (in acres)	0	0	0	0	0	0	0	0	0
Hazardous Material Database Sites (# sites)	7	7	7	7	1	2	3	3	4
Large Woodland Tracts (in acres)	5.5	5.6	5.8	5.7	0.2	0.7	15.1	10.8	0
Other Undisturbed Area (in acres)	8.9	8.9	9	8.4	3.6	3.6	3.9	4.4	0
Land Use and Farmland									
Residential Use (Total land / Undisturbed land in acres)	19.0 / 1.6	19.3 / 1.5	22.6 / 2.2	20.9 / 1.9	18.6 / 1.5	12.5 / 1.5	13.8 / 2.6	14.3 / 3	0
Commercial Use (Total land / Undisturbed land in acres)	14 / 0.9	15.5 / 0.9	20 / 0.9	18.2 / 0.9	3.7 / 0.1	3.9 / 0.1	2.6 / 0.01	2.61/0.01	5.9 / 0
Industrial Use (Total land / Undisturbed land in acres)	1.9 / 0.2	2 / 0.2	2.2 / 0.2	2 / 0.2	0 / 0	0 / 0	15.4 / 0.6	9 / 0.6	0
Agricultural Use (Total land / Undisturbed land in acres)	0	0	0	0	0	0	0	0	0

Eastern Corridor Segment IVa (Bach Buxton Interchange Alternatives) Preliminary Environmental Impact Summary									
	Preliminary Impacts by Alternative								
Feature	**Alt A1**	**Alt A2**	**Alt A3**	**Alt A4**	**Alt B1**	**Alt B2**	**Alt C1**	**Alt C2**	**Glen-Este Over-pass**
Existing Transportation (Total land / Undisturbed land in acres)	1.1 / 0	1.2 / 0	1.6 / 0	1.6 / 0	3.3 / 0	1.4 / 0	7.8 / 0	7.8 / 0	0
Educational / Institutional Use (in acres)	7.2 / 6	7.2 / 6.1	6.7 / 5.6	6.4 / 5.1	8.2 / 2	4.0 / 2	6.0 / 0	8.1 / 0	0
Agricultural District Parcels (# sites)	0	0	0	0	0	0	1	1	0
Cultural Resources									
National Register property (# sites)	0	0	0	0	0	0	0	0	0
National Register District (# sites)	0	0	0	0	0	0	0	0	0
Other Historic or Archaeological Resources (# sites)	0	0	0	0	0	0	0	0	0
Socioeconomic Factors									
Potential Residential Displacements - Single Family (#)	15	15	17	17	33	9	6	6	0
Potential Residential Displacements - Multi-Family (# buildings)	6	9	11	9	0	0	0	0	0
Potential Commercial Displacements (#)	2	3	3	3	6	5	1	1	4
Potential Institutional Displacements (#)	1	1	1	1	0	0	0	0	0
Potential Industrial Displacements (#)	0	0	0	0	0	0	0	0	0

Overall, impacts to environmental features are not substantially different between the alternatives, as summarized below. Key concerns and comparative conclusions are noted in **bold text.**

Bach Buxton Interchange Alternatives (Alternatives A1-A4)

- The preliminary Bach Buxton interchange alternatives primarily impact existing residential and commercial areas, for an estimated 15 to 17 single family displacements, 6 to 11 multi-family building displacements, and 2 to 3 commercial displacements
- **Each of the interchange alternatives clips a high quality (Category 3) wetland formed in an old retention pond on the south side of SR 32;** it is likely that this feature can be avoided through minor alignment shift or use of retaining walls; these measures will be evaluated during further design conducted in the Eastern Corridor Part B phase of work
- **Alternative A3 has generally greater impacts to existing residential and commercial development compared to the other interchange configurations**

Connector Roads on North Side of SR 32 (Alternatives B1 and B2)

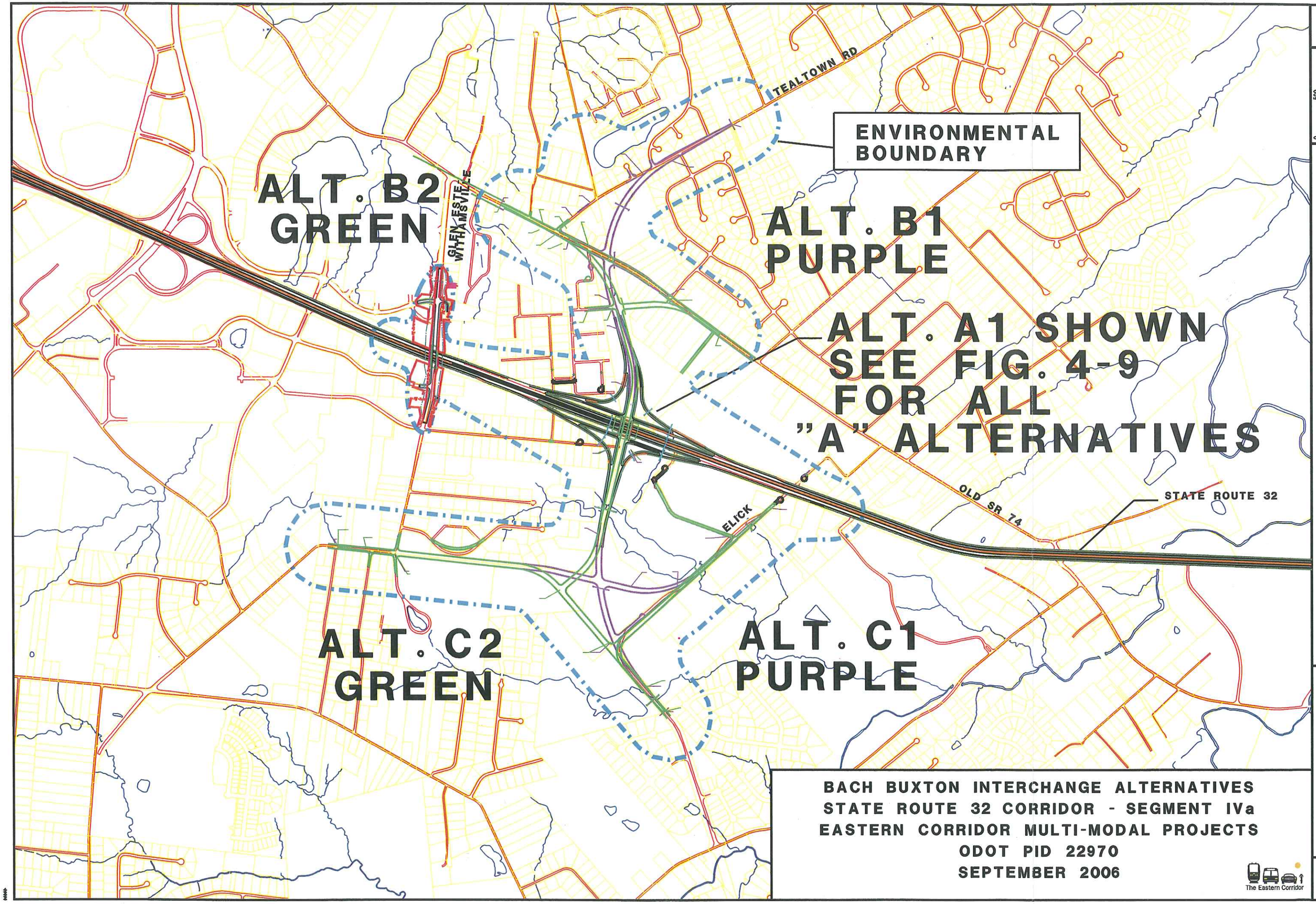
- Preliminary connector roads on the north side of SR 32 primarily impact existing residential and commercial areas, **with Alternative B1 exhibiting greater residential impacts**
- Specifically, Alternative B1 is expected to displace 33 residences compared to 9 residences for Alternative B2 due to its configuration for connection with Tealtown Road

Connector Roads on South Side of SR 32 (Alternatives C1 and C2)

- Preliminary connector roads on the south side of SR 32 impact a mix of land uses, including residential and commercial development, educational land use, and ecological features, including scattered small, limited quality wetlands and small, headwater streams
- Both alternatives impact a large woodland tract (south of SR 32 and west of Elick Lane/Bach Buxton Road) that contains scattered wetlands and large canopy trees (one potential state champion tree)
- **Both alternatives encroach on the parking lot and track and ball fields of the Gleneste Withamsville High School / Middle School complex.**

APPENDICES

APPENDIX A. HIGHWAY EXHIBITS


ALT. B2
GREEN
ALT. B1
PURPLE
ENVIRONMENTAL
BOUNDARY
ALT. A1 SHOWN
SEE FIG. 4-9
FOR ALL
"A" ALTERNATIVES
ALT. C2
GREEN
ALT. C1
PURPLE
TEALTOWN RD
GLEN ESTE
WITHAMSVILLE
ELICK
OLD SR 74
STATE ROUTE 32
STATE ROUTE 32
0
250
500
1000
HORIZONTAL
SCALE IN FEET
SCHEMATIC PLAN
FIGURE 1
1
9
BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006
The Eastern Corridor

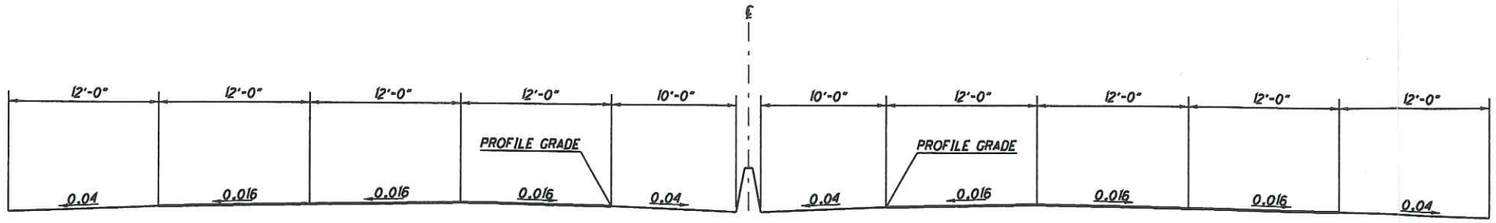
SCHEMATIC PLAN

FIGURE 1A

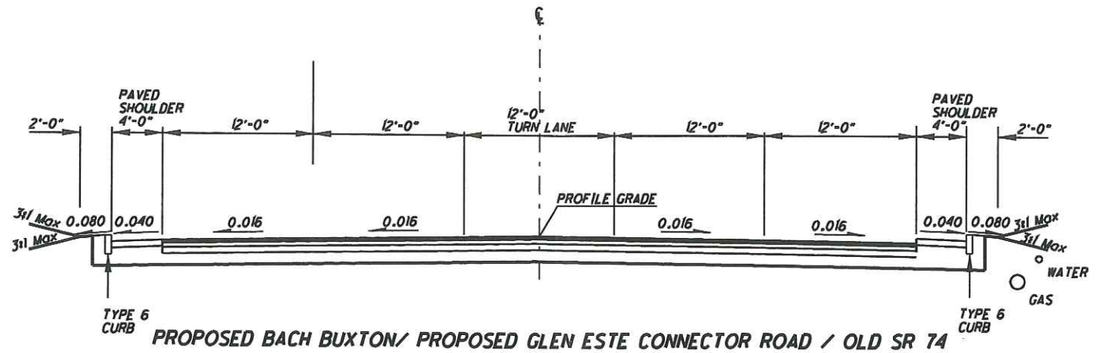
1A
9

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

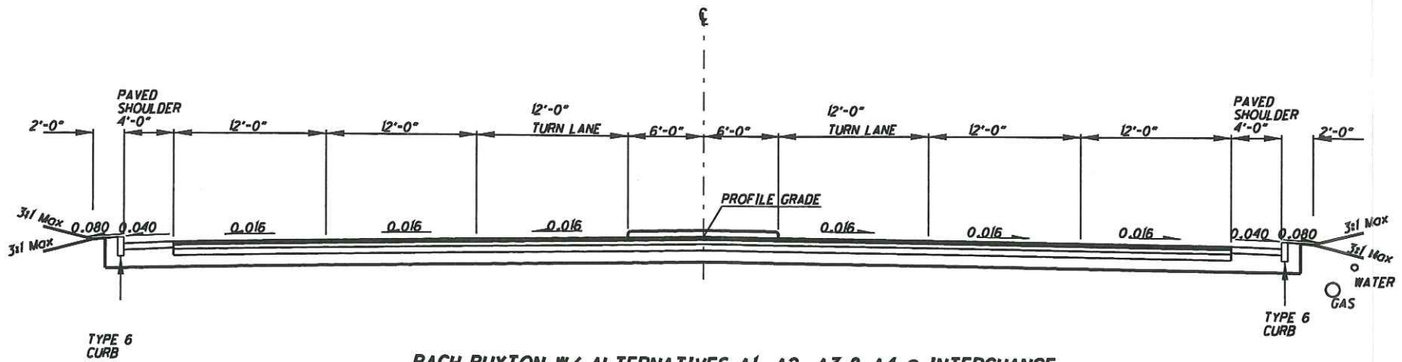
The Eastern Corridor



STATE ROUTE 32



PROPOSED BACH BUXTON/ PROPOSED GLEN ESTE CONNECTOR ROAD / OLD SR 74
ALTERNATIVES B1, B2, C1, C2



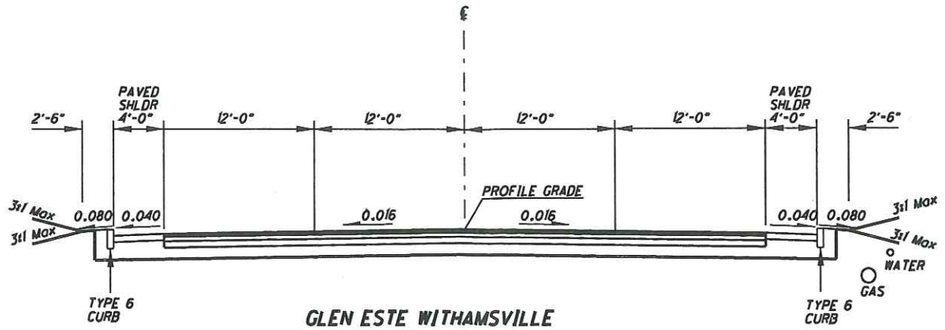
BACH BUXTON W/ ALTERNATIVES A1, A2, A3 & A4 @ INTERCHANGE

TYPICAL SECTION
SR 32 AND CONNECTOR ROADS

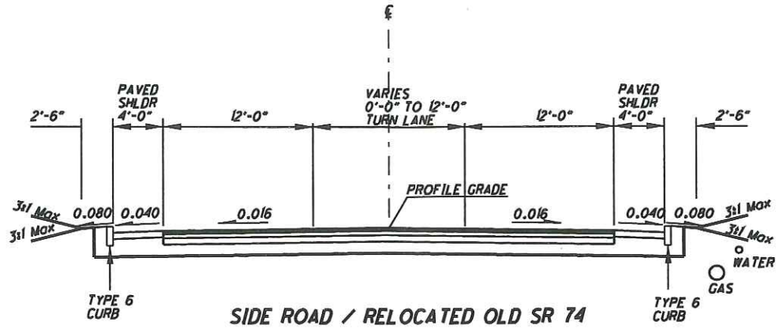
FIGURE 2

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

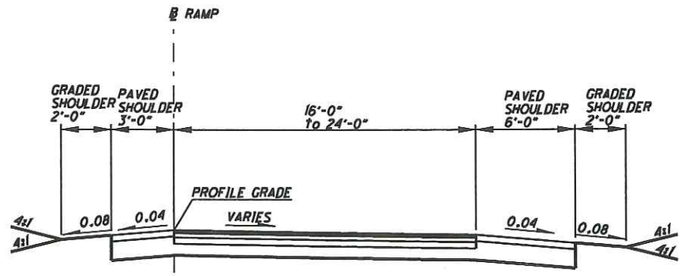
The Eastern Corridor



GLEN ESTE WITHAMSVILLE



SIDE ROAD / RELOCATED OLD SR 74



RAMP

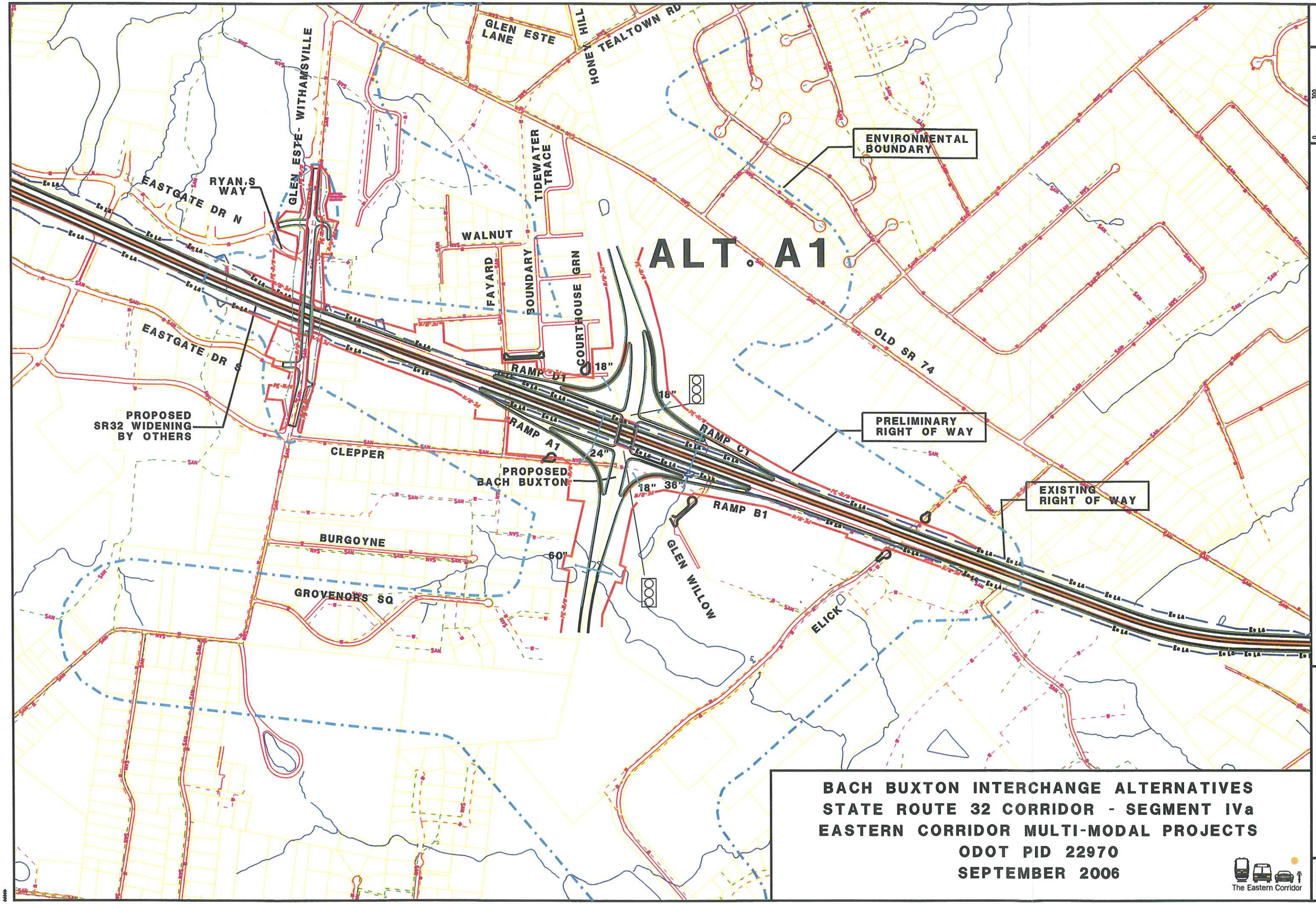
BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

TYPICAL SECTIONS
GLEN ESTE WITHAMSVILLE, SIDE ROADS AND RAMPS

FIGURE 3

3/9



PLAN - ALTERNATIVE A1

FIGURE 4

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

PLAN - ALTERNATIVE A1

FIGURE 4A

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

ALT. A2

ENVIRONMENTAL BOUNDARY

PRELIMINARY RIGHT OF WAY

EXISTING RIGHT OF WAY

PROPOSED SR32 WIDENING BY OTHERS

PROPOSED BACH BUXTON

RYAN,S WAY

EASTGATE DR N

EASTGATE DR S

GLEN ESTE- WITHAMSVILLE

TIDEWATER TRACE

WALNUT

FAYARD

BOUNDARY

COURTHOUSE GREEN

OLD SR 74

CLEPPER

BURGOYNE

GROVENORS SQ

GLEN WILLOW

ELICK

RAMP A2

RAMP B2

RAMP C2

RAMP D2

18"

24"

30"

36"

60"

HORIZONTAL SCALE IN FEET

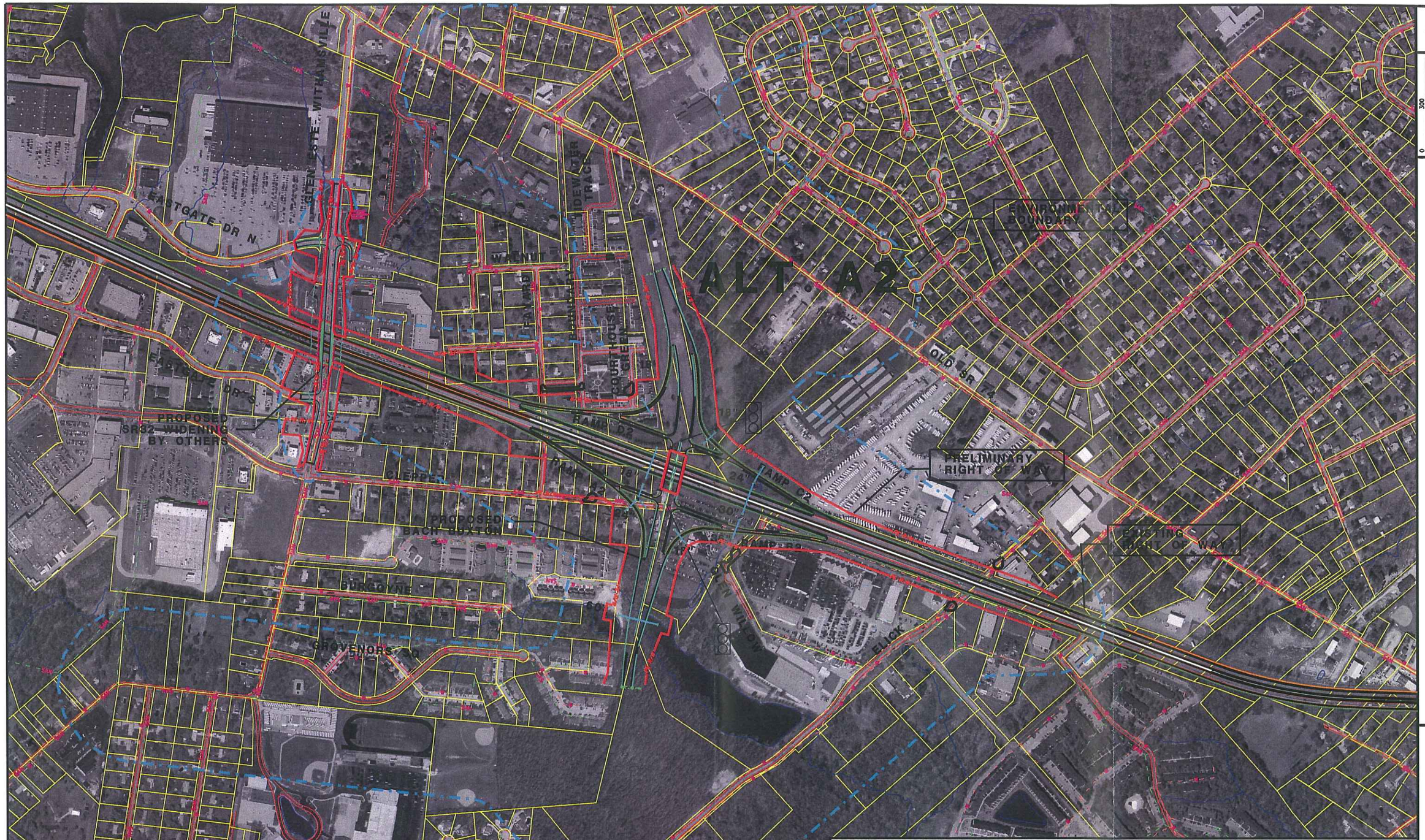
0 150 300 600

PLAN - ALTERNATIVE A2

FIGURE 5

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

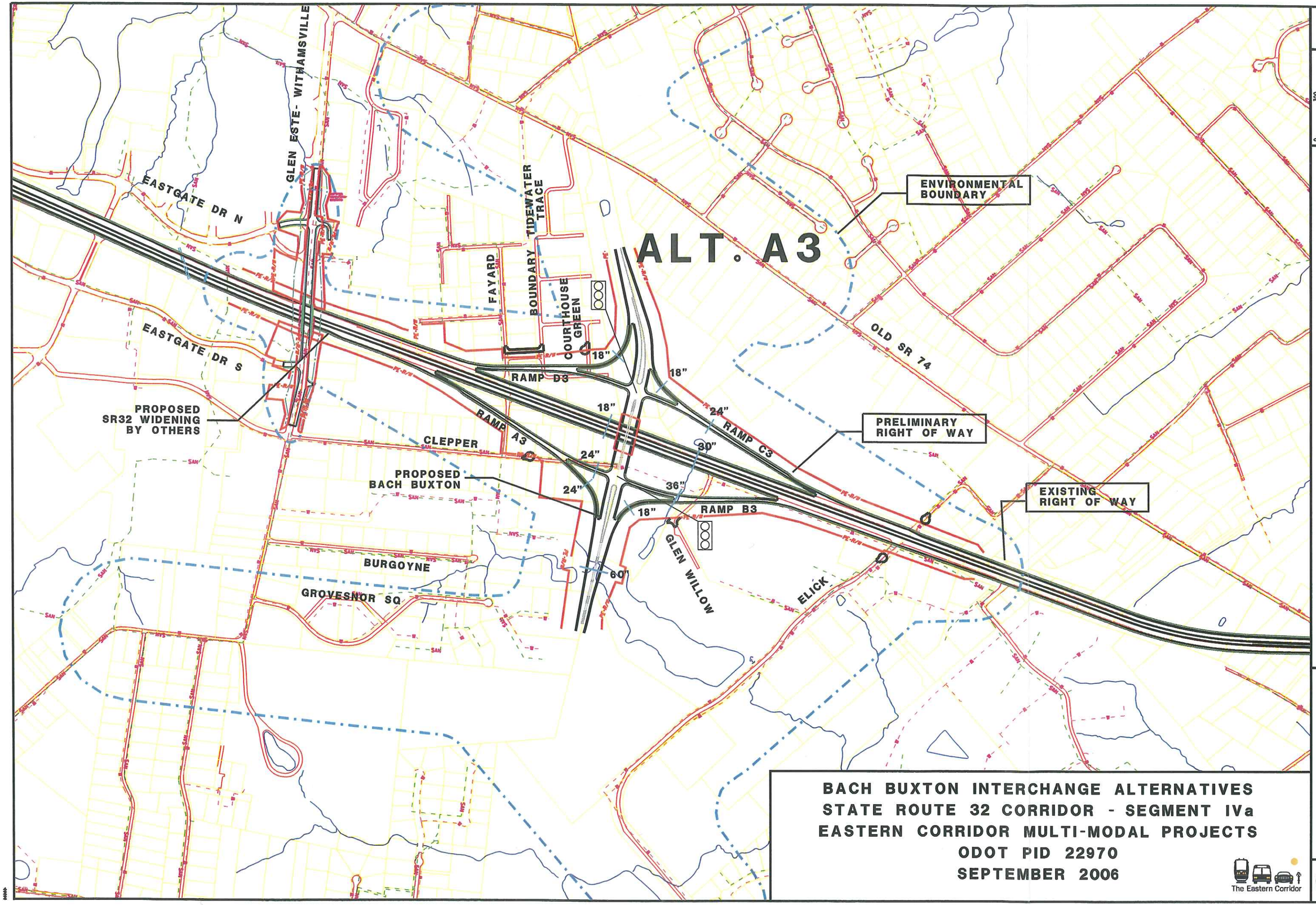


PLAN - ALTERNATIVE A2

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

FIGURE 5A

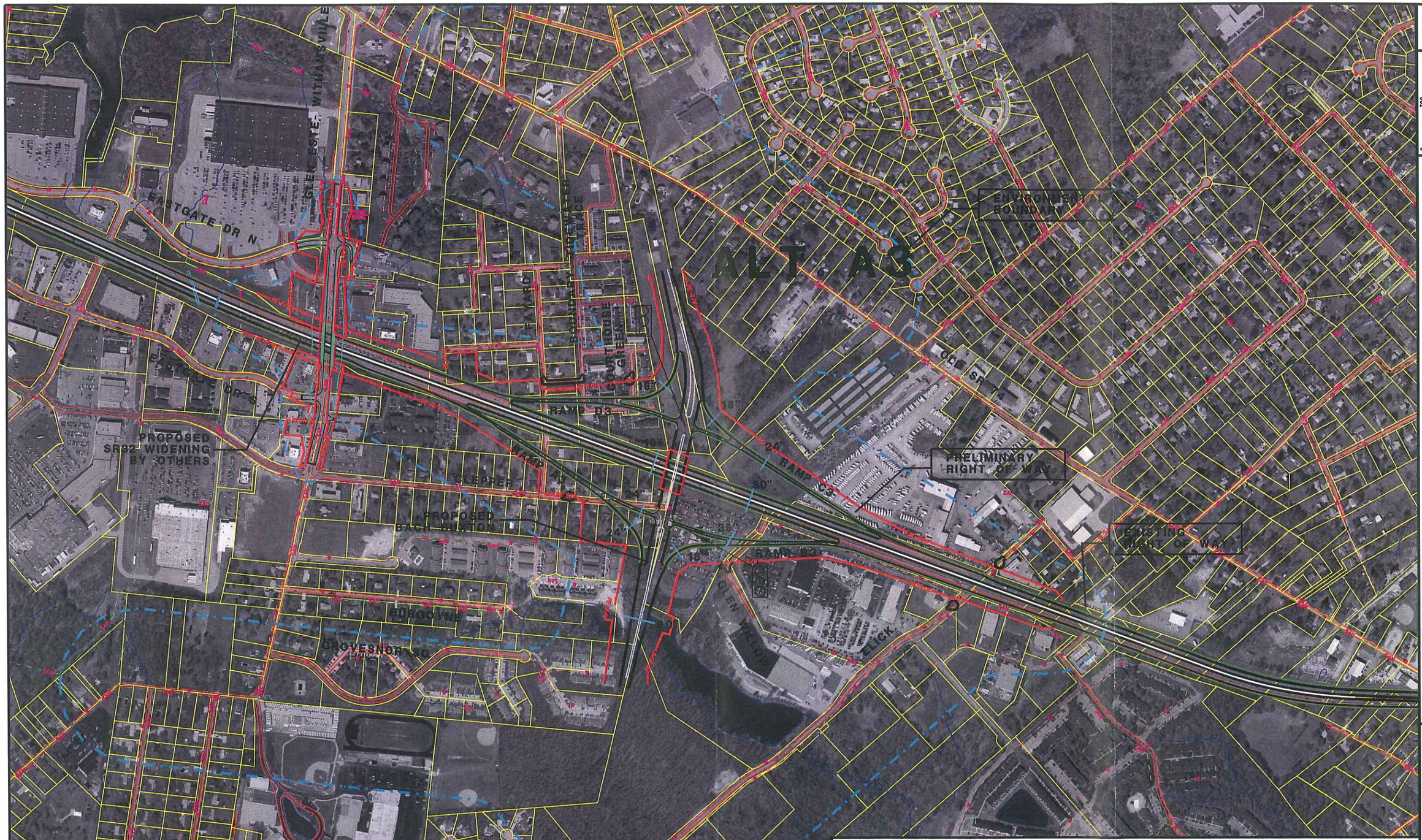


BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

PLAN - ALTERNATIVE A3

FIGURE 6



PLAN - ALTERNATIVE A3

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

FIGURE 6A

6A
9

ALT. A4

ENVIRONMENTAL BOUNDARY

EXISTING RIGHT OF WAY

EASTGATE DR N

EASTGATE DR S

GLEN EDITE- WITHAMSVILLE

TIDEWATER TRACE

FAYARD

BOUNDARY

COURTHOUSE GREEN

OLD SR 74

PROPOSED SR32 WIDENING BY OTHERS

CLEPPER

RAMP D4

RAMP A4

RAMP C4

RAMP B4

18"

24"

30"

36"

60"

PROPOSED BACH BUXTON

BURGOYNE

GROVENORS SQ

GLEN WILLOW

ELICK

HORIZONTAL SCALE IN FEET

0 150 300 600

N

PLAN - ALTERNATIVE A4

FIGURE 7

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

PLAN - ALTERNATIVE A4

FIGURE 7A

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

ALT. C1

ALT. B1

WUEBOLD LANE

GLEN ESTE WITHAMSVILLE

GOVENORS SQ

BURGOYNE

EASTGATE DR S

EASTGATE DR N

GLEN ESTE- WITHAMSVILLE

CLEPPER

FAYARD

WALNUT

CLERMONT LN

GLEN ESTE LANE

TIDEWATER TRACE

HONEY HILL

COVES CREEK

BROOKVIEW

TEALTOWN RD

SADDLEBACK

PROPOSED GLEN ESTE

PRELIMINARY RIGHT OF WAY

PROPOSED BACH BUXTON

18"

60"

SEE ALTERNATIVES A1, A2, A3 OR A4 FOR INTERCHANGE

60"

18"

36"

PRELIMINARY RIGHT OF WAY

BACH BUXTON

ENVIRONMENTAL BOUNDARY

72"

PROPOSED GLEN ESTE

GLEN WILLOW

SR 32

36"

ELICK

OLD SR 74

SCHOOLHOUSE

HORIZONTAL SCALE IN FEET

0 60 300 600

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

FIGURE 8

PLAN - ALTERNATIVE B1 AND C1

8
9

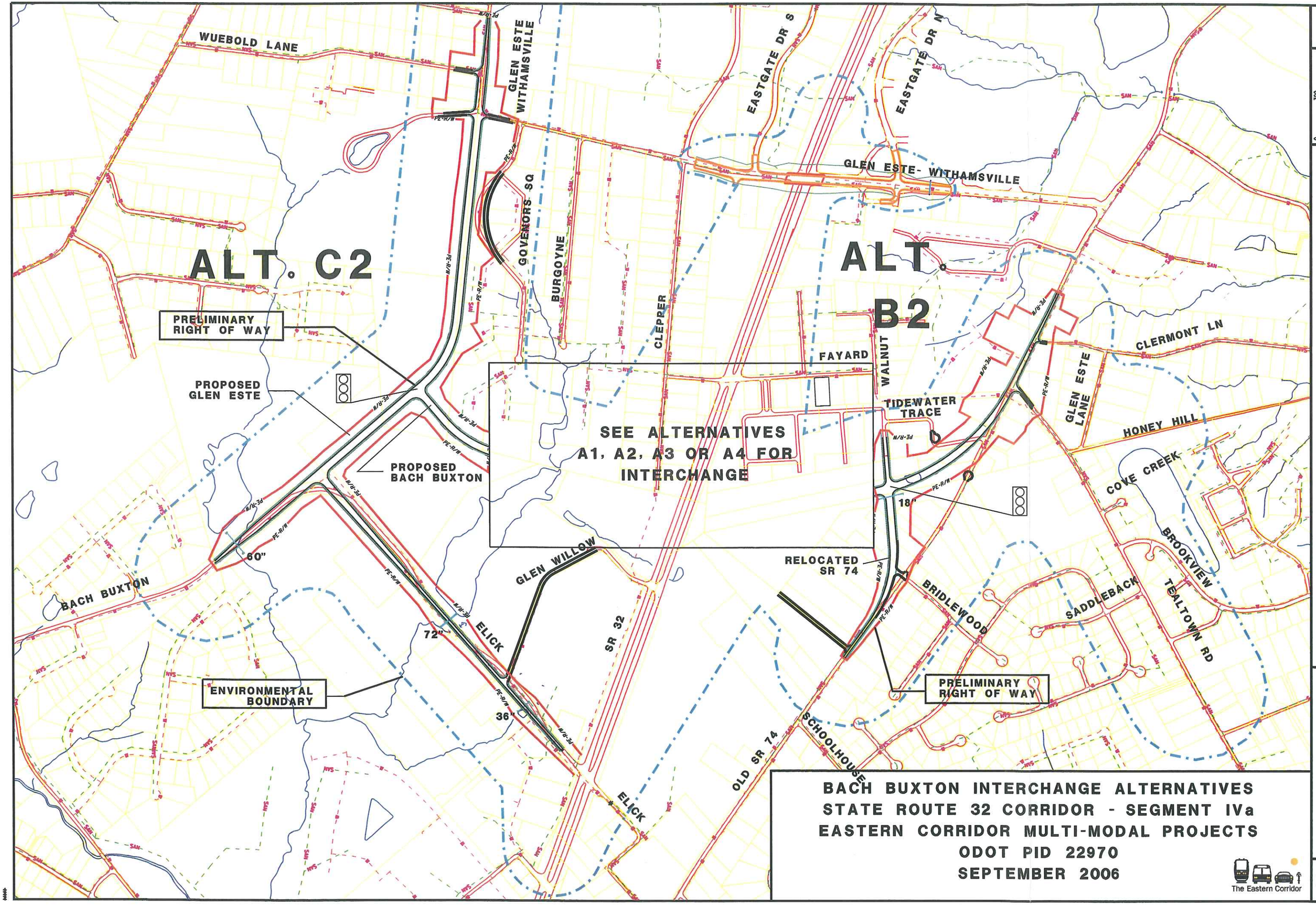
PLAN - ALTERNATIVE B1 AND C1

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

FIGURE 8A

8A
9



ALTERNATIVE B2 AND C2 PLAN - ALT

FIGURE 9

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

BACH BUXTON INTERCHANGE ALTERNATIVES
STATE ROUTE 32 CORRIDOR - SEGMENT IVa
EASTERN CORRIDOR MULTI-MODAL PROJECTS
ODOT PID 22970
SEPTEMBER 2006

The Eastern Corridor

PLAN - ALTERNATIVE B2 AND C2

FIGURE 9A

9A
9

APPENDIX B. COST OPINION

Preliminary Input for Assessment of Feasible Alternatives
Bach Buxton Interchange Alternatives - State Route 32 Corridor - Segment IVa
Eastern Corridor Mulit-Modal Projects
Hamilton and Clermont Counties, Ohio ODOT PID 22970
September 2006

Summary				
	R/W - Acres	Construction	Utility Reimbursement	
Alternative A1	44	$17,581,000	$532,000	
Alternative A2	46	$18,048,000	$532,000	
Alternative A3	54	$18,715,000	$559,000	
Alternative A4	50	$20,821,000	$558,000	
Alternative B1	31	$6,772,000	$792,000	
Alternative B2	39	$3,865,000	$805,000	
Alternative C1	20	$8,007,000	$659,000	
Alternative C2	35	$6,378,000	$755,000	
Glen Este Withamsville	8	$6,378,000	$569,000	

Preliminary Input for Assessment of Feasible Alternatives
Bach Buxton Interchange Alternatives - State Route 32 Corridor - Segment IVa
Eastern Corridor Mulit-Modal Projects
Hamilton and Clermont Counties, Ohio ODOT PID 22970
September 2006

Breakdown of construction items - Totals are rounded to the nearest $1000				
	Alternative A1	Alternative A2	Alternative A3	Alternative A4
Earthwork	$6,056,228	$6,028,031	$6,645,481	$6,664,627
Roadway	$2,849,158	$2,874,609	$2,966,848	$3,001,331
Structures	$4,598,460	$4,960,566	$4,960,566	$6,690,000
Traffic Control	$308,615	$311,480	$313,611	$231,985
Drainage	$837,961	$864,981	$708,931	$762,857
Contingency	$2,930,085	$3,007,934	$3,119,088	$3,470,160
Total Alternative	$17,581,000	$18,048,000	$18,715,000	$20,821,000

Preliminary Input for Assessment of Feasible Alternatives
Bach Buxton Interchange Alternatives - State Route 32 Corridor - Segment IVa
Eastern Corridor Mulit-Modal Projects
Hamilton and Clermont Counties, Ohio ODOT PID 22970
September 2006

Breakdown of construction items - Totals are rounded to the nearest $1000				
	Alternative B1	Alternative B2		
Earthwork	$2,063,250	$857,980		
Roadway	$1,730,089	$1,159,563		
Structures	$0	$0		
Traffic Control	$210,577	$176,710		
Drainage	$1,639,739	$1,026,406		
Contingency	$1,128,731	$644,132		
Total Alternative	$6,772,000	$3,865,000		
	Alternative C1	Alternative C2		
Earthwork	$1,752,895	$959,760		
Roadway	$2,521,905	$2,440,209		
Structures	$0	$0		
Traffic Control	$262,425	$200,462		
Drainage	$2,134,973	$1,714,341		
Contingency	$1,334,439	$1,062,954		
Total Alternative	$8,007,000	$6,378,000		

Preliminary Input for Assessment of Feasible Alternatives
Bach Buxton Interchange Alternatives - State Route 32 Corridor - Segment IVa
Eastern Corridor Mulit-Modal Projects
Hamilton and Clermont Counties, Ohio ODOT PID 22970
September 2006

Breakdown of construction items - Totals are rounded to the nearest $1000				
	Glen Este Withamsville			
Earthwork	$964,539			
Roadway	$566,640			
Structures	$3,194,421			
Traffic Control	$149,473			
Drainage	$439,621			
Contingency	$1,062,939			
Total Alternative	$6,378,000			

APPENDIX C. ECOLOGICAL FEATURES MEMORANDUM

The Eastern Corridor

Technical Memorandum:
SUMMARY OF ECOLOGICAL FEATURES
Preliminary Input for Assessment of Feasible Alternatives (Step 6 ODOT PDP - Part)

Task B.1. (HE) - SR 32: Eastgate Phase 2 Improvements, Gleneste-Withamsville to Olive Branch-Stonelick Road (Segment IVa - Part)
EASTERN CORRIDOR MULTI-MODAL PROJECTS
HAMILTON AND CLERMONT COUNTIES, OHIO
ODOT PID 22970

Prepared for:

The Hamilton County Transportation Improvement District
The Clermont County Engineer's Office
The Ohio Department of Transportation - District 8

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August 7, 2006

TABLE OF CONTENTS

LIST OF TABLES
In-Text

LIST OF EXHIBITS

I. INTRODUCTION AND BACKGROUND

A. PURPOSE OF THIS TECHNICAL MEMORANDUM

The purpose of this *Technical Memorandum* (hereafter referred to as *Tech Memo*) is to present a summary of ecological resources located within the proposed project study area, generally located along State Route 32 (SR 32) between Gleneste-Withamsville Road and Olive Branch-Stonelick Road in Union Township, Clermont County, Ohio (see Exhibit 1). Information summarized in this *Tech Memo* will be detailed in the Ecological Survey Report drafted for this Eastern Corridor Tier 2 project Segment IVa.

This *Tech Memo* serves as an interim base study component of environmental documentation for ecological resources found through survey of the Bach-Buxton area. Data forms and additional information for these ecological resources will be included in the project Ecological Survey Report (ESR) as required by the National Environmental Policy Act (NEPA) and related statutes. Survey of ecological resources within the project study area was conducted according to Ohio Department of Transportation (ODOT) and NEPA guidelines and in coordination with appropriate state and federal agencies. The work conducted in this study was structured to provide meaningful input to the evaluation and refinement of the improvements proposed for this Eastern Corridor Tier 2 project Segment IVa.

The findings of this *Tech Memo* are based on information presented in the Eastern Corridor project *Ecological Resources Inventory Report* (ERIR) (Balke Engineers, February 2003). Information not included in the Eastern Corridor ERIR for this project study area was obtained through field surveys conducted from June 13 to July 6 2006, as well as through evaluation of secondary source information. Ecological survey methods for this study were conducted according to procedures outlined in the Ohio Department of Transportation, Office of Environmental Services January 2005 Ecological Manual (see Section II below).

B. PROPOSED ACTION

The proposed project includes safety, access and capacity improvements to approximately 1.2 miles of SR 32 from just west of Gleneste-Withamsville Road to Newberry Drive. Proposed improvements involve consolidating and managing access points to establish SR 32 as a limited access arterial roadway, including elimination of access at SR 32/Gleneste-Withamsville Road. Planned local road improvements will be implemented separately in support of this improvement.

The proposed project includes a connector road between Old SR 74 and Bach-Buxton as well as an interchange with SR 32. A 5-lane rural arterial approximately 1.5 miles long from Elick/ Bach-Buxton to either Tealtown Road or Old SR 74 would complete a roadway loop from north of SR 32 to south of SR 32. Four alternatives were developed for the north and south termini with distinctions being the orientations of the termini, either west toward I-275 with existing development (Alternatives B2 and C2), or east for future development (Alternatives B1 and C1). The interchange location with SR 32 is the same for each of the arterial alternatives.

Alternatives A1, A2, A3 and A4 represent 4 different interchange configurations for the arterial and SR 32. Alternatives A1, A2 and A3 are Diamond Interchanges with progressively wider spaces between the ramp termini. Alternative A4 is a single point urban interchange. The alternatives and interchange configurations considered for this project do not appear on exhibits

included in this document, however, they are described in detail and shown on exhibits in the project *Bach-Buxton Interchange Alternatives* (Balke American, August 2006).

C. PROJECT STUDY AREA

The project study area is located in western Clermont County and extends along existing SR 32 approximately 1.2 miles from just west of Gleneste-Withamsville Road to Newberry Drive (see Exhibits 1 and 2). The project study area also includes area along portions of Old SR 74, Tealtown Road, Glen Este-Withamsville Road, Elick Lane and Bach-Buxton Road (see Exhibit 2). The total area covered by the project study area is approximately 500 acres. Ecological resources identified in the project study area are displayed on Exhibits 3b and 3c.

D. SUMMARY OF ENVIRONMENTAL SETTING

The proposed project is located in the Eastern Corn Belt Plain Ecoregion of the eastern United States and is characterized by gently rolling glacially influenced topography (Rankin, 1996). The project area is located within the East Fork sub-basin of the Little Miami River drainage basin.

Underlying bedrock is mapped as Silurian-aged Niagara limestone and shale. Upper Ordovician age bedrock occurs at numerous cascades in the project study area. The entire area is overlain with Illinoian-aged glacial drift comprised of ground moraine with Wisconsinan-aged alluvium occurring in the Little Miami and East Fork River valleys. Landforms in Clermont County include glacial uplands, glacial river terraces and outwash plains. Soils in the area range from moderately well drained to well drained soils, formed in weathered limestone and shale bedrock and wind deposited silt (Lerch et al., 1975). One hydric soil occurs in the area encompassed by the project study area and was estimated to comprise less than 2 percent of the total project study area.

Land use in the area is mostly residential/commercial and existing right-of-way, with some areas of wooded upland and wooded corridors, and limited amounts of agricultural, newfield and oldfield land uses. Semi-natural habitats occur as small wetlands, woodlots, and discontinuous riparian corridors along surface streams within the project study area.

There are no Public Water Supply (PWS) wells, Wellhead Protection Areas (WHPA's), or Federal Emergency Management Agency (FEMA) designated 100-year floodplains located within the project study area (ODNR, 2004).

Four Federally listed species (Indiana bat, running buffalo clover, sheepnose mussel and rayed bean mussel) are reported as potentially occurring in the area, however, no specific occurrences of any of the species have been recorded from within the project study area.

II. METHODS USED IN CONDUCTING ECOLOGICAL SURVEY WORK

A. GENERAL APPROACH

Ecological survey methods employed for this project were conducted according to guidelines established in the Ohio Department of Transportation-Office of Environmental Services (ODOT-OES) Ecological Manual (ODOT-OES, January 2005). A project study area was identified as described in Section I.C, above, and ecological field work was conducted within this area that included detailed stream surveys, wetland determinations, and terrestrial habitat, fauna and threatened and endangered species observations. Detailed stream surveys included analysis of basic water quality, Qualitative Habitat Evaluation Index (QHEI) analysis, and Headwater Habitat Evaluation Index (HHEI) analyses (physical habitat survey) and Headwater Macroinvertebrate Field Evaluation Index (HMFEI) analysis (where necessary). Ecological survey methods are described in detail below.

B. SECONDARY SOURCE INFORMATION

General information concerning the occurrence of ecological resources and previous levels of identification and assessment were obtained for streams, wetlands, woodlands, groundwater and floodplains, terrestrial features and threatened and endangered species from the Eastern Corridor project *Ecological Resources Inventory Report (ERIR)* (Balke Engineers, February 2003) which was incorporated into the Eastern Corridor *Tier 1 Draft Environmental Impact Statement* (Balke American, August 2004) and the I-275/SR 32 Interchange project *Ecological Survey Report (Level 1)* (Balke American, October 2004). The Eastern Corridor ERIR presented an overview and preliminary evaluation of ecological resources within the entire Eastern Corridor study area, which included a portion of the western half of the current project study area, as described above. Several ecological resources identified in the *Ecological Survey Report (Level 1)* (Balke American, October 2004) also occur within the boundary of the current project study area. These ecological resources were field checked during the June 13 to July 6 field survey for the current project and those features still present are included in this *Tech Memo* (see Section III below).

Additional secondary source information was used for the more detailed level of assessment conducted for this *Tech Memo*, as further described, below.

C. SURVEY METHODS FOR STREAMS

1. Stream Inventory and Detailed Stream Surveys

Secondary source information, including county soil surveys and topographic mapping were used to determine the presence of potential jurisdictional streams within the project study area. All roadside ditches within the study area were investigated following the criteria and technical guidance on roadside ditches found in the ODOT-OES Ecological Manual (2005). Roadside ditches that did not meet any of the criteria for jurisdictional status were considered non-jurisdictional and excluded.

Drainage areas for the remaining USGS and non-USGS features were calculated using Delorme 3-D TopoQuads® mapping software to determine the level of assessment required for detailed stream surveys. According to ODOT-OES guidance (2005), stream drainages of one square

mile or less require a Headwater Habitat Evaluation Index (HHEI) assessment. Using this guidance, 26 stream sites were evaluated as Primary Headwater Habitats (PHWH). Using the "Flow Chart For Conducting Stream Sampling", found on page 36 of the ODOT-OES Ecological Manual (2005), it was determine that none of the streams sites had OEPA Aquatic Life Use Designations and none required aquatic sampling using the Qualitative Habitat Evaluation Index (QHEI). A summary of HHEI scores and provisional stream class designations at each stream site encountered within the project study area are presented in Table 1 below (see Section III).

a. Physical Habitat (HHEI) Surveys

During stream surveys conducted from June 13 to July 6, 2006, physical surface stream conditions at 26 stream sites were recorded and photographed. Information regarding bank conditions, bottom substrate, channel conditions, adjacent land use, erosion and pollution problems, and riparian composition were recorded on OEPA Site Description Sheets (OEPA, 2002), and used in the calculation of HHEI scores according to OEPA methods (2002). Physical surface stream conditions at three additional features identified in the I-275/SR 32 Interchange 2004 *Ecological Survey Report (Level 1)* were field verified during the 2006 stream survey.

b. Water Quality Analyses

Single grab samples were analyzed on-site at all sites with sufficient water depth (2 inches) using a YSI 556 Multi-Parameter System. Water quality parameters sampled included water temperature, pH, dissolved oxygen, and conductivity. A summary of water quality conditions by stream site is presented in Table 2 below (see Section III).

c. Biological Sampling

Macroinvertebrates were sampled at one stream site (Site #45) using the OEPA rapid bio-assessment field sampling method following the Headwater Macroinvertebrate Field Evaluation Index (HMFEI) protocol (OEPA, September 2002) as per ODOT-OES guidance in the Ecological Manual (ODOT-OES, January 2005). Full aquatic biological sampling was not required at any of the remaining stream sites for this project. However, the presence or absence of biological organisms, such as fish, macroinvertebrates and amphibians, was noted on the HHEI data sheets (data sheets will be included in the project ESR).

2. Assigning Provisional Aquatic Life Use Designations

Twenty-six stream sites were evaluated and assigned a provisional stream class using the decision-making flowchart for determining appropriate PHWH stream class using the HHEI protocol, found on page 23 (Figure 7) of OEPA's Field Evaluation Manual for Ohio's Primary Headwater Streams (OEPA, September 2002).

D. SURVEY METHODS FOR WETLANDS

1. Project Study Area

Field identification and mapping of jurisdictional wetlands for this project was conducted for the entire project study area and immediately adjacent areas, using the methods described below.

2. Field Determinations and Wetland Delineations

A walk-over survey of sites within the project study area that were suspected to be or to contain wetlands was conducted from June 13 to July 6, 2006. These areas, which included approximately 44 separate field sites, included a check of: a) all NWI mapped features and b) potential "wet spots" in farm fields, residential areas, right-of-way etc. as identified from aerial photographs, soil surveys, the Eastern Corridor ERIR (Balke Engineers, February 2003), the I-275/SR 32 Interchange project ESR (Level 1) (Balke American, October 2004) and other secondary sources.

For those field sites identified as likely jurisdictional wetlands, information was recorded on Routine On-site Wetland Determination forms (following US Army Corps of Engineers 1987 methods and 2005 ODOT-OES ecological guidelines) and a photograph was taken. Wetland delineations were performed according to guidance in the ODOT-OES Ecological Manual (ODOT-OES, January 2005), and included point-in documentation of dominant vegetation, observed hydrology, soil conditions, wetland status, as well as delineation of wetland boundaries using a Trimble GeoXT GeoExplorer® Model 51900-20 global positioning system unit. Information from an adjacent upland (non-wetland) point was also obtained (vegetation, hydrology and soils) for each wetland site. Wetlands were classified according to Cowardin (1979).

3. ORAM Assessment and Wetland Categories

For this study, assessment of wetland value and placement into a wetland category was made for 19 jurisdictional wetland features by using the OEPA Ohio Rapid Assessment Method (ORAM) for Wetlands, Version 5.0 (OEPA, 2001).

E. SURVEY METHODS FOR TERRESTRIAL FEATURES

Identification and description of terrestrial habitats and faunal observations for this project were conducted for the entire project study area, using the methods described below.

1. Terrestrial Habitats

Interpretation of aerial photographs and qualitative vegetative field surveys were used to describe and define the extent of each of the habitat types occurring in the project study area. Species lists were compiled for community types and habitats during the June 13 to July 6, 2006 field survey. Standard references and professional judgment were used to estimate replacement time for various habitats (as an indicator of relative value). The primary taxonomic references used for plant identifications included Peterson (1996), Strausbaugh and Core (1977), Wharton and Barbour (1973), Wharton and Barbour (1979), and Beal and Thieret (1986).

2. Faunal Components

Evaluation of fauna within the project study area primarily consisted of the overturning of rocks, logs, and debris in order to assess small mammal, reptile, and amphibian populations. Animal signs (tracks, scats, road kills, calls) and direct field observations were also documented. Bird populations were not quantified, but notations of considerable populations were made. All

faunal specimens encountered were identified in the field. The primary taxonomic references used included Hamilton and Whitaker, 1979 (mammals), Peterson, 1980 and Sibley, 2000 (birds), and Conant, 1998 (amphibians and reptiles).

F. SURVEY METHODS FOR THREATENED AND ENDANGERED SPECIES

Agency information requests were conducted with the Ohio Department of Natural Resources Division of Natural Areas and Preserves (ODNR-DNAP) concerning the existence of any Federal or State-listed species in the project area. In addition, a review of the United States Fish and Wildlife Service lists for Federal species in Ohio was conducted.

Detailed biological surveys for endangered species were not conducted as a part of this study. However, for species reported in response to agency information requests as possibly occurring in the area, efforts were made during field surveys to identify areas, features and locations of potential habitat.

III. RESULTS AND FINDINGS OF THE ECOLOGICAL SURVEY

A. SURFACE STREAM RESULTS

1. Results of Detailed Stream Surveys

Walk-over surveys and qualitative analyses of 26 stream sites were conducted according to field and evaluation methods described in Section II.C.1 and 2 of this *Tech Memo*. The locations of these 26 stream sites are shown on Exhibits 3b-c.

Based on the results of the HHEI analyses, the 26 stream sites evaluated for this study include the following provisional classifications: Modified Class I-PHWH (two sites), Class I-PHWH (13 sites), Modified Class II-PHWH (four sites) and Class II-PHWH (seven sites).

The 26 stream sites evaluated for this study are further described below:

a. Physical Stream Conditions (HHEI and QHEI Results)

Modified Class I-PHWH: Based on the results of this ecological study, three stream sites are considered provisional modified Class I-PHWH features, including Sites #2, and #41. These stream segments are mostly straight, channelized features with moderately wide to mostly open riparian corridors. Substrates are dominated by sand and silt with some gravel, clay and the presence of hardpan. Both sites were dry at the time of the field survey. The HHEI scores for the modified Class I-PHWH stream segments were 7 points for Site #41 and 23 points for Site #2, out of a maximum 100 points.

Class I-PHWH: Based on the results of this ecological study, 13 stream sites are considered provisional Class I-PHWH features, including Sites #1, #5, #6, #7, #8, #12, #13, #14, #15, #17, #45, #46 and #47. Excluding Site #45, which scored high on the HHEI form and was re-evaluated using the HMFEI, these stream segments are characterized by meandering and straight channels with mostly wide to moderately wide, narrow and open riparian corridors. Substrates are dominated by sand and silt with moderate amounts of leaf pack and woody debris, with some boulder slab, cobble and gravel present. These stream segments typically had no flow. The few sites with water had maximum pool depths ranging from 1.8 to 3.5 inches (4.8 to 9.0 centimeters). The HHEI scores for the provisional Class I-PHWH stream segments ranged from 13 points to 29 points, out of a maximum 100 points. Stream Site #45 is characterized by a slightly meandering channel with wide to moderately wide riparian corridor, cobble and gravel dominated substrate, interstitial flow with a maximum pool depth of 5.1 inches (13 centimeters) and an HHEI score of 71 points. Site #45 was re-evaluated using the HMFEI and subsequently scored 4 points, classifying Site #45 as a provisional Class I-PHWH stream.

Modified Class II-PHWH: Based on the results of this ecological study, four stream sites are considered provisional modified Class II-PHWH features, including Sites #9, #42, #48 and #49. These stream segments range from mostly straight and channelized to slightly meandering with riparian corridors that range from complete and wide to absent and open. Substrates are dominated by sand and silt with some gravel also present. These stream segments typically had moderate flow or had isolated pools with maximum pool depths ranging from 2.4 to 7.9 inches (6.0 to 20 centimeters). The HHEI scores for the provisional modified Class II-PHWH stream segments ranged from 31 points to 58 points, out of a maximum 100 points.

Class II-PHWH: Based on the results of this ecological study, seven stream sites are considered provisional Class II-PHWH features, including Sites #3, #4, #10, #11, #16, #43 and #44. These stream segments are characterized by mostly meandering and straight channels with mostly wide to some moderately wide and narrow riparian corridors. Substrates include a range of boulder slab, bedrock, cobble, gravel, sand, silt, leaf pack, woody debris, hardpan and artificial materials. These stream segments had mostly moderate flow with some interstitial flow, isolated pools or no flow. For those features with water, maximum pool depths ranged from 1.9 to 13.4 inches (4.9 to 34 centimeters). The HHEI scores for the Class II-PHWH stream segments ranged from 37 points to 66 points, out of a maximum 100 points.

Summary Table: The following table summarizes HHEI scores and provisional stream class for the 26 surface stream features surveyed for this study.

Table 1. Summary of HHEI Scores and Provisional Stream Class at Survey Sites

Site #	Stream Name	HHEI Score	Provisional Stream Class
1	Unnamed Tributary #1	27	Class I
2	Unnamed Tributary #2	23	Modified Class I
3	Unnamed Tributary #3	52	Class II
4	Unnamed Tributary #4	37	Class II
5	Unnamed Tributary #5	13	Class I
6	Unnamed Tributary #6	13	Class I
7	Unnamed Tributary #7	13	Class I
8	Unnamed Tributary #8	14	Class I
9	Unnamed Tributary #9	43	Modified Class II
10	Unnamed Tributary #10	66	Class II
11	Unnamed Tributary #11	58	Class II
12	Unnamed Tributary #12	29	Class I
13	Unnamed Tributary #13	24	Class I
14	Unnamed Tributary #14	29	Class I
15	Unnamed Tributary #15	24	Class I
16	Unnamed Tributary #16	53	Class II
17	Unnamed Tributary #17	25	Class I
41	Unnamed Tributary #41	7	Modified Class I
42	Unnamed Tributary #42	31	Modified Class II

Table 1. Summary of HHEI Scores and Provisional Stream Class at Survey Sites

Site #	Stream Name	HHEI Score	Provisional Stream Class
43	Unnamed Tributary #43	55	Class II
44	Unnamed Tributary #44	65	Class II
45	Unnamed Tributary #45	71	Class I [1]
46	Unnamed Tributary #46	16	Class I
47	Unnamed Tributary #47	17	Class I
48	Unnamed Tributary #48	58	Modified Class II
49	Unnamed Tributary #49	42	Modified Class II

[1] Headwater Macroinvertebrate Field Evaluation Index (HMFEI) employed per ODOT-OES guidance (ODOT, January 2005). Site #45 scored 4 points on the HMFEI.

b. Biological Observations

Overall, observed biology was limited. Most of the stream sites had no evidence of biology present at the time of the survey. A few salamanders were observed at one stream site only (Site #45). Fish were observed at only two streams Sites #10 and #11. Biological organisms observed at the remaining stream sites included macroinvertebrates that were dominated by leeches, aquatic sow bugs and water striders. Additional macroinvertebrates encountered less frequently included snails and mosquito larvae.

A Headwater Macroinvertebrate Field Evaluation Index (HMFEI) analyses was conducted at one site (Site #45). The HMFEI score was 4 points.

c. Water Quality Results

General - Overall, water quality data collected for this study indicate surface water conditions that are slightly degraded. Physical water quality data (for stream sites with sufficient water depth) by water quality parameter are summarized in Table 2, below.

Table 2. Summary of Water Quality Data Collected at Stream Survey Sites

Stream Name	Site #	Water Quality Parameters			
		Temperature °F (°C)	pH	Dissolved Oxygen (ppm)	Conductivity (µmhos/cm)
Unnamed Tributary #3	3	59.4 (15.2)	7.7	5.68	1,679
Unnamed Tributary #4	4	59.2 (15.1)	7.4	3.50	824
Unnamed Tributary #9	9	76.8 (24.9)	7.9	9.66	1,489
Unnamed Tributary #10	10	69.8 (21.0)	8.1	7.16	400
Unnamed Tributary #11	11	66.5 (19.2)	8.0	6.56	400

Table 2. Summary of Water Quality Data Collected at Stream Survey Sites

Stream Name	Site #	Water Quality Parameters			
		Temperature °F (°C)	pH	Dissolved Oxygen (ppm)	Conductivity (µmhos/cm)
Unnamed Tributary #14	14	69.4 (20.8)	7.2	1.55	207
Unnamed Tributary #16	16	66.2 (19.0)	6.9	2.40	602
Unnamed Tributary #18	18	64.8 (18.2)	7.9	7.80	906
Unnamed Tributary #42	42	71.4 (21.9)	7.8	2.70	1,089
Unnamed Tributary #43	43	65.3 (18.5)	7.8	7.60	1,070
Unnamed Tributary #44	44	65.5 (18.6)	7.9	7.50	1,278
Unnamed Tributary #45	45	66.9 (19.4)	7.9	6.10	849

2. Summary of Provisional Aquatic Life Use Designations

Using HHEI collected for this ecological study, provisional (non-official) stream class designations (PHWH streams) for streams in the project study area were determined following OEPA guidelines (OEPA, 2002).

Based on the results of the HHEI, HMFEI (for Site #45 only), and QHEI analyses, a potential breakdown of the 48 stream sites by OEPA PHWH stream Class and aquatic life use designation is as follows:

- Modified Class I-PHWH: 2 total (Stream Sites #2, and #41)
- Class I-PHWH: 13 total (Stream Sites #1, #5, #6, #7, #8, #12, #13, #14, #15, #17, #45, #46 and #47)
- Modified Class II-PHWH: 4 total (Stream Sites #9, #42, #48 and #49)
- Class II-PHWH: 7 total (Stream Sites #3, #4, #10, #11, #16, #43 and #44)

B. WETLAND RESULTS

1. General Overview

Most wetlands in the general project area are small, limited quality and associated with disturbed areas. These types of wetlands are typically emergent features in drainage swales, low spots in fields or depressional areas in previously disturbed sites.

a. Isolated Versus Non-Isolated Wetland Features

None of the wetlands identified during field surveys conducted for this project were determined to be isolated features.

2. Wetlands Identified in the Project Study Area

a. Jurisdictional Features and Wetland Categories

Based on wetland determination surveys conducted for this study (according to methods described in Section II.D), a total of 19 jurisdictional wetlands were identified within and immediately adjacent to the boundaries of the project study area. Wetland locations are shown on Exhibits 3b and 3c.

Based on the results of ORAM analyses, a breakdown of the 19 jurisdictional features by OEPA wetland category is as follows:

- Category 1 (limited value): 11 total (Wetlands 1, 2, 3, 6, 10, 17,18,19 and 21)
- Category 1/2: 5 total (Wetlands 4, 7, 15 and 16)
- Category 2 (Moderate value): 6 total (Wetlands 5, 20, 23, 24 and 25)
- Category 3 (High value): 1 total (Wetland 22)

A summary of the 19 jurisdictional wetlands identified within and immediately adjacent to the project study area is presented in Table 3 below:

Table 3. Summary of Jurisdictional[1] Wetlands Identified Within and Adjacent to the Project Study Area

Wetland #	Description/ Classification	Approximate Size	ORAM V5.0 Score	OEPA Wetland Category
1	Emergent; retention basin from parking lot runoff; east side of Gleneste-Withamsville Road (palustrine)	0.08 ac	18	Category 1
2	Emergent; edge of parking lot behind car dealership south of SR 32 (palustrine)	0.01 ac	12	Category 1
3	Emergent; retention basin adjacent to parking lot behind car dealership west of Elick Lane (palustrine)	0.19 ac	24	Category 1
4	Emergent / Scrub-shrub; located adjacent to stream on terrace south of Marian Drive (palustrine)	0.19 ac	31.5	Category 1 or 2
5	Forested / Emergent; low depression within Woodland B (palustrine)	0.02 ac	46	Category 2
6	Emergent; low depression adjacent to Elick Lane ROW (palustrine)	0.05 ac	24.5	Category 1
7	Emergent; low swale adjacent to commercial development east of Elick Lane (palustrine)	0.11 ac	33	Category 1 or 2
10	Emergent; drainage channel between gas station and residence north of SR 32 (palustrine)	0.01 ac	26	Category 1
15	Forested / Emergent; low lying area with shallow depression pond between commercial development north of SR 32 (palustrine)	1.17 ac	31	Category 1 or 2
16	Emergent; shallow depression and drainage swale across newfield south of Old SR 74 (palustrine)	0.09 ac	33	Category 1 or 2

Table 3. Summary of Jurisdictional[1] Wetlands Identified Within and Adjacent to the Project Study Area

Wetland #	Description/ Classification	Approximate Size	ORAM V5.0 Score	OEPA Wetland Category
17	Emergent; retention basin and shallow swale from Church parking lot southeast of Tealtown Road (palustrine)	0.05 ac	12	Category 1
18	Emergent; drainage swale from residential apartment complex south of Old SR 74 (palustrine)	0.09 ac	21	Category 1
19	Emergent; shallow depression adjacent to commercial parking lot west of Elick Lane (palustrine)	0.02 ac	18.5	Category 1
20	Forested; low depression with emergent edge within Woodland A (palustrine) [same as Wetland 2 from Part A ESR]	0.06 ac	51	Category 2
21	Emergent; low depression in corner of newfield adjacent to existing SR 32 ROW (palustrine) [same as Wetland 1 from Part A ESR]	0.004 ac	29.5	Category 1
22	Open Water / Forested / Scrub-Shrub; old retention pond with shallow backwater mudflat channel and emergent edge (palustrine) [same as Wetland 9 from Part A ESR]	0.83 ac	76	Category 3
23	Forested; low shallow depression within Woodland B (palustrine) [same as Wetland 6 from Part A ESR]	0.13 ac	59	Category 2
24	Forested; low shallow depression within Woodland B (palustrine) [same as Wetland 4 from Part A ESR]	0.25 ac	59	Category 2
25	Forested; low shallow depression within Woodland B (palustrine) [same as Wetland 3 from Part A ESR]	0.10 ac	57	Category 2

[1] None of the wetlands identified during field surveys conducted for this project were determined to be isolated features.

C. PONDS

Four ponds are located within or immediately adjacent to the project study area (see Exhibits 3b and 3c). All of these features are man-made and were created by excavation of upland areas.

The three larger ponds are used for recreational purposes. Willowbrook Lake (5.2 acres in size) located on the north side of Tealtown Road is associated with the Willowbrook Home Owners Association and has a paved walking or biking path around the perimeter. Glen Willow Lake (6.2 acres in size) located south of SR 32 to the west of Elick Lane occurs on commercial/industrial property owned by Grover Industries, LLC and is provided by the company for use by employees. Wuerdeman Lake (3.3 acres in size) located on the west side of Bach-Buxton Road behind a residential subdivision is used for recreational fishing. The one smaller pond is a retention pond (0.5 acres in size) located on the north side of Glen Willow Lake on property belonging to a car dealership. In general, all of these ponds possess limited biological value due to relatively small size, a lack of vegetation and quality aquatic habitat, and location within generally disturbed semi-natural to suburban environments.

D. TERRESTRIAL RESOURCES RESULTS

1. General Conditions of the Terrestrial Environment

The project study area consists of primarily a mixture of existing right-of-way, residential/commercial lands, some wooded uplands and bottomlands, and limited oldfield and newfield land uses. Additionally, there are several wooded riparian corridors located immediately adjacent to surface streams in the project study area (see Exhibits 3b and 3c).

2. Identification of Terrestrial Habitat Types

Ten terrestrial habitat types were identified within the project study area. General locations of these habitats are shown on Exhibits 3b and 3c. The ten habitat types found within the project study area and their corresponding map codes are as follows:

Table 4. Terrestrial Habitat Types Identified in the Project Study Area

Terrestrial Habitat	Map Code
Right-of-Way (highway and secondary roads)	**ROW**
Residential/Commercial (residential, commercial, industrial)	**RC**
Wooded Riparian Corridor	**WRC**
Open Riparian Corridor	**ORC**
Riparian Woodland	**RW**
Upland Woodland	**UW**
Wooded Fence Row	**WFR**
Oldfield	**OF**
Newfield	**NF**

Wetlands (Wetland) and Ponds (P), which can include both aquatic and terrestrial features, are discussed in Sections III.B and C, above, respectively. Detailed descriptions of each of the 10 habitats types are presented below.

a. Right-of-Way (Map Code: ROW)

Characteristics and Distribution - Right-of-way habitat for this project includes the narrow strips of maintained (unpaved) land and roadway ditches along highway and secondary roads. Also

included in this category are existing roadway pavement and shoulder. The widest right-of-way areas in the study corridor occur along existing SR 32. Narrower strips of right-of-way occur throughout the area along existing state, county and township streets and roads.

Right-of-way habitat is typically vegetated by a mixture of grasses and herbaceous perennials (per ODOT specifications) that are regularly maintained by mowing, herbicide application or some other type of maintenance activity. Roadside ditches in the area typically have grassy, maintained banks, but also contain scattered pockets of invader species, especially along the lower banks. Some areas of right-of-way for this project include scrubby to young wooded areas comprised of dense bush honeysuckle, along with young scrubby black locust, red elm and eastern red cedar.

Biological Value and Replacement Time - The biological value of right-of-way habitat is limited due to continual mowing, spraying and maintenance and close proximity to on-going human activities (traffic). Estimated replacement time is 2 years for the non-wooded areas of right-of-way. Estimated replacement time for areas having a mixture of trees and shrubs is 40 years.

b. Residential/Commercial (Map Code: RC)

Characteristics and Distribution - This habitat consists mainly of single family and multi-unit residences, commercial and light industrial facilities characterized by highly disturbed features such as paved or gravel parking lots and drives and/or mowed and maintained yards. The use of this habitat type within the project study area consists of a fairly even mix of small individual and large (multi-business operations at one location or within a single structure) commercial and light industrial facilities concentrated in areas with vast expanses of asphalt-paved parking lots and single family and multi-unit residential land use comprised of mowed and maintained yard areas, driveways and/or parking lots, a single family or multi-unit residence or building, and generally one or more outbuildings. This habitat type is distributed in the project study area throughout the existing roadway network.

Typical vegetation in the Residential/Commercial Habitat land use areas consists of a mixture of grasses and ornamental plantings, and a scattering of trees common to the area (oaks, maples, ashes, elms).

Biological Value and Replacement Time - The biological value of residential and commercial habitat is limited due to the close proximity to human activities and the typically sterile (paved) and highly disturbed nature of the environment. Estimated replacement time is 2 to 3 years for areas that are mostly paved and contain only limited herbaceous cover to about 40 years for sites having a mixture of trees and shrubs.

c. Wooded Riparian Corridor (Map Code: WRC)

Characteristics and Distribution - Wooded riparian corridor is located on immediate streambank terraces that line streams. For this project wooded riparian corridor trees included individuals ranging in size from large saplings to mature trees. In this study, intermediate-aged wooded riparian corridor habitat was found to be more common than young growth or mature-aged growth along streams, and occurred in greatest concentration in Woodlands B, C and D in the project study area. For most of the streams within the project study area, wooded riparian corridor was fairly wide when present.

Biological Value and Replacement Time - Wooded riparian corridor is a valuable ecological feature in that it provides sanctuary, travel and forage sites for animals in an area where woodland is not plentiful. It also augments stream structure and quality by supplying instream cover (roots, logs, overhang), food sources, erosion control and bank stability. Estimated replacement time is 40 to 100 years, based on the average size of the largest trees in the habitat.

d. Open Riparian Corridor (Map Code: ORC)

Characteristics and Distribution - Open riparian corridor, like wooded riparian corridor, occurs along the first "terrace" of land adjacent to stream channels within the project study area. These open, approximately 20-foot wide corridors, are mainly treeless and dominated by a mixture of grasses, herbaceous weeds and/or shrubby saplings that grow on both sides of the streambank. This habitat is scattered in small segments within the project study area, especially in areas of concentrated development and fairly recent disturbance.

Biological Value and Replacement Time - Due to the lack of canopy cover and continual disturbances (mowing and clearing) and typical association with small and/or modified drainage features, open riparian corridor is not considered to be a highly valuable ecological habitat. Estimated replacement time is 2 to 3 years for most areas, and up to 10 to 15 years for areas dominated by shrubs.

e. Riparian Woodland (Map Code: RW)

Characteristics and Distribution - Riparian woodlands include woodlots located either directly adjacent to a stream or that are physically linked to a stream by another semi-natural habitat. These sites can therefore be located in either upland topographic positions or in floodplain areas along surface streams. Overall, these riparian-linked sites are similar to isolated upland woods in age, structure and in canopy composition.

Biological Value and Replacement Value - Linkage to riparian corridors gives added value to this type of woodland habitat. Wooded drainage slopes provide bank stability and erosion control. Upland riparian-linked woodlands provide a protected travel corridor to aquatic habitats. Estimated replacement time is approximately 75 to 100 years, based on the average size of the largest trees.

f. Upland Woodland (Map Code: UW)

Characteristics and Distribution - This habitat is fairly uncommon in the project area and is defined as second-growth upland woodland either physically separated from a stream or, if contiguous to a stream, is extensive enough and elevated enough to be considered separate from wooded riparian corridor and riparian woodland. Upland woodland habitat in this project study area is located on the north and south side of SR 32 in the vicinity of Elick Lane and Bach-Buxton Road and at the east project terminus and includes Woodlands A, B, C and D (see Exhibits 3b-c).

Within Woodland B an extremely large white oak (*Quercus alba*), measured at 7.5 feet in diameter at breast height, 18 feet in circumference and calculated to be approximately 120-130 feet in height (per ODNR Division of Forestry, 2004), was noted. Most of Woodland B, including

this extremely large white oak, occurs on property owned by the West Clermont Local School District. Woodland B is a large wet, low lying woodland that has remained relatively undisturbed for a long period of time. The tree was within range of other individuals existing as Ohio State Champion Big Trees and was submitted for official measurement to the Ohio Department of Natural Resources. Other large mature (15 inches +) trees, mainly other oak and ash species, were noted to occur scattered throughout Woodland B.

Biological Value and Replacement Time - Due to the gradual reduction of woodlands throughout the project area for development, upland woodlands are considered ecologically valuable because they provide an "oasis" for birds, deer and other locally common wildlife in an otherwise degraded mostly urban environment. Estimated replacement time for upland woodlands is approximately 75 to 100 years, based on the average size of typical canopy trees in the habitat, and from between 250 and 400 years, based on the average size of the largest trees which occurred predominantly within Woodland B.

g. Wooded Fence Row (Map Code: WFR)

Characteristics and Distribution - Wooded fence row in the project study area occurs in a few areas as narrow lineal strips adjacent to roadway right-of-way or along property lines. Wooded fence row areas are typically composed of a more mature canopy of deciduous trees including hackberry, oaks, sugar maple, locusts and osage orange and a scrubby understory of honeysuckle, rose, briars and occasional woody tree saplings. Groundcover consists of mixed grasses, herbaceous weeds and poison ivy.

Biological Value and Replacement Time - Wooded fence row habitat is biologically valuable because of the protection, forage, nesting, and travel corridors it provides for locally common birds and small mammals in an otherwise open urban developed surrounding. Estimated replacement time is 5 to 10 years for portions of open scrubby fence row to about 35 to 55 years for portions with a deciduous tree canopy.

h. Oldfield (Map Code: OF)

Characteristics and Distribution - Oldfield habitat occurs in only a few areas within the project study area. It is distinguished from new field and right-of-way habitats because of the lack of disturbance (no continual grazing or mowing). Community structure in oldfield habitat typically consists of a herbaceous groundcover, 3 to 6 feet in height comprising up to 90 percent of the species, in combination with irregular occurrences of young woody species (sapling trees, shrubs, woody vines) comprising the remainder of the cover.

Biological Value and Replacement Time - Oldfield habitat consists of a more complex structure than newfield, right-of-way, or agricultural pastureland, because it is largely undisturbed. It is considered to have greater ecological value compared to other open habitats in the project vicinity because the growth of woody species provides structure for breeding and foraging activities and open space for birds, small mammals, rabbit, fox and deer. Estimated replacement time for oldfield habitat in the project study area is 2 to 6 years.

i. Newfield (Map Code: NF)

Characteristics and Distribution - This habitat is fairly uncommon in the project area and is

subject to periodic disturbance in the form of mowing or clearing, and generally lacks young woody species. If left undisturbed, new field habitat would eventually evolve into oldfield habitat after several years. Typical herbaceous plants dominating newfield vegetation in this area included mixed grasses, ragweed, aster species, foxtail, teasle and goldenrod.

Biological Value and Replacement Time - Because of the high level of disturbance associated with newfield habitat, it is considered to have limited biological value, similar to residential/commercial habitat. Estimated replacement time is approximately 1 to 2 years.

E. THREATENED AND ENDANGERED SPECIES

1. Federal-Listed Species

The project study area lies within the range of the Federal endangered Indiana bat (*Myotis sodalis*), running buffalo clover (*Trifolium stoloniferum*), sheepnose mussel (*Plethobasus cyphyus*) and rayed bean mussel (*Villosa fabalis*) as reported by the U.S. Fish and Wildlife Service. No known occurrences of these Federal-listed species are reported from the immediate project vicinity by either the USFWS or ODNR-DNAP, and no Federal-listed species were encountered during field surveys conducted for this study. However, potential habitat for Indiana bat and running buffalo clover was observed at several locations, as further described below.

a. Conclusions Relative to Indiana Bat Occurrence

No winter habitat for Indiana bat (caves, rock overhangs) occurs in the project study area. Summer habitat requirements for Indiana bat include dead or live trees and snags with peeling or exfoliating bark, split tree trunks and/or branches, or cavities, which may be used as maternity roost areas, live trees (such as shagbark hickory) which have exfoliating bark, and/or stream corridors, riparian areas, and upland woodlots which provide forage sites. No detailed biological assessments for Indiana bat were conducted as part of this study; however, it was noted during field studies that habitat fitting these characteristics was located in the project study area. Potential summer habitat for this species is scattered throughout the project study area (see Exhibits 3b and 3c). However, the likelihood of Indiana bats inhabiting these areas is limited, since these locations are already disturbed/disrupted by the existing SR 32 and secondary roadways, and because all of the areas are in close proximity to human activities.

b. Conclusions Relative to Running Buffalo Clover Occurrence

Habitat requirements for running buffalo clover include rich soils, some form of moderate long-term disturbance from mowing and/or grazing by herbivores such as deer, and filtered sunlight. Consequently, running buffalo clover can be found along logging roads, stream banks, forest/field ecotones, park trails, lightly grazed woodlots, and forest clearings. Habitat of this nature exists in the project study area in the form of shaded yards, grassy paths, stream banks and clearings in woodlands.

F. SUMMARY OF IMPORTANT ECOLOGICAL FEATURES IDENTIFIED IN THIS STUDY

In general, much of the project study area is disturbed and lacks extensive natural habitats. However, several notable features were identified from this ecological survey that will require (if impacted) special consideration during project development due to regulatory requirements. Notable ecological resources identified within the project study corridor for this project, based on the results of the ecological survey, include the following:

- *Surface streams, especially provisional Class II-PHWH features:* (potential NEPA required avoidance and minimization and 404/401 involvement) - Twenty-six provisional jurisdictional stream sites were noted in the project study area including: two Modified Class I-PHWH surface water features, 13 Class I-PHWH surface water features, 4 Modified Class II-PHWH surface water features and 7 Class II-PHWH surface water features.

- *Wetlands*: (NEPA required avoidance, minimization and mitigation for all jurisdictional wetlands) - Nineteen wetlands were identified in and immediately adjacent to the project study area, the majority of which are limited-quality Category 1 features. One Category 3, high quality wetland feature (Wetland22) was identified occurring partially within the project study area.

- *Potential habitat for Federal-Endangered Indiana bat*: (potential NEPA required avoidance and minimization) - Potential summer habitat for Indiana bat was identified scattered throughout the project corridor (limited potential).

- *Potential habitat for Federal-Endangered running buffalo clover*: (potential NEPA required avoidance and minimization) – Potential habitat for running buffalo clover was identified occurring in shaded yards, grassy paths, stream banks, and clearings in woodlands throughout portions of the project study area (limited potential).

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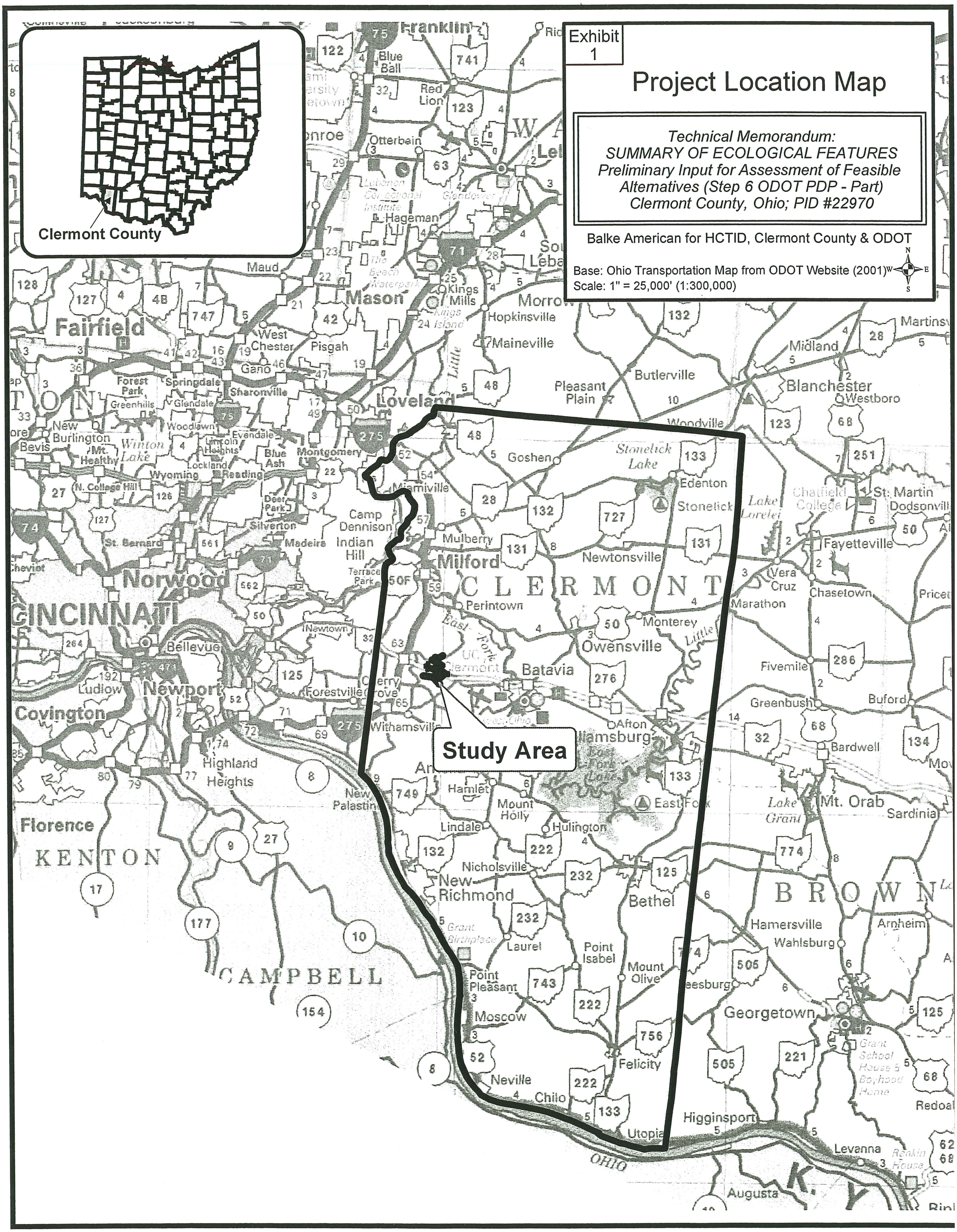
Exhibit 1
Project Location Map
Technical Memorandum:
SUMMARY OF ECOLOGICAL FEATURES
Preliminary Input for Assessment of Feasible
Alternatives (Step 6 ODOT PDP - Part)
Clermont County, Ohio; PID #22970
Balke American for HCTID, Clermont County & ODOT
Base: Ohio Transportation Map from ODOT Website (2001)
Scale: 1" = 25,000' (1:300,000)
Clermont County
Study Area

Exhibit 2

Study Area Map

Technical Memorandum:
SUMMARY OF ECOLOGICAL FEATURES
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Clermont County, Ohio; PID #22970

Balke American for HCTID, Clermont County & ODOT

Base: Clermont County GIS (2003)
Scale: 1" = 1,000' (1:12,000)

N
W E
S

Legend

- Study Area
- Centerlines of Major Roads
- Streams

Exhibit 3a

Ecological Features & Terrestrial Habitats Key Map

Technical Memorandum:
SUMMARY OF ECOLOGICAL FEATURES
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Clermont County, Ohio; PID #22970

Balke American for HCTID, Clermont County & ODOT

Base: Clermont County GIS (2003)
Scale: 1" = 1,000' (1:12,000)

N
W E
S

Exhibit 3c

Exhibit 3b

Legend

- Study Area
- Centerlines of Major Roads
- Streams

Exhibit 3b

Ecological Features & Terrestrial Habitats in the Project Study Area

Technical Memorandum:
SUMMARY OF ECOLOGICAL FEATURES
Preliminary Input for Assessment of Feasible Alternatives (Step 6 ODOT PDP - Part)
Clermont County, Ohio; PID #22970

Balke American for HCTID, Clermont County & ODOT

Base: Clermont County GIS (2003)
Scale: 1" = 500' (1:6,000)

N W E S

Legend

- Study Area
- Stream Sample Site

Wetlands
- Category 1
- Category 1 or 2, Category Modified 2, Category 2
- Category 2 or 3, Category 3

- Woodlands
- Potential Indiana bat tree
- Streams

Terrestrial Habitat Types

ROW = Right-of-way
ORC = Open Riparian Corridor
UW = Upland Woodland
OF = Oldfield
P = Pond
RC = Residential Commercial
WRC = Wooded Riparian Corridor
RW = Riparian Woodland
WFR = Wooded Fence Row
NF = Newfield

Exhibit 3c

Ecological Features & Terrestrial Habitats in the Project Study Area

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Clermont County, Ohio; PID #22970

Balke American for HCTID, Clermont County & ODOT

Base: Clermont County GIS (2003)
Scale: 1" = 500' (1:6,000)

N W E S

Site #42
Willowbrook Lake
Site #43
Wetland 17
Site #44
Site #45
Site #46
Wetland 18
Wetland 20
Woodland D
Site #41
Wetland 16
Wetland 1
Wetland 21
Site #6

Legend

- Study Area
- Stream Sample Site
- Wetlands
  - Category 1
  - Category 1 or 2, Category Modified 2, Category 2
- Woodlands
- Potential Indiana bat tree
- Streams

Terrestrial Habitat Types

- ROW = Right-of-way
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