

KY 1426 Transportation Study

Pike County, Kentucky

*Improving Safety on the
Pikeville Bypass
by addressing
Rockfall and
Intersection
Elements*

Final Report
May 2008

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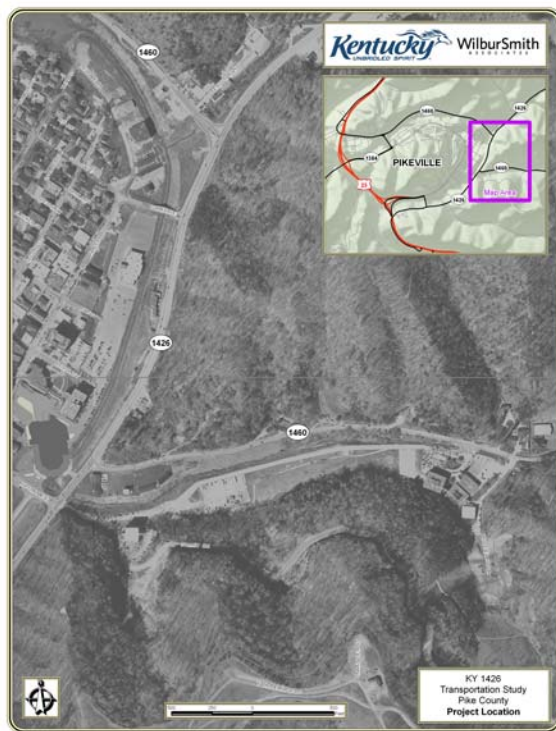
Kentucky Transportation Cabinet

KY 1426 Transportation Study, Pike County

May 2008

The Kentucky Transportation Cabinet (KYTC) has undertaken this Transportation Study to consider improvements to a segment of KY 1426 in Pikeville, Kentucky in Pike County. The purpose of this study is to (1) evaluate catchment systems and/or reconstruction options to mitigate recurring rockfall problems along KY 1426 and (2) identify operational and/or minor reconstructive measures to improve traffic flow and safety at the intersections of (a) KY 1426 with KY 1460 (Chloe Creek Road) and (b) KY 1426 with Summit Drive/Huffman Avenue.

Study Area Conditions



Study Area

The project area lies on the eastern side of the city of Pikeville. KY 1426 provides an eastern bypass of the city. KY 1460 provides rural access to the east of the city and connects to US 460/KY 80 to the southeast. Summit Drive serves one business and several residences on



KY 1426 intersection with Chloe Creek Road
(KY 1460)

an adjacent ridge, tying into KY 1426 across from Huffman Avenue, which leads downtown.

In the project area, KY 1426 is an undivided, two-lane highway with 12-foot wide lanes and a 45 mph speed limit. Shoulders transition from a 2-foot wide curb with sidewalk to an 11-foot paved cross-section. KY 1460 has two undivided lanes, 10 to 12 feet wide, with narrow shoulders and a 45 mph speed limit. A known rockfall hazard lines the eastern side of KY 1426 between the Chloe Creek Road and Combs Avenue intersections.

Study intersections (KY 1426 with Summit Drive/Huffman Avenue and with KY 1460) are tightly spaced with limited opportunity for roadway growth given the surrounding landscape. Pikeville Elementary School, located along Chloe Creek Road at the eastern edge of the study area, significantly influences peak hour traffic operations along the KY 1426 Bypass. An access road from the school to Summit Drive serves as the drop-off and pick-up point for many children who do not ride the bus system.

Other constraints in the study area include mountainous terrain, Chloe Creek, a historic cemetery and marker, utility lines, and nearby structures, including the Eastern

Kentucky Exposition Center and Pikeville Fire Station.

Traffic Characteristics

Traffic volumes in the study area are 7,300 vehicles per day (vpd) on KY 1460 and range from 9,800 to 12,100 vpd on the bypass (KY 1426). Study intersections operate at level of service (LOS) C or better during the PM peak hour; high peak hour factors due to concentrated school traffic distributions and commuter patterns generate increased delays, worse LOS, and longer queues during the AM peak hour. Analysts relied on additional performance measures – delay time, number of stops, travel time, conflict points, and average speeds – to describe network performance. Assuming a 1% annual growth rate for traffic, study area traffic operations will deteriorate in future years. The KY 1426 intersection with Huffman Avenue may be expected to operate at a LOS F by 2030 during the AM peak period.

Reported crashes occurring during 2002-2006 defined multiple spots and segments with high crash tendencies. The southern and eastern approaches to the KY 1426/KY 1460 intersection showed up as roadway segments with above average crash rates; one 1/10-mile spot (including this intersection and the Huffman Avenue intersection) also had a concentration of crashes.

Project Purpose

The purpose of this project is to improve safety throughout the study area. Both project components - the rockfalls and the intersection traffic operations - relate to this goal independently.

Rockfall

Along portions of KY 1426, debris routinely erodes and falls from an existing rock cut located east of the edge of pavement. In 2007, KY 1426 had to be closed due to a rockfall event.

While improving safety, the rockfall improvement should focus on (1) avoiding negative operational impacts along KY 1426 (e.g., road/lane closures); (2) minimizing negative environmental impacts; (3) avoiding impacts to adjacent businesses; and (4) providing an aesthetically pleasing solution.

Intersection

Both KY 1460 and KY 1426 south of the KY 1460 intersection exhibit a critical rate factor (CRF) greater than 1.00. This means that crashes occur on the study roadways at higher frequencies than on similar roads throughout the state. A 1/10-mile high crash “spot” occurs on KY 1426 which includes the intersections with Huffman Avenue/Summit Drive and KY 1460; this spot has a CRF of 2.47. Within this spot, 21 of 27 reported crashes involve a vehicle stopping on the mainline, resulting in either a rear end crash or a second vehicle being forced to depart the driving lane to avoid impact.

Additional intersection goals supplementing the primary purpose include (1) improving traffic operations; (2) providing adequate storage for school traffic queues; (3) preserving access to surrounding streets and driveways; and (4) minimizing environmental impacts.

Project Purpose and Need: Improve Safety

Rockfall Element

- Avoid negative traffic impacts
- Minimize negative environmental impacts
- Avoid business impacts
- Provide aesthetically pleasing solution

Intersection Element

- Improve traffic operations
- Provide adequate school queue storage
- Preserve access to streets/driveways
- Minimize environmental impacts

Alternatives Development

The project team and key stakeholders met throughout the study process to identify project issues, define the project purpose, gather technical data, and develop and evaluate alternatives.

Three rockfall strategies were developed to address the rockfall hazard:

- Rockwall benching involves cutting the embankment into tiered steps and has major earthwork implications.
- A barrier catchment system resembles a fence running alongside the highway and is designed to catch debris before it enters the roadway.
- A rockfall drape employs a protective material draped along the embankment surface to prevent loose stones from falling.

Eight intersection concepts were also developed to address queuing and safety issues with the existing network. Alternatives were designed which combined Summit Drive, Huffman Drive, and KY 1460 into one intersection with KY 1426, which separated school traffic from Summit Drive, which realigned/widened KY 1460 on or near its alignment, and rerouted school access to KY 1460.

In addition, two small scale improvement elements were evaluated to find a low cost, minimal impact alternative which would offer

modest improvements to traffic flow in the project area. Analysts evaluated adding a left turn lane along KY 1426 at Huffman Drive and considered benefits associated with having an officer direct traffic during school peak hours.

A public meeting in November 2007 gave residents of Pikeville and interested parties an opportunity to comment on the issues and vote for a preferred alternative.

Recommendations

Based on public input, technical analysis, and project team concurrence, the preferred alternative was established. This included a rockfall barrier system, pictured below.

A left turn lane along the bypass to serve movements onto Huffman Avenue would also provide operational benefits and could be installed concurrent with the barrier system. Further analysis is recommended for Alternatives 1 and 7 due to public support and the system-wide benefits predicted during simulation exercises. Alternative 1 creates one intersection on KY 1426; Summit Drive and the school access road would tie into KY 1460 opposite one another at a stop-controlled intersection, with Summit Drive bridging above KY 1460. Alternative 7 widens KY 1426 on its existing alignment and moves the school access road to KY 1426, leaving Summit Drive at its current location.

Alternative A - Rockfall Barrier



I. INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) has undertaken this Transportation Study to consider improvements to a segment of KY 1426 in Pikeville, Kentucky in Pike County. The purpose of this study is twofold: (1) to identify catchment systems and/or reconstruction to mitigate recurring rockfall problems along KY 1426 between KY 1460 and Combs Avenue; and (2) to identify operational and/or minor reconstructive measures to improve traffic flow and safety at the intersections of KY 1426 with KY 1460 (Chloe Creek Road) and KY 1426 with Summit Drive/Huffman Avenue.

To accomplish these tasks, this study will:

- Identify known issues, concerns, and constraints, including safety, traffic, environmental, and geotechnical considerations;
- Develop a “purpose and need” statement and goals for the proposed project;
- Develop and evaluate project alternatives based on the project purpose and need, including elements to improve the study intersections and to address the rockfall hazard; and
- Make project recommendations.

Through this Transportation Study, the KYTC ensures that any future project improvements along KY 1426 effectively address identified transportation needs, and that project development decisions meet federal requirements as defined in the National Environmental Policy Act (NEPA).

A. Project Location

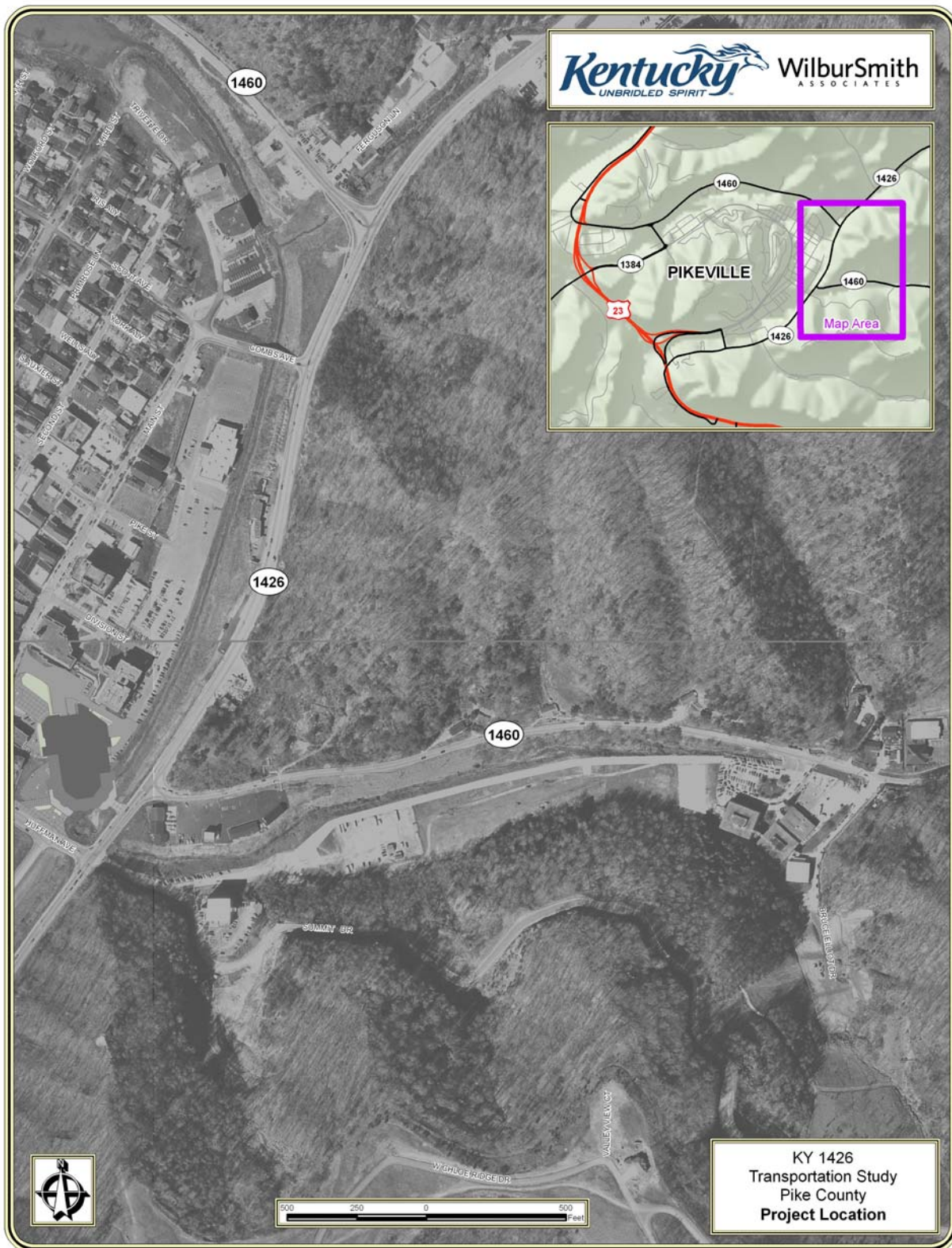
The study area, shown in **Figure 1.1**, for the KY 1426 Transportation Study includes three primary routes:

- KY 1426 from Summit Drive/Huffman Avenue to KY 1460 north and east of Combs Avenue;
- KY 1460 from KY 1426 to a point just east of Pikeville Elementary School at Bruce Elliot Drive; and
- Summit Drive from KY 1426 to the access road to Pikeville Elementary.

The project area lies on the eastern side of the city of Pikeville. KY 1426 provides an eastern bypass of the city. KY 1460, locally Chloe Creek Road, provides rural access to the east and connects to US 460/KY 80 to the southeast. Summit Drive serves one business and several residences on an adjacent ridge, tying into KY 1426 across from Huffman Avenue. **Appendix A** presents pictures from the project area.

A number of environmental features and community resources fall within the study area and may be impacted by any potential solutions. Aggressive terrain, hydrological concerns, existing businesses, a historical cemetery, and Pikeville Elementary School are in the immediate vicinity and will play significant roles in defining feasible transportation solutions.

Figure 1.1 – Study Area Map



B. Background

KY 1426 has a long history of rockfall problems. The KYTC Maintenance Department makes regular visits to the project site to clean up debris from the rock face. In 2007, debris from the adjacent embankment fell onto KY 1426, which resulted in its closure.

In 2007, the City of Pikeville received \$250,000, independent of this study, from the Commonwealth to study ways to mitigate the rockfall. Summit Engineering, the city's on-call consultant, is awaiting the completion of this study before proceeding with their project.

Adjacent to the rockfall section are the KY 1426 intersections with Chloe Creek Road and Huffman Avenue/Summit Drive. These two intersections are tightly spaced with limited opportunity for expansion given the surrounding landscape. Influencing traffic operations along KY 1426 is Pikeville Elementary School, which is located along Chloe Creek Road at the eastern edge of the study area. In recent years, an access road was built from the school to Summit Drive and serves as the drop-off and pick-up point for children not riding the bus system. Parent drop-off and pick-up is not permitted from Chloe Creek Road.

The existing conditions in the study area are presented in more detail in **Chapter II** of this report.

II. EXISTING CONDITIONS

Characteristics of highways in the study area (KY 1460 and KY 1426) are identified in the following sections. Information is included on transportation systems, geometric characteristics, bridges, traffic conditions, vehicle crash history, adequacy ratings, environmental features, and geotechnical concerns. Applicable features are summarized from the KYTC Highway Information System (HIS) database as of October 2007 unless otherwise noted.

A. Highway Systems

Major highway systems information is shown for the study routes in **Table 2.1**, including the State Primary Road System, Functional Classification System, National Highway System (NHS), National Truck Network (NN), and Designated Truck Weight Class. System descriptions for the main classifications are listed below.

- State-maintained roads in Kentucky are classified into one of five categories under the State System, ranging from the highest order classification to the lowest as follows: Interstates, Parkways, Other State Primary roads, Rural Secondary roads, and Supplemental roads.
- One of 13 functional classification categories is assigned to each state-maintained road in Kentucky, based on the function the road provides and whether the location is urban or rural. These are classified from highest to lowest and by geographic designation such as: Rural Interstate, Urban Interstate, Other Rural Freeways and Expressways (Principal Arterial), Other Urban Freeways and Expressways (Principal Arterial), Other Rural Principal Arterial, Other Urban Principal Arterial, Rural Minor Arterial, Urban Minor Arterial, Rural Major Collector, Urban Collector, Rural Minor Collector, Rural Local, and Urban Local.
- The National Highway System (NHS), first established in 1991 by the Intermodal Surface Transportation Efficiency Act (ISTEA), includes Interstate Highways and other significant Principal Arterials important to the nation's economy, defense, and mobility.
- The National Truck Network (NN) includes roads designated for use by commercial trucks with increased dimensions (102 inches wide; 13 feet, 6 inches high; semi-trailers up to 53 feet long; and trailers up to 28 feet long – not to exceed two trailers per truck).
- Kentucky Revised Statutes require weight limits on the state-maintained highway system. There are three (3) weight classification limits: (1) AAA – 80,000 lbs. maximum gross vehicle weight; (2) AA – 62,000 lbs. maximum gross vehicle weight; and (3) A – 44,000 lbs. maximum gross vehicle weight. For special circumstances, occasional exceptions may be granted for over-dimensional or overweight vehicles.

B. Geometric Characteristics

Geometric characteristics for the two major routes in the study area are listed in **Table 2.2**, including the number of lanes, lane widths, shoulder widths, roadway type, local terrain, and route speed limits.

Table 2.1 - Highway Systems Information

	KY 1460	KY 1426
State Primary System	State Secondary	State Secondary
National Truck Network (NN)	No	No
National Highway System (NHS)	No	No
Functional Classification	Urban Minor Arterial	Urban Minor Arterial
Truck Weight Class	A/AAA	AAA
Appalachian Development Highway System	No	No
Bike Route	No	No
Coal Haul (annual tons)	None	478,076
Extended Weight System	No	Yes
Forest Highway System	No	No
Scenic Byway System	No	No

Table 2.2 - Geometric Characteristics Information

KY 1460
Pike County – MP 4.100 to MP 5.100 <ul style="list-style-type: none"> ○ Undivided, two lane highway ○ Rolling to Mountainous terrain ○ 10 to 12 foot lane widths with 1 to 2 foot shoulders ○ 45 mph posted speed limit ○ 0% passing sight distance
KY 1426
Pike County – MP 5.500 to MP 6.600 <ul style="list-style-type: none"> ○ Undivided, two lane highway ○ Mountainous terrain ○ 12 foot lane widths ○ Shoulders vary from 2 foot curb to 11 foot paved shoulder ○ 45 mph posted speed limit ○ Passing sight distance data unavailable

C. Bridges

Two structures lie within the project area.

At milepoint 4.639 on KY 1460, a 26 foot long culvert spans Lower Chloe Creek. With a sufficiency rating of 82.6, this bridge is neither functionally obsolete nor structurally deficient.

Just north of the Huffman Avenue/Summit Drive intersection on KY 1426, Chloe Creek passes under the roadway again in a reinforced concrete box culvert. This structure is 144 feet long with a 10 foot wide cross-section. Bridge ratings are not available for this structure.



Culverts under KY 1460 (top) and KY 1426 (bottom)

D. Traffic and Operations

Existing (Year 2007) and estimated future traffic and operational conditions for each major route in the study area are discussed in the following subsections.

1. 2007 Volumes and Performance

Historic traffic volume information from the KYTC CTS database and turning movement counts conducted in August 2007 provided an overview of traffic conditions in the existing transportation network. **Figure 2.1** shows the most recent annual daily traffic (ADT) volumes in the study area. **Figure 2.2** shows the results of the turning movement counts at the primary study intersections for both AM (7:00 - 8:00 a.m.) and PM (2:45 - 3:45 p.m.) peak hours. An early PM peak hour was used to capture the effects of school traffic.

Level of Service (LOS) is a qualitative measure of highway traffic conditions, as defined in the *2000 Highway Capacity Manual* (HCM), published by the Transportation Research Board (TRB). Individual levels of service characterize these conditions in terms of speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and given letter designations from A to F, with LOS A as the best condition, representing free flow conditions, and ranging to LOS F, the worst condition, representing severe congestion and/or time delays. Typically, a minimum of LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas.

Analysts used Synchro 7 and SimTraffic 7, standard traffic analysis applications, to analyze the LOS at key study intersections. Because of the close spacing between intersections, considering only the LOS for each intersection does not provide a full indication of system performance. Additional measures were evaluated on a network-wide basis to provide a comparative basis for later alternative evaluations. Key parameters reported include:

- Delay Per Vehicle – The amount of time, in seconds, a single vehicle was delayed (due to intersection control devices or other traffic) while traveling through the network;
- Total Delay – The total hours of delay experienced by all vehicles in the network during the analysis period: 60 minutes for this exercise;

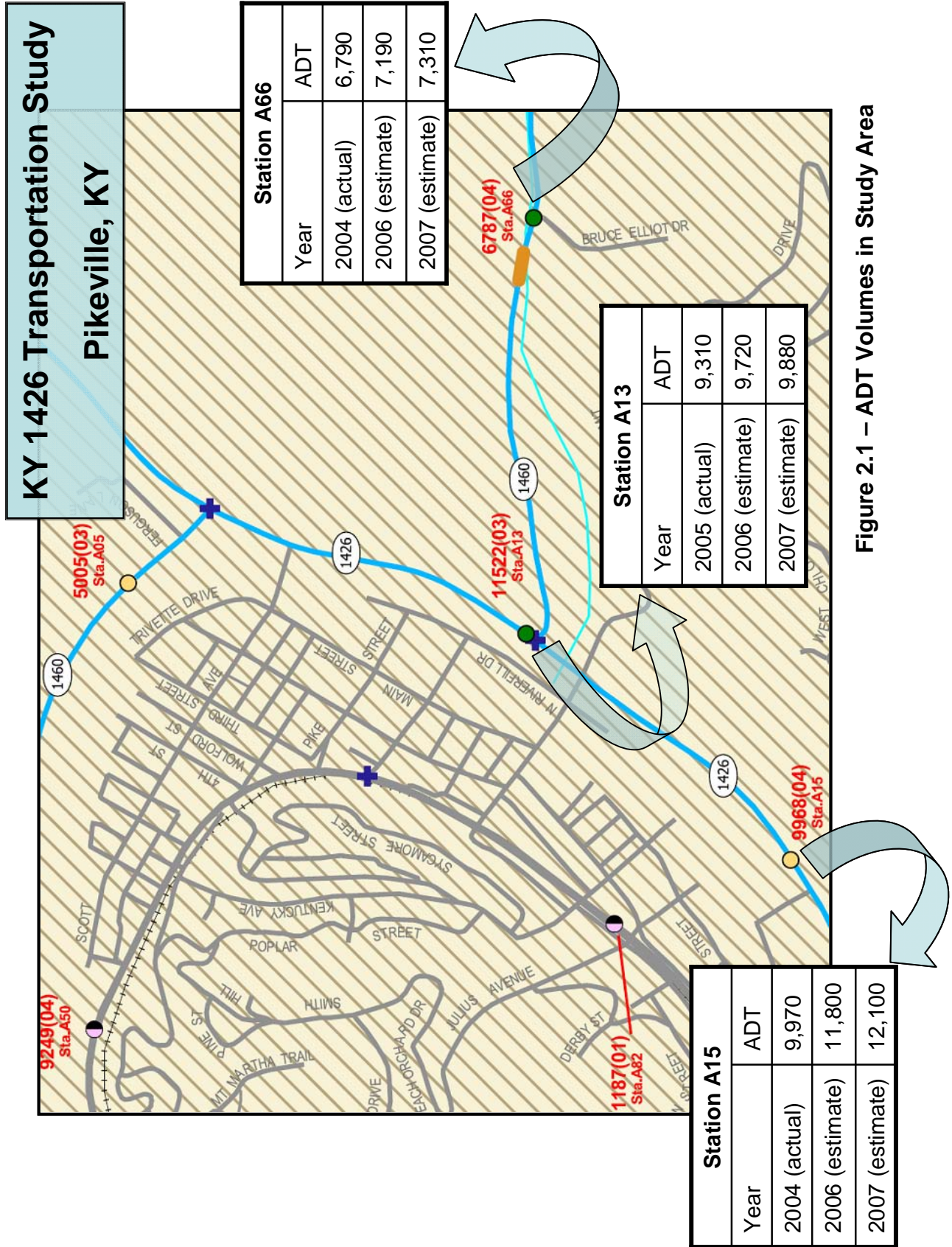
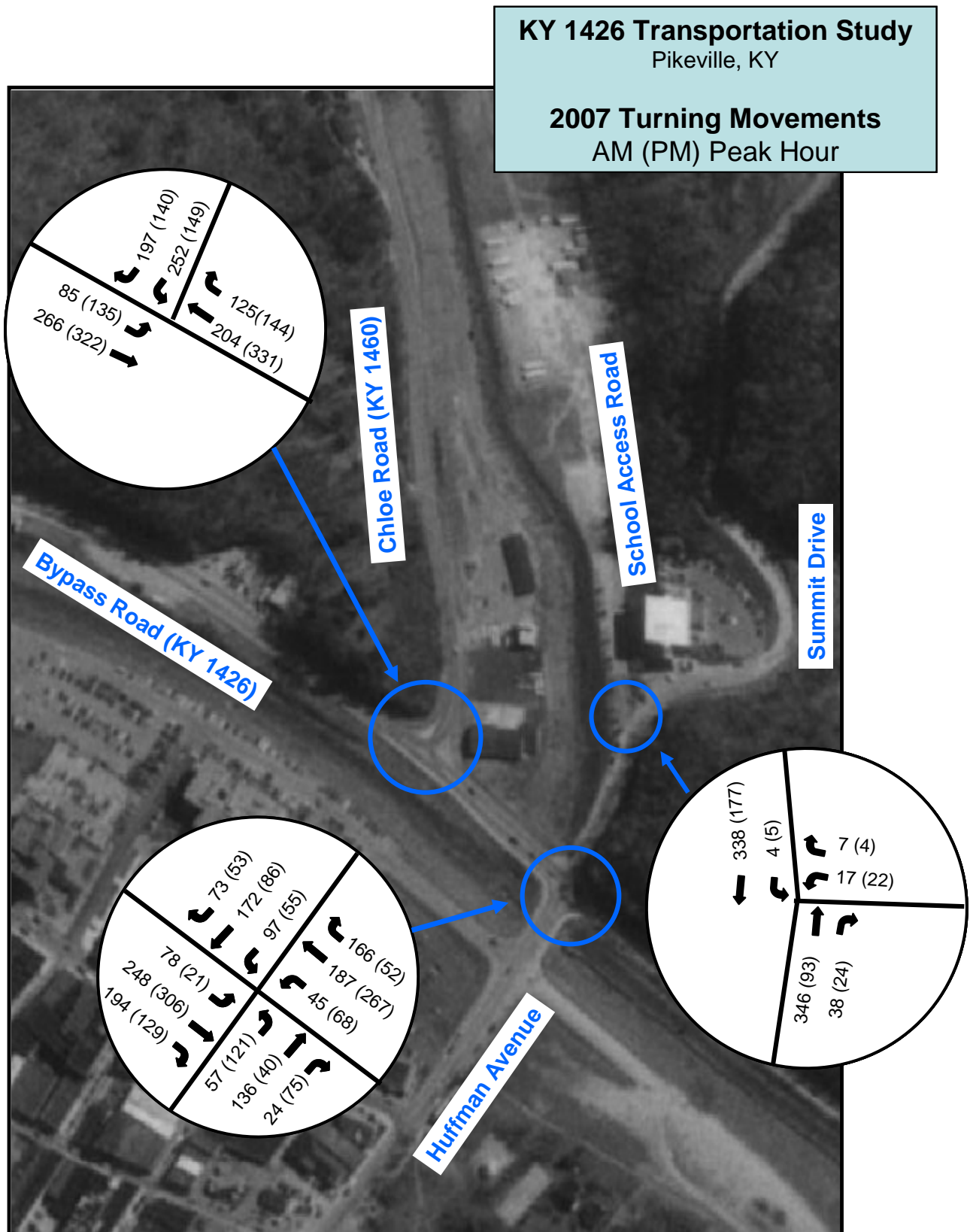


Figure 2.1 – ADT Volumes in Study Area

Figure 2.2 – 2007 Hourly Volumes at Key Intersections



- Total Stops – The total number of times all vehicles traveling through the network during the 60 minute analysis period dropped below a speed of 10 mph;
- Travel Time – The total time spent by all vehicles in the network or waiting to enter the network during the analysis period;
- Average Speed – The average speed throughout the network, including stopped time and time spent waiting to enter the network, given in mph; and
- Conflict Points – The number of locations within an intersection where vehicle paths merge, diverge, or intersect.

Results are summarized in **Table 2.3** for the AM and PM peak hours, based on the existing geometrics and control devices.

Table 2.3 – Performance Measures for 2007 Existing Network

Measure	AM Peak	PM Peak
Delay Per Vehicle (sec)	85.2	35.6
Total Delay (hr)	48.2	17.9
Total Stops	3,279	1,781
Travel Time (hr)	83.0	47.5
Average Speed (mph)	14	22
Conflict Points - Network wide	50	50
Conflict Points - Bypass	41	41
LOS at Key Intersections		
KY 1426 at Huffman	D	C
KY 1426 at KY 1460	B	C
School Access at Summit Dr*	B	B

**Note: LOS reported for stop-controlled approach at unsignalized intersections*

Analyzed intersections along KY 1426 operate at LOS C during the PM peak hour. During the AM peak hour period, peak school traffic volumes and peak daily commuter volumes overlap: volumes accessing the school and traveling inbound on KY 1460 are higher than during the PM peak hour. This results in increased delays, worse LOS, and longer queues at intersections.

Pikeville Elementary School significantly impacts traffic operations during the peak hours: high volumes of cars access the site during a 15-30 minute peak as students are dropped off and picked up. Cars arrive before the school day ends then must wait to pick up students; local input and field observation confirm that afternoon traffic queues up and affects operations along Summit Drive to the KY 1426 intersection.

2. Future Volumes and Performance

Annual growth throughout the study area was examined based on historic traffic growth rates and community development patterns. The aggressive terrain severely limits developable space in the region; over the last 20 years, traffic volumes on the study area highways have grown by less than 1% per year.

Assuming no improvements to the existing infrastructure, the analysis was repeated with various annual growth rates to determine operational conditions for a future No Build scenario. It is unlikely that actual volume increases will reach even 1% annually; the school's student capacity will limit traffic growth for this institution, and the majority of the Chloe Ridge neighborhood is developed already. By 2030, assuming 1% growth, the KY 1426 intersection with Huffman degrades to LOS F for the AM period; all other

intersections analyzed were within acceptable levels. As expected, other performance measures increased (with the exception of average speed, which decreased) with the increase in vehicles for both analysis periods, indicating performance deteriorates.

E. Crash History

To analyze vehicle crash history trends, crash records were assimilated from the KYTC-maintained CRASH database for reported incidents from 2002 to 2006. Wilbur Smith Associates (WSA) used the methodology developed by the Kentucky Transportation Center (KTC). This analysis locates roadway “segments” based upon traffic volumes and geometric characteristics to identify crash concentrations. It also determines the location of 1/10 mile “spots” which demonstrate high crash frequencies. Each segment or spot is assigned a critical rate factor (CRF) based on formulas published by KTC. The CRF is one measure of the safety of a road; it compares the crash rate to the average crash rate for sections of roadway of the same functional classification throughout the state. If the CRF is 1.00 or greater, it is assumed that crashes are happening due to circumstances that cannot be attributed to random occurrence.

If a location has a high CRF, it should be studied more specifically to ascertain if there are remedial actions that should be taken to improve the overall safety of the facility. Computations for the segments and key spots (with a CRF > 0.90) along the primary roadways are summarized in **Table 2.4**. Spots/segments with a CRF greater than 1.0 are shown in red for added emphasis.

Table 2.4 – High CRF Segments and Spots

Spot or Segment	Location			Length	Crashes				Critical Rate Factor (CRF)
	Route	BMP	EMP		Fatal	Injury	PDO	Total	
Segment	KY 1460	4.100	5.100	1.000	0	10	47	57	1.15
Segment	KY 1426	5.500	6.187	0.687	0	13	48	61	1.10
Segment	KY 1426	6.187	6.600	0.413	0	5	25	30	0.97
Spot	KY 1426	5.610	5.710	0.100	0	3	19	22	1.82
Spot	KY 1426	6.100	6.200	0.100	0	6	21	27	2.47
Spot	KY 1426	6.200	6.300	0.100	0	4	6	10	0.95
Spot	KY 1426	6.496	6.596	0.100	0	1	9	10	0.95
Spot	KY 1460	4.295	4.395	0.100	0	2	7	9	1.05
Spot	KY 1460	4.420	4.520	0.100	0	2	8	10	1.17
Spot	KY 1460	4.540	4.640	0.100	0	0	12	12	1.41
Spot	KY 1460	5.000	5.100	0.100	0	1	7	8	0.94

The spot with the highest crash rate lies on KY 1426 between the KY 1460 and Huffman Avenue/Summit Drive intersections (CRF = 2.47). KY 1460 and KY 1426 south of the KY 1460 intersection appear as high CRF segments in their entirety. The segment of KY 1426 north of the KY 1460 intersection has a CRF approaching 1.00 as well. The majority of the project area exhibits crash rates above state averages.

To gain a better understanding of prevailing trends and probable causation factors, analysts investigated crash data in light of severity and type. Crashes were divided into one of three severity categories: fatality, injury, or property damage only (PDO); no fatality crashes occurred in the project area during the analysis period. Analysts also investigated crash data based on crash type. Crash type trends (divided between the categories described below) suggest causation trends and provide valuable insight to mitigation strategies. The type classifications used to define cause include:

- Rear Ends – one car impacts the rear end of another which may be stopped or moving;
- Single Vehicle – a single vehicle impacts an external object (excluding another vehicle);
- Angle – one car is making a turning movement to/from an intersecting side road or entrance; and
- Other – all other accident types.

Figure 2.3 shows the location of reported vehicle crashes and presents the results of the investigation for the two high CRF spots falling in the project area.

Additional investigation was completed for the 1/10-mile spot occurring at KY 1426 between the intersections with KY 1460 and Huffman Avenue/Summit Drive (milepoints 6.1-6.2). At this spot, the majority of crashes (21 of 27) involved a vehicle stopping on the bypass; a second vehicle then either rear ended the stopped car or departed the driving lane to avoid collision. This suggests that frequent stops on KY 1426 (likely due to close intersection spacing and/or current signal timings) are contributing to the frequency of crashes. Analysts noted that there was an even directional distribution and that the majority of crashes (18 of 27) occurred in dry conditions. The distribution of crashes by time period at this spot, as shown in **Figure 2.4**, corresponds well to the number of cars on the road, with a slightly higher number occurring during 6 AM – 9 AM.

F. Adequacy Ratings

The KYTC HIS database provides an adequacy rating percentile for state-maintained arterials and most major collectors. The composite rating is based on the condition, safety, and service component scores of the route. The Condition Index considers only the condition of the road's pavement. The Safety Index is evaluated based on lane width, shoulder width, median widths, alignment, and critical Crash Rate Factors. The Service Index considers the route's Volume-to-Capacity (V/C) ratio and access control.

Table 2.5 depicts the adequacy ratings assigned to portions of the routes. Safety is the primary category affecting composite scores for both KY 1460 and KY 1426. Two of six segments fall into the lowest composite adequacy quartile statewide; all segments but one have a composite adequacy percentile less than 50%.

Figure 2.3 – High Crash Spot Data

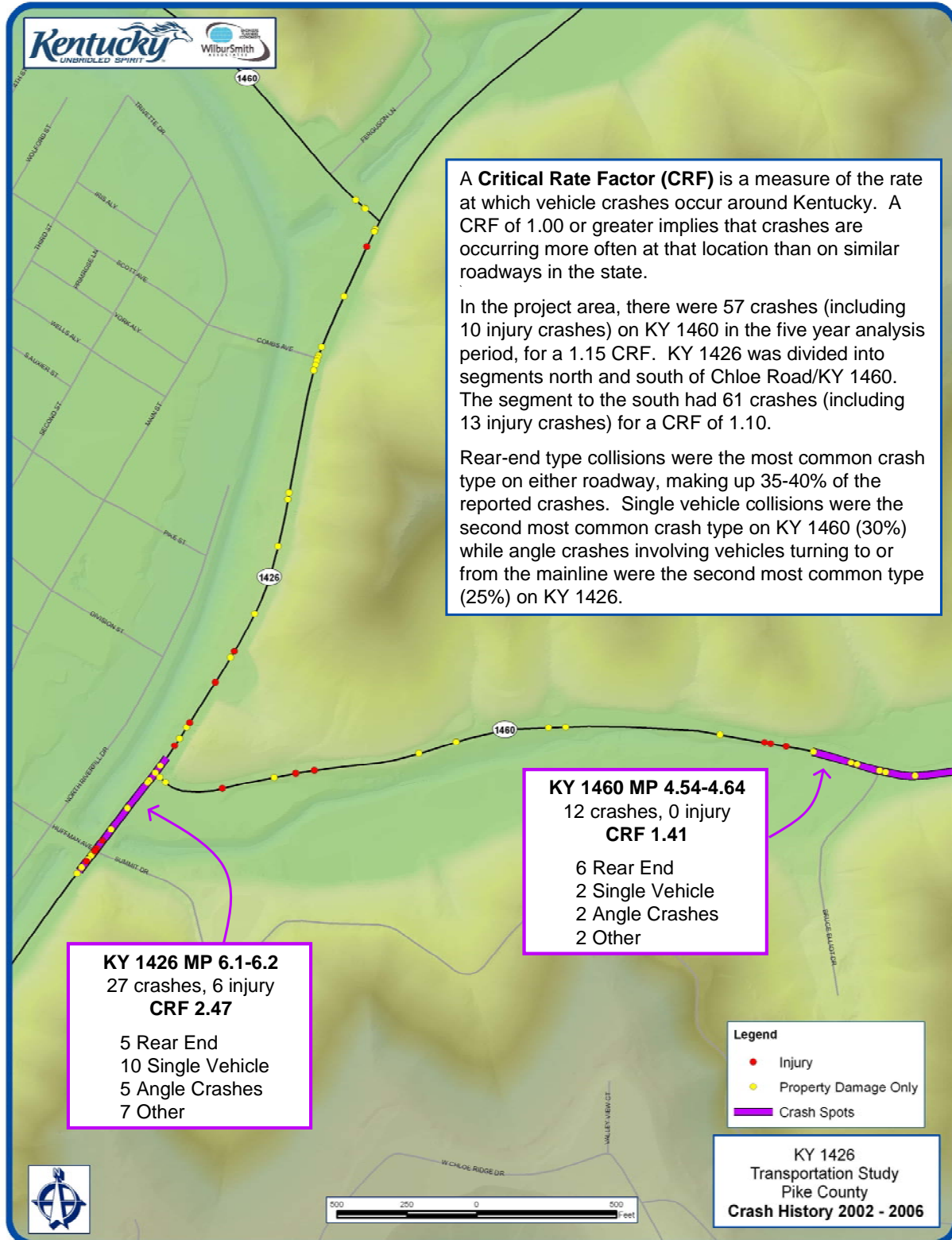
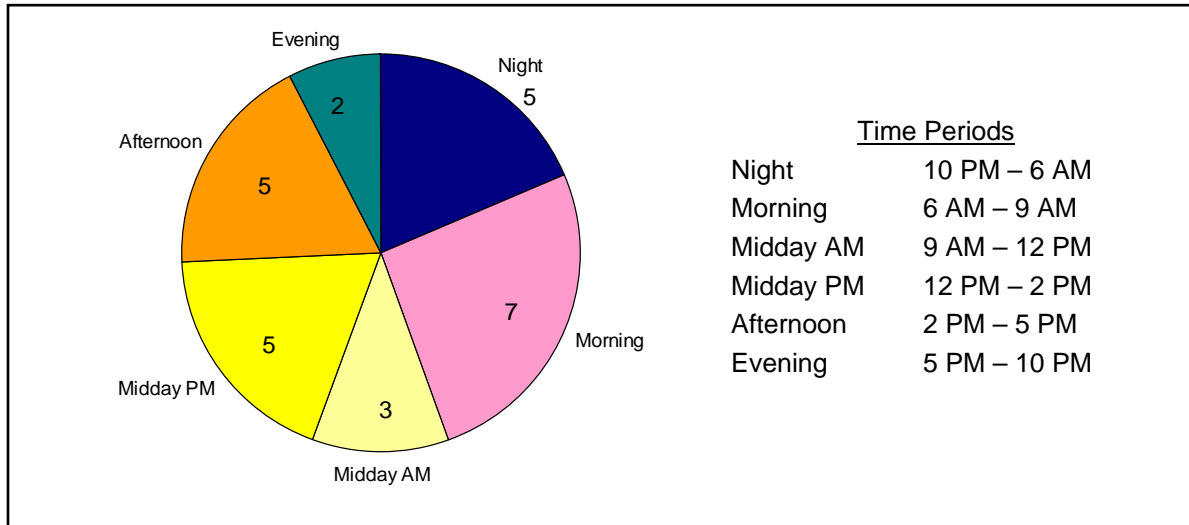


Figure 2.4 – Time Distribution of Crashes at Spot (KY 1426 MP 6.1-6.2)**Table 2.5 - Adequacy Ratings**

Begin MP	End MP	Section Length (miles)	Composite Adequacy Rating	Composite Adequacy Percentile	Safety Component	Service Component	Condition Component
KY 1460: MP 4.100 to MP 5.100							
4.100	4.802	0.702	44.1 of 100	13.20	1.6 of 45	20.0 of 25	22.5 of 30
4.802	5.070	0.268	58.1 of 100	27.60	25.6 of 45	10.0 of 25	22.5 of 30
5.070	5.100	0.030	75.6 of 100	68.56	25.6 of 45	20.0 of 25	30.0 of 30
KY 1426: MP 5.500 to MP 6.600							
5.500	6.025	0.525	63.6 of 100	38.27	13.6 of 45	20.0 of 25	30.0 of 30
6.025	6.165	0.140	62.6 of 100	36.53	13.6 of 45	19.0 of 25	30.0 of 30
6.165	6.600	0.435	44.1 of 100	13.20	1.6 of 45	20.0 of 25	22.5 of 30

G. Environmental Features

A variety of natural and man-made environmental features can be found in the project area. **Figure 2.5** provides an environmental footprint map for the study area.

1. Natural Resources

The project area lies on the eastern side of Pikeville; KY 1426 provides an eastern bypass of the city. To the east of KY 1426, the mountainous terrain common to the region rises on either side of KY 1460. Chloe Creek flows alongside both KY 1426 and KY 1460, crossing KY 1460 at a culvert near milepoint 4.639 and crossing KY 1426 just north of the Huffman Avenue/Summit Drive intersection.

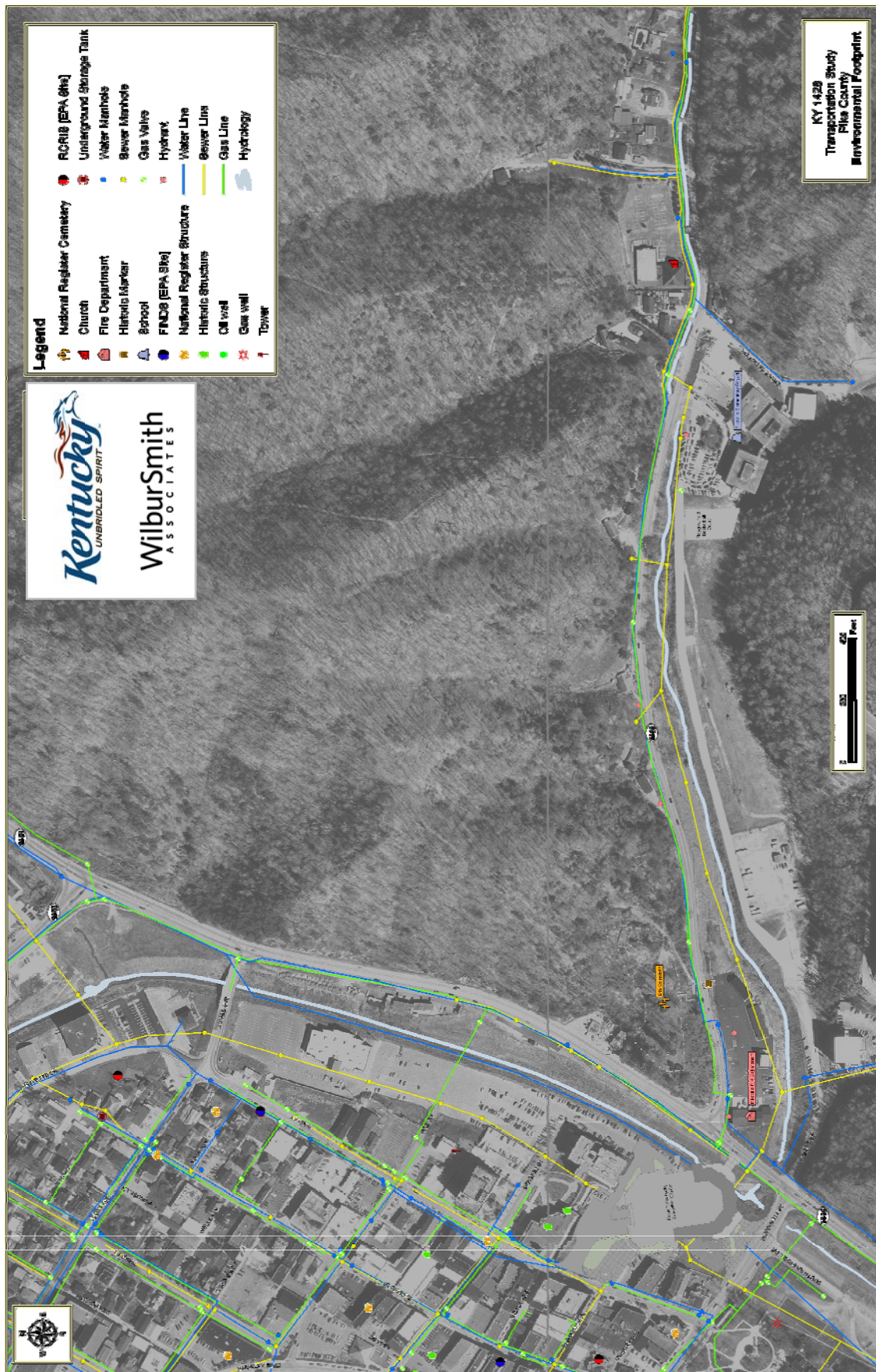


Figure 2.5 – Environmental Footprint

2. Man-made Resources

A number of community resource buildings lie along the study roadways: Pikeville Elementary School, the Pikeville Fire Station, the Eastern Kentucky Exposition Center, and several businesses. A historic cemetery sits atop a hill in the northeast quadrant of the KY 1426/KY 1460 intersection. There is also a historic marker along KY 1460 approximately 450 feet beyond the intersection with KY 1426. Gas, sewer, water, electric, telephone, and cable lines run along both roadways. There are several churches and historic structures near the project area, but these do not lie within the immediate vicinity likely to be impacted by any build scenarios.

H. Geotechnical Concerns

A known rockfall hazard occurs along KY 1426 between the intersections with KY 1460. A 120 foot tall rock cut on the eastern side of KY 1426 lies from 12.5-22 feet from the edge of the roadway. In the immediate vicinity of the recurring rockfalls, the average clearance is approximately 16 feet. Shales and sandstones primarily compose the embankment. Maintenance forces routinely must remove fallen stones from along the roadway; in 2007, this portion of KY 1426 had to be closed due to a rockfall event.

III. PROJECT PURPOSE AND NEED

The general purpose of this project is to improve safety throughout the study area. Due to the dual nature of the project, each distinct component of the project – the rockfall hazard and the intersection improvements – relates to the primary goal independently. The following sections elaborate on the project purpose and need for each of these components.

A. Purpose of Rockfall Catchment Component

Improving safety is the primary purpose of the rockfall component of this project. Along KY 1426 between KY 1460 and Combs Drive, rocks and other debris routinely erode and fall from an existing rock cut located 12.5-22 feet east of the edge of pavement. In 2007, this portion of KY 1426 had to be closed due to a rockfall event. Maintenance forces routinely must remove fallen stones along the route.

While improving safety, the additional goals should be supported by the rockfall component. These include (1) avoiding negative operational impacts along KY 1426 (e.g. road/lane closures); (2) minimizing negative environmental impacts; (3) avoiding impacts to adjacent businesses; and (4) providing an aesthetically pleasing solution.

B. Purpose of Intersection Improvement Component

Improving safety is also the primary purpose of the intersection improvement component of the project. Crashes occur on the study roadways at higher frequencies than on similar roads throughout the state. Both KY 1460 and KY 1426 south of the KY 1460 intersection exhibit a CRF greater than 1.00. A 1/10-mile spot occurs on KY 1426 and includes the intersections with Huffman Avenue/Summit Drive and KY 1460; this spot has a CRF of 2.47. Within the identified high-CRF spot, 21 of 27 reported crashes involve a vehicle stopping on the mainline, resulting in either a rear end crash or a second vehicle being forced to depart the driving lane to avoid impact.

Additional goals supplement the primary purpose – improving safety – for the intersection component of this study. These goals, discussed in the following subsections, include (1) improving traffic operations; (2) providing adequate storage for school traffic queues; (3) preserving access to surrounding streets and driveways; and (4) minimizing environmental impacts.

1. Improved Traffic Operations

High volumes of traffic utilize KY 1426 during peak AM and PM hours and cause the roadway to operate under congested conditions. Closely spaced signalized intersections increase delay time and vehicle queue lengths. Vehicle queues are also reported to occur along KY 1460, particularly during the AM peak hour as traffic volumes accessing Pikeville Elementary School are highest. Improvements to the roadway network should focus on improving vehicle traffic flow in the network, concentrating on providing arterial benefits along KY 1426 to service high through volumes.

2. Access To Surrounding Streets and Driveways

A number of local streets and businesses currently rely on KY 1426 for access, directly or indirectly. Summit Drive, KY 1460, Huffman Avenue, and Combs Avenue, in addition to commercial entrances, are reached via KY 1426. This access should be maintained before, during, and after any future phases of the project.

3. Adequate Storage for School Queues

The existing access road to Pikeville Elementary School provides 2,000 feet of storage for vehicles dropping off and picking up students. Any roadway improvements should put back at least this length of storage so that the school queue does not create additional impacts on other roadways.

4. Environmental Impacts

Environmental impacts should be avoided or minimized if at all possible. Chloe Creek runs alongside the study area roads, so any changes to the road may have potential negative impacts.

IV. DEVELOPMENT OF ALTERNATIVES

Based on the project purpose and the constraints imposed by the existing conditions within the project area, a number of alternatives were developed to address the rockfall and intersection elements of the project. The following sections outline the development process and resulting alternatives considered as part of this study.

A. First Project Team Meeting

The first project team meeting was held September 19, 2007, at the KYTC Central Office in Frankfort. The purpose of this meeting was to discuss the purpose of the study, examine the existing conditions, and define key constraints for the project area. The topography of the study area and storage space required by Pikeville Elementary School will limit the range of alternatives which will be feasible for the area. Minutes of this meeting are included in **Appendix B**.

B. Geotechnical Meeting

A coordination meeting between KYTC District 12, KYTC Geotechnical Branch, and consultant staff was held October 2, 2007, in Pikeville. The purpose of the meeting was to discuss potential rockfall solutions in more detail prior to development and analysis of the alternatives. Minutes of this meeting are included in **Appendix B**.

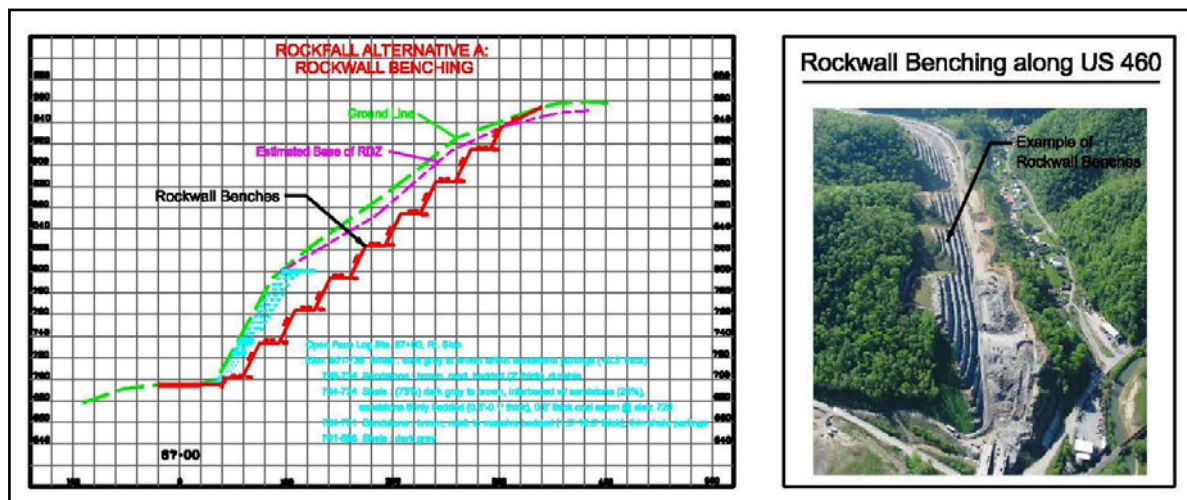
C. Definition of Rockfall Alternatives

Three separate “build” strategies were employed to address the rockfall hazard along KY 1426. In addition, the No Build Alternative was considered for evaluation. Drawings of the alternatives are presented in both **Appendices C** and **D**.

1. Alternative A: Rockwall Benching

This alternative calls for the embankment on the eastern side of KY 1426 to be cut back into tiered steps. Based on the existing terrain, this would require excavation of approximately 400,000 cubic yards of rock. Additional right-of-way on top of the ridge would be required and the project would have to undergo a detailed environmental review process. KY 1426 would not have to be relocated with this configuration. **Figure 4.1** provides an overview of this alternative.

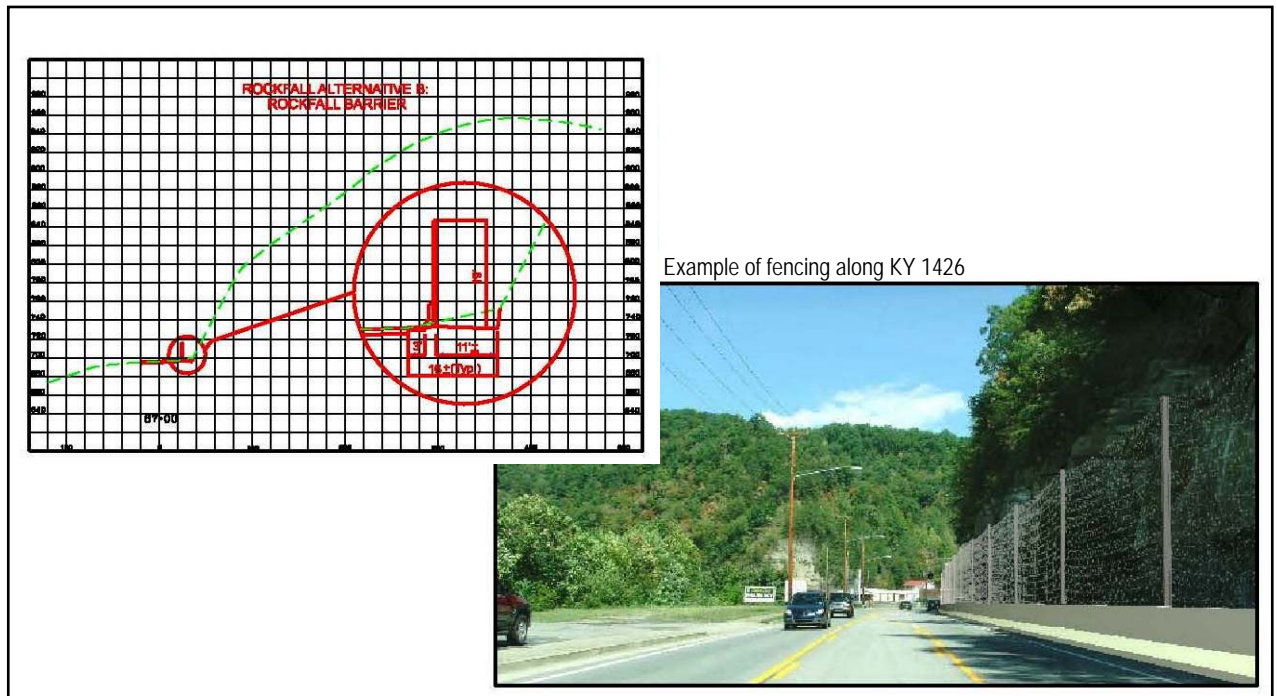
Figure 4.1 – Rockwall Benching Concept



2. Alternative B: Rockfall Fence

As shown in **Figure 4.2**, this alternative includes the construction of a protective barrier along KY 1426 to prevent falling rocks from entering the roadway. The barrier would be composed of concrete K-barriers alongside the road with an anchored 19-foot tall steel fence behind. No additional right-of-way will be required for this alternative. KYTC maintenance forces will need to have access behind the fence routinely to clear fallen debris; approximately 11 feet of clearance between embankment and fence would remain for this purpose.

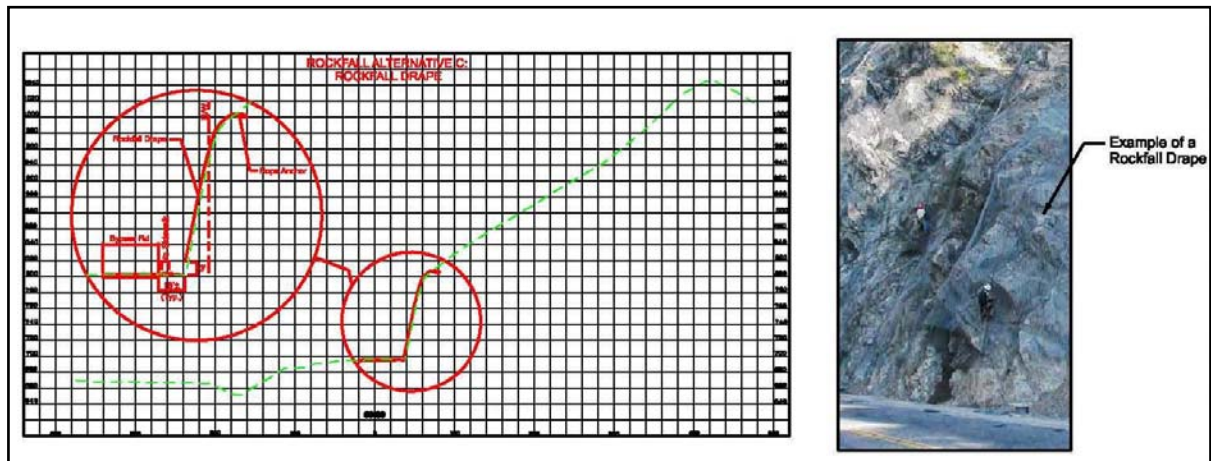
Figure 4.2 – Rockfall Fencing Concept



3. Alternative C: Rockfall Drape

This alternative consists of a protective material draped along the cliff face to prevent loose stones from falling. Some additional right-of-way would be required and an environmental review would be necessary. The mountainside would have to be cleared prior to installation of the drape. **Figure 4.3** provides conceptual details for this strategy.

Figure 4.3 – Rockfall Drape Concept



4. Other Measures Considered

Consideration was given to relocating KY 1426 to the west beyond the limits of falling debris. This strategy would require a minimum offset of 60 feet from the existing alignment, and would include major utility relocations, modifying/replacing two existing bridges, relocating the adjacent stream, and relocating several area businesses. Based on these impacts and associated high costs, this alternative was determined to be infeasible and was dismissed from further consideration.

Estimates for construction, right-of-way, and utilities costs for each of these alternatives are shown in **Table 4.1**. Materials cost estimates were provided by Geobrugg North America and WSA, while KYTC provided utility and right-of-way costs.

Table 4.1 – Rockfall Alternative Cost Estimates

Alternative		Construction Cost (\$1,000)	Right of Way		Utility Cost (\$1,000)	Total Cost (\$1,000)
			Acres	Cost (\$1,000)		
Rockfall	Alternative A	\$7,400	10.1	\$20	\$540	\$7,960
	Alternative B	\$1,200	0.0	\$0	\$50	\$1,250
	Alternative C	\$2,000	3.3	\$10	\$50	\$2,060

D. Definition of Preliminary Intersection Alternatives

A variety of intersection improvement alternatives were developed to address the KY 1426 intersections with Chloe Creek Road (KY 1460) and Summit Drive/Huffman Avenue. In addition to the No Build scenario, six preliminary intersection alternatives were developed. These were then presented during the second project team meeting and refined before presentation to stakeholders and the public. Drawings of the preliminary intersection alternatives are presented in **Appendix C**.

1. Alternative 1

With this alternative, Chloe Creek Road (KY 1460) would be relocated opposite existing Huffman Avenue. Summit Drive and the school access road would tie into KY 1460 opposite one another at a stop-controlled intersection. This alternative would require the purchase of the entire fire station complex and construction of a large culvert and a bridge for Summit Drive to cross KY 1460.

2. Alternative 2

With this alternative, KY 1460 would be relocated opposite existing Huffman Avenue. Summit Drive would be relocated to tie into the school access road, which then connects to KY 1460. This alternative would take the fire station training facility, but it preserves the station. A large culvert must be constructed.

3. Alternative 3

With this alternative, the Summit Drive approach at the KY 1426/Huffman Avenue intersection would be closed to form a three-leg intersection. KY 1460 would be reconstructed near its existing location, thus, forming a second three-leg intersection. The school access road would connect to Summit Drive, which connects to KY 1460 at a stop-controlled intersection. Although the fire station is preserved, the training facility would need to be removed to accommodate the improvements.

4. Alternative 4

With this alternative, the Summit Drive approach at the KY 1426/Huffman Avenue intersection would be closed to form a three-leg intersection. KY 1460 would be reconstructed approximately 150 feet south of its existing location to form a second three-leg intersection. Summit Drive would connect to the school access road, which ties into KY 1460 at a stop-controlled intersection. The short spacing between the two intersections on KY 1426 would generate poor operational conditions due to signal timing inefficiencies. The entire footprint of the fire station complex would be needed for the relocation of KY 1460.

5. Alternative 5

With this alternative, KY 1460 is relocated opposite existing Huffman Avenue. Summit Drive and KY 1460 would tie into the school access road opposite one another at a four leg stop-controlled intersection. This alternative would require the purchase of the fire station training facility, but preserves the station. Construction of a large culvert would be necessary. This alternative makes KY 1460 secondary to the school access road and creates a small radius (100 to 150 feet) for a rural highway with a 45 mph design speed.

6. Alternative 6

With this alternative, the Summit Drive approach at the KY 1426/Huffman Avenue intersection is closed to form a three-leg intersection. KY 1460 would be reconstructed near its existing location to form a second three-leg intersection. Summit Drive would connect to the school access road, which ties into KY 1460 at a stop-controlled intersection. This alternative would take the fire station training facility but preserves the station. As a modification to this alternative, KY 1460 could be widened along its current alignment to reduce costs.

Both the rockfall and intersection Alternatives were presented to the project team at the next meeting, discussed in the following section.

E. Second Project Team Meeting

A second project team meeting was conducted October 17, 2007, in Pikeville at the KYTC District 12 Office. At this meeting, the rockfall alternatives and preliminary intersection alternatives were presented for team review and comment. The meeting minutes are included in **Appendix B**. Team discussions included the following points:

- Realignment of KY 1426 far enough from the rockwall to avoid falling debris would require major utility relocations, structure replacement, stream relocation, and extensive right-of-way acquisitions and was therefore determined to be infeasible.
- The City is concerned about the aesthetics of the selected rockfall alternative as well as performance.
- A large queue forms during peak school drop off times and causes several alternatives to exhibit degrading performance during the AM peak hour. Adding a police officer at the school access road intersection with KY 1460 may improve operations; this measure will be evaluated as part of the Tier 2 traffic analysis.
- Intersection Alternative 5 is not considered a viable alternative due to the 100-150 foot radius created on KY 1460. KYTC common practice standards suggest a minimum radius of 600 feet for this class of roadway. Increasing this radius would require cutting into the hillside and would incur additional costs and environmental consequences, including impacts to the historic cemetery. This configuration creates unsafe conditions on a state-maintained, rural collector serving 7,000 vehicles per day. This Alternative was removed from further analysis.

F. Modification of Intersection Alternatives

As a result of discussions at the second project team meeting, the following modifications were made to the intersection alternatives before presenting them to stakeholders and the public. Drawings of each of these intersection alternatives can be found in **Appendix D**, along with drawings of the rockfall alternatives.

- Alternatives 1 through 4 remain unchanged.
- Alternative 6 described above was renamed Alternative 5 after the elimination of the layout with a sharp radius on KY 1460. Alternative 5 from this point forward refers to the layout with two three-leg intersections along KY 1426 that connects Summit Drive to the school access road.
- Alternative 6 widens KY 1460 on its existing alignment. The Summit Drive approach to KY 1426 is removed and Summit Drive is rerouted to tie into the school access route, which connects to KY 1460.
- Alternative 7 also widens KY 1460 along its existing alignment. The school access road is removed from Summit Drive and ties into KY 1460.

All seven of these intersection alternatives were modeled and evaluated at a network level. The results are presented in **Table 4.2** for the PM peak hour. For comparison, the results for the existing conditions are presented as well. **Table 4.3** shows cost and safety information; construction costs were developed by WSA while KYTC provided right-of-way and utility estimates.

The rockfall alternatives and modified set of intersection alternatives were presented to stakeholders and the public, as described in the following chapter.

Table 4.2 – Performance Measures for Refined Intersection Alternatives

Measure	Existing	Alt 1	Alt 2	Alt 3
Delay Per Vehicle (sec)	35.6	31.8	30.8	32.8
Total Delay (hr)	17.9	15.7	15.3	16.5
Total Stops	1,781	1,450	1,467	2,003
Travel Time (hr)	47.5	45.9	44.9	46.8
Average Speed (mph)	22	23	24	23
Conflict Points - Network wide	50	64	50	36
Conflict Points - Bypass	41	32	32	18
LOS at Key Intersections				
KY 1426 at Huffman	C	C	C	C
KY 1426 at KY 1460	C			C
KY 1460 at Summit/School*	n/a	School=F	Sum/Sch=E	Sum/Sch=E
Summit Dr at School Access*	School=B	Summit=B	Summit=B	Summit=B
Measure	Alt 4	Alt 5	Alt 6	Alt 7
Delay Per Vehicle (sec)	48.9	30.9	30.9	37.9
Total Delay (hr)	24.6	15.5	15.5	19.3
Total Stops	2,066	1,836	1,836	1,855
Travel Time (hr)	54.3	44.9	44.9	48.8
Average Speed (mph)	19	23	23	21
Conflict Points - Network wide	36	36	36	50
Conflict Points - Bypass	18	18	18	41
LOS at Key Intersections				
KY 1426 at Huffman	C	C	C	C
KY 1426 at KY 1460	D	C	C	C
KY 1460 at Summit/School*	Sum/Sch=E	Sum/Sch=E	Sum/Sch=E	School=D
Summit Dr at School Access*	Summit=B	Summit=B	Summit=B	n/a

NOTES: *LOS for unsignalized intersections reported for stop-controlled approach(es).

Some measures vary from those presented at public meeting due to subsequent analysis.

Table 4.3 – Costs and Conflict Points for Refined Intersection Alternatives

Alternative		Construction Cost (\$1,000)	Right of Way		Utility Cost (\$1,000)	Total Cost (\$1,000)	Safety (Conflict Points)	
			Acres	Cost (\$1,000)			Bypass	Total Network
Intersection	Current Conditions						41	50
	Alternative 1	\$3,100	5.6	\$2,910	\$1,720	\$7,730	32	64
	Alternative 2	\$2,700	4.5	\$2,210	\$1,720	\$6,630	32	50
	Alternative 3	\$1,900	4.6	\$2,560	\$1,720	\$6,180	18	36
	Alternative 4	\$2,100	4.5	\$3,640	\$1,720	\$7,460	18	36
	Alternative 5	\$2,000	4.4	\$3,990	\$1,720	\$7,710	18	36
	Alternative 6	\$1,500	3.9	\$2,110	\$1,720	\$5,330	18	36
	Alternative 7	\$950	2.7	\$1,490	\$1,720	\$4,160	41	50

V. STAKEHOLDER AND PUBLIC INVOLVEMENT

Following the development and initial evaluation of alternatives, public officials, local business representatives, and the public were given the opportunity to provide input on the study. The results of this effort are described in the following sections.

A. Stakeholders Meeting

The project team met with elected officials and interested stakeholders on November 8, 2007, at the Pikeville Fire Station to discuss the project purpose and proposed alternatives. Minutes from this meeting are included in **Appendix B**.

Team members emphasized that this Transportation Study is composed of two independent elements along KY 1426, both of which are intended to improve safety along KY 1426 (the Pikeville Bypass). Following presentations on both the rockfall and intersection alternatives, attendees expressed concern about safety, cost, and aesthetics.

Following the stakeholders meeting, the Pikeville City Commission passed a Resolution supporting Alternative B (the rockfall barrier system) and Alternative 1 (the consolidation of the existing Huffman Avenue/Summit Drive and KY 1460 intersections into one four-leg signalized intersection with a second unsignalized intersection between KY 1460, Summit Drive, and the school entrance) as the preferred alternatives. A copy of this Resolution is included in **Appendix B**.

B. Public Meeting

A public meeting was also conducted November 8, 2007, to allow residents of Pikeville an opportunity to review and comment on the KY 1426 planning effort. The purpose of this event was to provide an open forum for the public to review the developed alternatives, interact with the project team, and provide feedback for the alternative evaluation process. Areas were set up for watching a presentation, viewing exhibit boards, and completing a survey. The meeting was heavily attended by an organized group from the Chloe Ridge Home Owners Association. The details of the meeting are included in a public meeting summary notebook on file with the KYTC Division of Highway Design and Division of Planning.

Discussion items covered during the meeting included the following questions and comments:

- What are the impacts to the businesses along KY 1426 during construction of the rockfall alternatives? Most likely the barrier and drape alternatives will require one lane to be closed for one construction season. Access to businesses would be maintained. The benching alternative would take longer and may require additional lanes to be closed, particularly during blasting periods. Between the three alternatives, the barrier would result in the least amount of disturbance to the businesses along this portion of KY 1426.
- How effective will the rockfall catchment systems (drape and barrier) be? They are designed to hold back 90% or more of potential rockfalls.
- How were the outer edges of the rockfall area determined? History and maintenance reports were used to determine the length of the project area.
- Some believe the rockfall benches are more aesthetically appealing than the rockfall barrier and rockfall drape.

- Do any of the alternatives impact the cemetery? The rockfall benching alternative is the only alternative that could potentially impact the cemetery. Additional analysis is needed before a determination can be made. The intersection alternatives were designed to not impact the cemetery.
- Which intersection alternatives increase the driving time between the Chloe Ridge neighborhood and the Pikeville Medical Center? Alternative 7 is the only alternative that does not increase this distance although increases are modest in all cases, usually only a few seconds.
- If the school traffic is redirected to KY 1460, what is the harm in leaving Summit Drive's access to KY 1426? As the traffic demand increases, you lose the ability to run these signals efficiently. This increases the overall delay to the system, particularly along the Bypass. It also maintains the existing number of safety conflict points, which is greater than the other build alternatives.
- Any intersection alternative that does not eliminate a signal on KY 1426 was not thought to be an overall improvement.
- Adding a northbound left turn lane on KY 1426 at the Huffman Avenue Intersection was thought to be a good idea, no matter which alternative was selected.

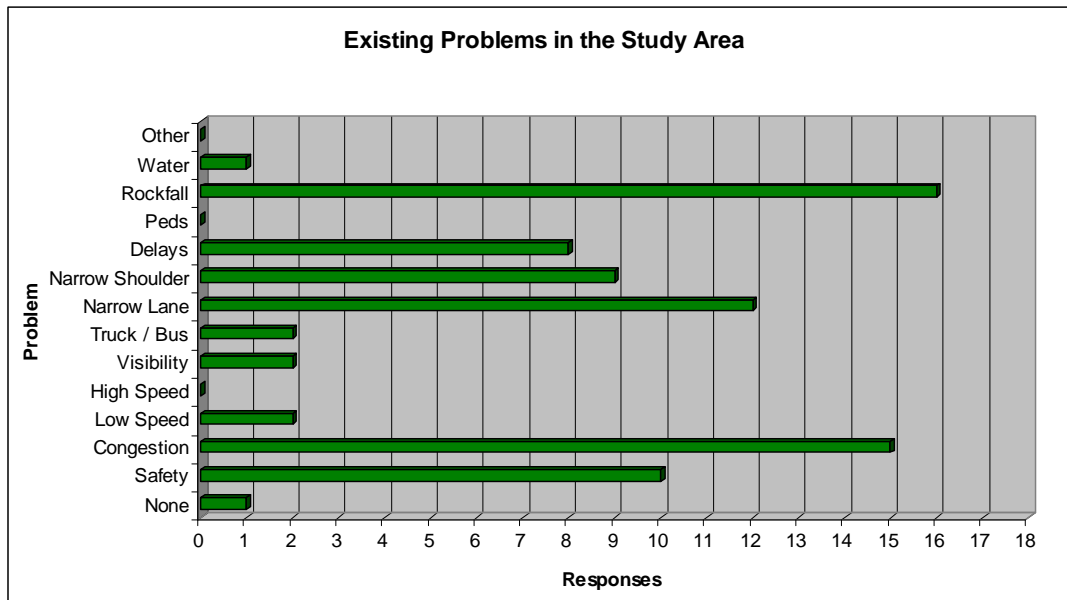
A survey was provided to meeting participants in order to gauge public opinion for both the rockfall and intersection alternatives. Completed surveys were received from 20 persons. The survey results are summarized below.

The survey asked respondents to denote how frequently they travel along the study area roadways: KY 1426, KY 1460, Summit Drive, and the school entrance. A second question asked whether each of the following roads and/or intersections should be improved. The responses are tabulated in **Table 5.1**. Falling rocks, traffic safety issues, and traffic congestion were listed as the primary needs for improvements.

Table 5.1 – Should the Road/Intersection Be Improved?

Feature	Yes	No	No Response
KY 1426/South Bypass Road	16	2	2
KY 1460/Chloe Creek Road	14	3	3
Summit Drive	5	8	7
School Access Driveway	13	4	3
Intersection of KY 1426 and 1460	13	4	3
Intersection of KY 1426 and Summit Dr	10	5	5

Respondents were asked to identify from a list which transportation problems currently exist in the study area. As seen in **Figure 5.1**, the most frequently chosen responses were rockfall and congestion. Water pooling in the roadway at Pikeville Elementary was mentioned as a concern.

Figure 5.1 – Existing Problems in the Study Area

Respondents were also given opportunities to select a preferred alternative for both the rockfall and intersection components of the study. Alternative 7 (rebuilding KY 1460 on its existing alignment and moving the school access road to KY 1460) was preferred by the majority of respondents; 12 of 19 respondents selected Alternative 7 as the preferred alternative. Alternative 1 was selected by 4 persons, followed by Alternative 2, which was preferred by 2 persons. One respondent indicated a preference for the No Build Alternative. When asked about a preferred rockfall Alternative, 10 respondents selected Alternative A while 7 selected Alternative B. Comments received indicate that both cost and aesthetics are primary concerns in selecting an Alternative. **Figures 5.2 and 5.3** present the results graphically for both sets of alternative preferences.

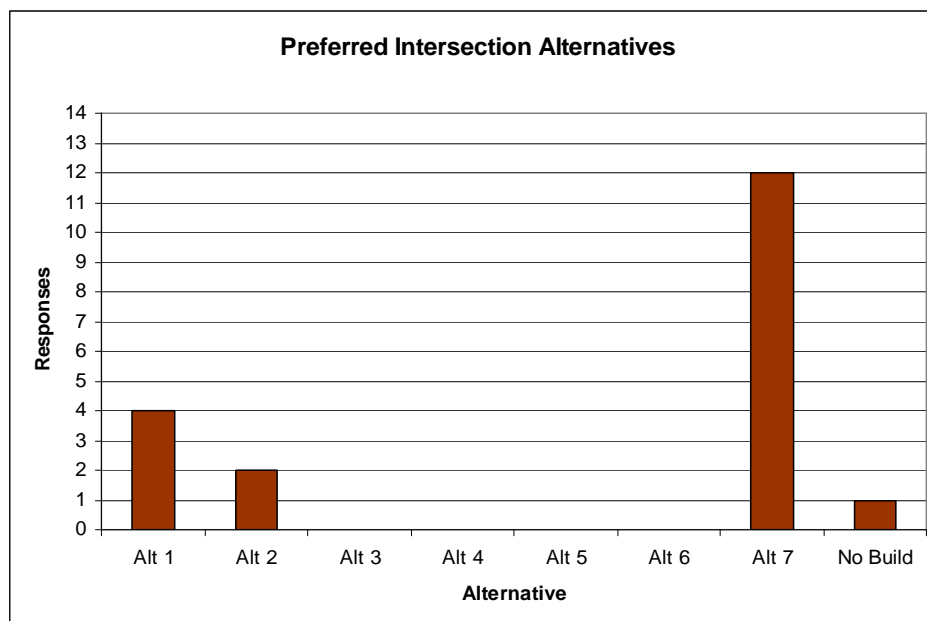
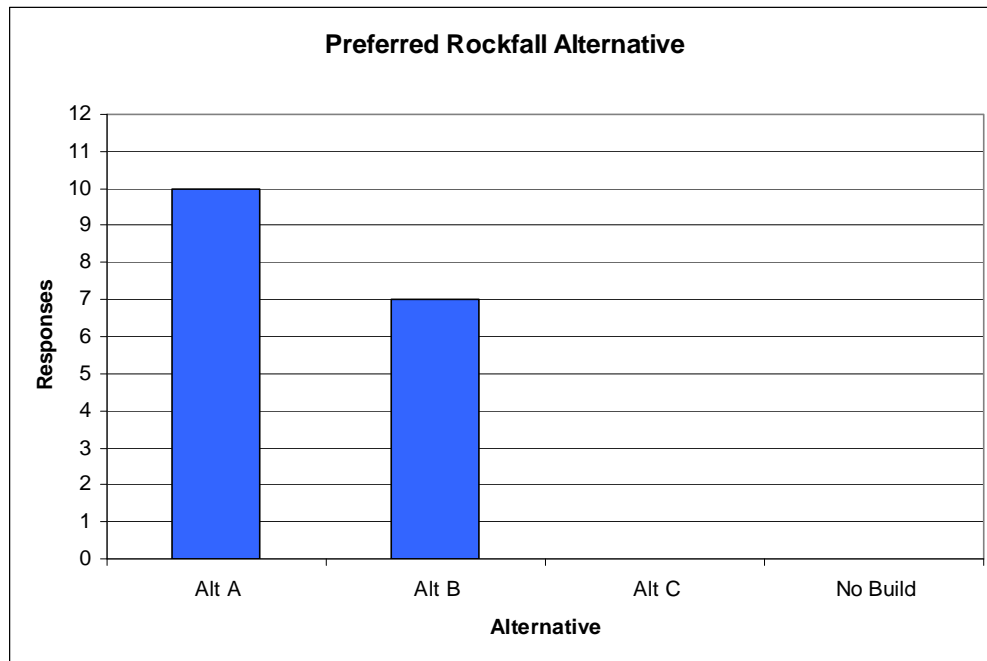
Figure 5.2 – Preferred Intersection Alternatives

Figure 5.3 – Preferred Rockfall Alternatives

C. Alternatives for Further Evaluation

Alternatives 2, 3, 4, and 5 were not recommended for further study. These alternatives received little to no support from local officials or the general public based on survey input. They involved more construction off existing roadbeds (and higher costs) than Alternatives 6 and 7. Respondents expressed concern about Summit Drive traffic being delayed in school traffic which Alternatives 2, 3, 4, 5, and 6 did little to address. The performance of Alternative 4 was worse than the existing conditions during both analysis periods.

Based on the preferences expressed by the City Commission and the public surveys, Intersection Alternatives 1, 6, and 7 were advanced for additional analysis. Other elements recommended for additional analysis were:

- How these alternatives can be expected to function during the AM peak period and in future years;
- What benefits are gained by installing a left-turn lane for northbound KY 1426 at the Huffman Avenue intersection; and
- Whether having a police officer direct traffic at the entrance to the school would improve traffic flow and safety.

These issues were addressed as part of a Tier 2 traffic analysis, described in the following chapter.

VI. ADDITIONAL ANALYSIS

Following input received during public involvement activities, Intersection Alternatives 1, 6, 7, and the No Build scenario were selected for additional analysis. Simulations were run to investigate key components of the Tier 2 Intersection Alternatives. These components include (1) examining alternatives during the AM period; (2) identifying future year impacts to the remaining alternatives; (3) adding a left turn lane on KY 1426 at Huffman Avenue; and (4) improving control at the school access driveway. These investigations are described in the following sections.

A. AM Peak Hour Analysis

The high volume of traffic accessing Pikeville Elementary School creates major impacts on the transportation network in the study area but only affects 30-45 minutes of the day. A long school queue makes AM peak hour performance measures increase and skews alternative evaluations. Alternatives 1, 6, and 7 all showed operating conditions degrading below existing conditions. This is because each alternative is routing the school traffic through an unsignalized intersection. In particular, left-turn movements at the school access road experience significant delay. Gains in system performance are offset by increased delay at the school access road.

To account for this, analysts studied arterial operations along KY 1426 during the AM peak to determine how performance changed for arterial movements in Alternatives 1, 6, and 7. Based on this analysis, each alternative resulted in significant improvement when compared to the existing condition. Delay per vehicle reduced from 82 seconds in the existing condition to 43 seconds for Alternatives 1 and 6. Alternative 7 resulted in a 21 second improvement. Other indicators resulted in similar improvements.

B. Future Year Analysis

Future traffic growth is expected to be minor; however, it is difficult to predict. Minimal traffic growth (less than 1%) is expected to occur throughout the study area. Over the past 20 years, recorded volumes have increased by less than 1% annually. In addition, growth constraints on both Pikeville Elementary and Chloe Ridge neighborhood make it unlikely that additional traffic will be attracted to the area. Despite these considerations, school traffic has a major influence on peak hour traffic operations. Unforeseen changes (e.g., relocation or expansion) to this facility may have large impacts on the network. For these reasons, a detailed future year analysis of the alternatives has not been undertaken at this time.

Conceptually, alternatives that provide a single intersection on KY 1426 (Alternative 1) will handle high traffic volumes better than two separate T intersections (Alternative 7). As volumes increase, storage between both intersections will exceed capacity, thereby reducing signal efficiency and increasing delay. A single intersection configuration is also easier to expand than attempting to route extra lane(s) through multiple intersections.

The number of crashes is likely to increase as traffic volumes grow. Alternatives that include multiple intersections along KY 1426 increase the number of stops along this arterial, thereby increasing the potential for rear end crashes. However, two separate three-leg intersections contain fewer conflict points than a single four-leg intersection.

C. Left Turn Lane on KY 1426

All of the intersection alternatives include a left turn lane on northbound KY 1426 at the Huffman Avenue/Summit Drive intersection, which does not exist currently. To determine

how much benefit is derived by this low cost improvement, analysts ran simulations for the PM peak hour of the existing network with and without this lane; results are presented in **Table 6.1**.

Table 6.1 – Performance Measures for a Left Turn Lane at Huffman

Measure	Existing Conditions	
	No Left	Add Left
Delay per Vehicle (sec)	35.7	33.8
Total Delay (hr)	18.0	17.0
Total Stops	1,779	1,703
Travel Time (hr)	47.6	46.5
Average Speed (vph)	22	22

Constructing a left turn lane at this location reduces system-wide delay per vehicle by 5-6% during the PM peak period when compared to the existing conditions. Complete construction of any one of the three intersection alternatives results in an additional 5-10% decrease in delay. Other performance measures follow similar trends.

It is necessary to restripe the southbound KY 1426 approach to provide a left turn lane in this direction facing the new northbound lane and to adjust signal timings and phases. Separating southbound left turn traffic combines the higher volumes of through and right turning vehicles into one lane. Based on low AM peak left turn volumes from southbound KY 1426 to Summit Drive, this actually worsens performance at this intersection in the AM peak.

According to Kentucky Transportation Center research¹, adding a left turn lane at an intersection may reduce crash rates by 25% for fatal, injury, and property damage only crashes.

With an estimated cost of \$200,000, installing a left turn lane at this location yields a higher benefit/cost ratio than other intersection improvement alternatives.

D. School Access Drive Control Measures

Analysts considered different control measures to find ways to improve operations at the driveway entrance, for example, by installing a signal or having a police officer direct traffic during peak times. This investigation showed that the majority of school traffic does not use KY 1460, but instead comes from KY 1426 northbound and Huffman Avenue. Realigning the school driveway to intersect KY 1460 (as in Alternatives 6 and 7) increases traffic volumes using portions of KY 1426 and KY 1460 and funnels higher volumes through the KY 1426/KY1460 intersection to reach the school.

For each alternative, signalization of the school access drive provided minimal benefits. A reduction in delay for motorists dropping off or picking up children resulted in an increase in delay for motorists traveling KY 1460. As an alternative measure, a police officer could assist motorists entering and exiting the school access drive during the morning and

¹ Kentucky Transportation Center. (2003). *Development and Procedures for Identifying High-Crash Locations and Prioritizing Safety Improvements*. Lexington, KY: Agent, Ken et al.

afternoon peak 15-30 minutes. Extra delay along KY 1460 would be limited to these short periods. Motorists leaving Pikeville Elementary School would be provided an increased level of safety because the police officer would stop oncoming traffic as they make their movement onto KY 1460. The drawback to this option is the cost and availability of police staff to provide this service on a daily basis.

VII. RECOMMENDATIONS

This chapter provides study conclusions and recommendations for improvements to KY 1426, addressing both the rockfall and intersection improvement components. The recommendations are based on the technical analysis and community input described in this report.

A. Project Purpose and Need

The identified purpose for this Transportation Study is to improve safety in the project area. This should be accomplished by addressing the rockfall hazard along KY 1426 between KY 1460 and Combs Avenue and by improving traffic safety along the Pikeville Bypass (KY 1426). Additional goals accompanying the primary purpose include:

- Rockfall:
 - Avoiding negative operational impacts due to falling debris (e.g. road or lane closures);
 - Minimizing negative environmental impacts;
 - Avoiding impacts to adjacent businesses;
 - Providing an aesthetically pleasing solution;
- Intersection:
 - Improving traffic operations;
 - Providing adequate storage for school traffic queues;
 - Preserving access to surrounding streets and driveways; and
 - Minimizing environmental impacts.

The project purpose and need is discussed in more detail in **Chapter 3**.

B. Third Project Team Meeting

A third and final project team meeting was held at the KYTC office in Frankfort on January 30, 2008. The purpose of the meeting was to review the public input received at the November public meeting, to examine results from the second tier of traffic analysis on Alternatives 1, 6, and 7, and to consolidate final study recommendations. The meeting minutes are presented in **Appendix B**. The resulting priorities and recommendations are outlined in the following sections.

C. Recommended Rockfall Alternative

To address the recurring rockfall problems along the bypass, Alternative B is recommended as the top priority. This alternative includes the installation of a barrier catchment system composed of a 19 foot tall steel fence anchored behind concrete K-barriers along the eastern side of KY 1426 between KY 1460 and Combs Avenue. Estimated costs total \$1.2 million for this alternative; including \$50,000 to relocate affected utilities.

D. Recommended Intersection Alternative

Concurrent with the construction of a rockfall barrier system, the second priority recommendation is that a 150-foot long northbound left turn lane be constructed along KY 1426 at the Huffman Avenue/Summit Drive intersection. This would provide approximately a 5% reduction in delay per vehicle throughout the network based on PM peak hour analysis. Adding this lane leads to a 40% reduction in delay for the northbound KY 1426 approach.

As noted in **Chapter 6**, the addition of the left turn lane at an intersection also has the potential to reduce crashes by 25%.

Additional overlay and restriping for the southbound approach at the intersection would be needed as a result of this project. Total costs for this improvement are estimated at \$200,000. Other minor improvements along the existing alignment (e.g., widening lanes) should be incorporated into this project as needed.

Due to fiscal constraints, none of the developed intersection alternatives are recommended for implementation at this time. The lower cost, turn lane improvement more cost effectively benefits traffic operations and safety than the Build Alternatives. As future traffic patterns develop and funding becomes available, additional study should be undertaken on Alternatives 1 and 7. Alternative 6 is not recommended for future study; it is more expensive than Alternative 7, does not separate Summit Drive traffic from Pikeville Elementary traffic, and did not receive any public support. The existing traffic safety and congestion problems experienced on KY 1426 are significantly impacted by school traffic. Future study should examine circulating patterns at the school to identify potential traffic flow improvements which could improve operations in the study area. Changes in the size, location, or hours of Pikeville Elementary School will influence transportation in the area; although none have been identified to date, these could vastly change the performance of the identified intersection alternatives.

Alternatives 1 and 7 received the most support locally. Both separate Summit Drive traffic from the existing school queue. Alternative 1 provides the fewest number of stops during both analysis periods and is among the alternatives with the least delay. This scenario also creates fewer intersections and fewer conflict points along KY 1426 compared to the existing conditions. Alternative 7 provides fewer changes to the existing network and is the least expensive configuration studied.

E. Potential Design Criteria and Considerations

Potential design criteria and considerations noted here are for planning purposes only. These criteria are general recommendations based upon information gathered throughout this planning study. Specific geometric parameters should be defined during future design phases of the project as more detailed information is available.

A northbound left turn lane is recommended to serve movements onto Huffman Avenue. This lane should provide a full 12-foot width for queue storage. For illustrative purposes, **Figure 7.1** shows a possible typical section approaching the intersection from the south. Curb and gutter along the southbound lane should be installed after widening, in addition to a 5-foot sidewalk on the western side of the road.

For illustrative purposes, a representative typical section for KY 1426 in the rockfall barrier area is shown as **Figure 7.2**. A three-foot shoulder follows the edge of the northbound lane. K-barriers are installed at the shoulder edge to anchor the 19-foot tall steel fence structure. The rockfall catchment system is expected to run 2,000 feet, with vertical support poles spaced at 30 feet. A more detailed analysis may be required to determine the final design criteria and additional sizing information.

Short term lane closures on KY 1426 may be necessary during catchment installation and turn lane construction, although impacts to adjacent businesses are not anticipated. Access to areas behind the rockfall barrier should be preserved to enable KYTC maintenance forces opportunity to routinely remove fallen debris collected.

Figure 7.1 – KY 1426 Typical Section with Turn Lane

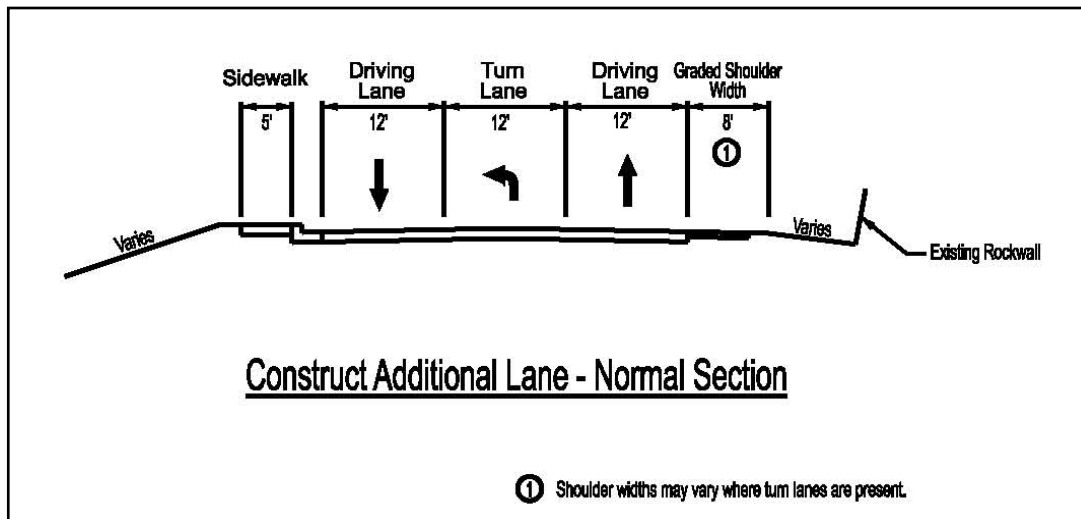
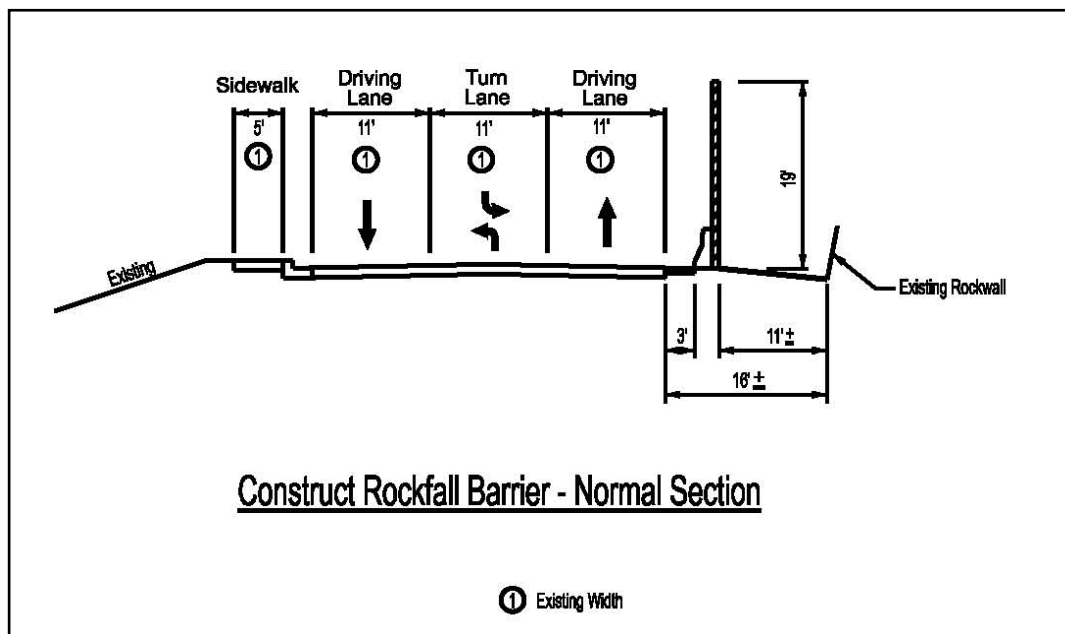


Figure 7.2 – KY 1426 Typical Section with Rockfall Fence



KY 1426 Transportation Study - Appendix A



KY 1460 at Bailey Blvd near Pikeville Elementary. Chloe Creek passes under the roadway at this location; local reports indicate water pools in roadway at times.



Chloe Creek Culvert, passing under KY 1460.



View West along KY 1460 and Chloe Creek



Area between KY 1460 and school access road facing east



Dils Cemetery



View along KY 1460 to intersection with KY 1426



View along KY 1426 facing North from KY 1460 intersection



KY 1426/KY1460 intersection, looking North



Cut slope at KY 1426/KY 1460 intersection with rockfall hazard. Dils Cemetery sits atop ridge



Summit Drive approach to KY 1426 intersection



Summit Drive



View of KY 1426 intersection with Huffman Avenue as
seen from Summit Drive



View Northeast along KY 1426 from intersection with
Summit Drive/Huffman Avenue. Eastern KY Expo
Center stands to the left of KY 1426



Southern KY 1426 approach at Huffman
Avenue/Summit Drive intersection



Rockfall area east of KY 1426



Businesses on Western side of KY 1426 in rockfall area



Intersection with Combs Avenue near rockfall area



Embankment opposite Combs Avenue, prone to falling debris

MINUTES

Project Team Meeting

KY 1426 Transportation Study Pike County

KYTC Central Office
Frankfort, Kentucky
September 19, 2007
10:00 AM

A project team meeting for the KY 1426 Transportation Study in Pike County was held at 10 a.m. on Wednesday, September 19, 2007, in Frankfort, Kentucky. The purpose of the meeting was to discuss the project purpose and history, the scope of work, the preliminary data collected, relevant project issues, and public involvement. Participants in the meeting included the Kentucky Transportation Cabinet (KYTC) Central Office, the KYTC District 12 Office, the KYTC Geotechnical Branch, and the consultant firm, Wilbur Smith Associates (WSA). Meeting attendees included the following persons:

Jim Wilson	KYTC Central Office, Planning
Steve Ross	KYTC Central Office, Planning
Brad Eldridge	KYTC Central Office, Highway Design
Sean House	KYTC Geotechnical Branch
Christian Wallover	KYTC Geotechnical Branch
Michael Blevins	KYTC Geotechnical Branch
Kevin Damron	KYTC District 12, Preconstruction
John Michael Johnson	KYTC District 12
Joe Stanley	KYTC District 12
Darold Slone	KYTC District 12, Operations
Charles Neeley	KYTC District 12, Traffic
Brad Johnson	Wilbur Smith Associates
Bill Gulick	Wilbur Smith Associates
Len Harper	Wilbur Smith Associates

A summary of the key components and discussion items for this meeting is provided below.

1. Welcome and Introduction

Jim Wilson began the meeting, welcoming the participants and introducing the project team members in attendance. He emphasized the fast pace nature of the project.

2. Purpose

Brad Johnson briefly outlined the purpose of the project: (1) Maintenance/operations measures and/or reconstruction to correct or mitigate recurring rockfall problems along KY 1426 between KY 1460 and Combs Avenue. (2) Traffic operational and/or minor reconstruction measures to improve traffic flow at the intersections of KY 1426 with KY 1460 (Chloe Road) and Summit Drive, including access/egress to the Pikeville Elementary School.

3. Project History

Kevin Damron briefly discussed the history of the project. He discussed the long history of the rockfall problem on KY 1426. In 2007, rocks fell onto KY 1426 which resulted in its closure. The KYTC Maintenance Department also makes regular visits to the project site to clean up debris from the rock face. The City of Pikeville received \$250,000, independent of this study, from the Commonwealth to find ways to mitigate the rockfall. Summit Engineering, the city's on-call consultant, has decided to wait until this study is finished before proceeding with their project.

Mr. Damron then talked about the Chloe Creek Road and Summit Drive intersections with KY 1426. The two intersections are very close in proximity which results in increased congestion and accidents. Although both the intersection and rockfall issues have been previously looked at, an additional study was needed due to all the project constraints (ex. terrain, McCoy Cemetery, Pikeville Civic Center, Pikeville Elementary School, queues from school, Proximity of KY 1426 to the rock wall, fire station proximity, etc.). Reliable cost estimates will also be needed for the upcoming KYTC Six-Year Highway Plan.

4. Scope of Work

Brad Johnson discussed the scope of work, noting that the KYTC Geotechnical Office would provide WSA with all the needed Geotechnical analysis. WSA will use this analysis to further develop three alternatives to mitigate the rockfall problem on KY 1426.

A tiered evaluation approach will be used for developing alternatives at the intersection. Up to six initial alternatives will be developed by WSA. WSA and the KYTC will screen these six alternatives and select two to be further developed and analyzed by WSA.

The traffic impacts for all alternatives will be evaluated.

This project has an accelerated schedule. WSA will provide the final recommendations and cost estimates by the end of November 2007, in order to advance potential projects into the next KYTC Six-Year Highway Plan. *Note: KYTC District 6 will provide WSA with Right of Way and Utility cost estimates.*

5. Preliminary Data

Brad Johnson and Bill Gulick presented an overview of the preliminary exhibits. The study area was discussed and it was noted that the project area map did not include the new school access road off Summit Drive. The sensitivity and location of the steep terrain, fire department, civic center, Dorsey's, Cemetery, Summit Engineering building, etc. were discussed more extensively. It was noted that the fire department was aware of the study and is willing to sell their Right of Way if needed.

Brad Johnson presented some preliminary traffic volumes, level of service, and crash data maps. The preliminary data showed the intersections performing adequately at a LOS C. The largest single traffic generator during the peak periods come from Pikeville Elementary. Approximate 2,000 foot queues exist during parent pick up and drop off. The queue currently sets on a school access road and must be accommodated in the proposed alternatives. There are some above average crash segments in this project area. WSA will further analyze the crash data to find possible causes. The preliminary nature of this traffic and crash data was noted.

6 and 7. Project Issues & Alternative Concepts

Bill Gulick facilitated a round table discussion of the project issues. The large footprint of this project and its potential for scope creep was noted. In order to complete the project within budget and on schedule, it is important to stay within the scope focusing on rockfall mitigation and the congestion at the intersections.

The following were some additional comments:

- School Access Road: The approximate 2,000 foot queue must be accommodated. The recommended project must replace their access with an improvement that is as good or better than what they currently have.
- KY 1426 Rockfall:
 - The KYTC Geotechnical office will analyze the rockfall and work with WSA to come up with workable alternatives.
 - Representatives from the KYTC Geotechnical Branch will participate in a field review (the week of October 24, 2007) with WSA and District 12 to help develop alternatives.
 - Catchment systems will be looked at as possible alternatives.
 - The Cemetery will affect any potential rock cuts in this area.
 - The aesthetics of any catchment system must be considered.
 - WSA will provide the KYTC Geotechnical Branch with cross sections along KY 1426.
 - The rockwall sets very close to KY 1426 roadway edge. Realigning KY 1426 will have to be looked at. If realignment is needed the flood zones will have to be located. There is also an interest in placing utilities below ground.
- Chloe Creek Road/KY 1426 and Summit Drive/KY 1426 Intersections:

- There is a potential to decrease level of service if the two intersections are combined into one.
- The steep grade of Summit Drive is one design challenge that must be considered.
- There is a creek between Chloe Creek Road and Summit Drive.
- The Pikeville Civic Center is located on the corner of Huffman Avenue and KY 1426. A pedestrian/bus drop-off was intended along KY 1426, but hasn't been completed. Need to confirm if this will be completed at a later time.
- There is very steep terrain on either side of Summit Drive and Chloe Creek Road that presents a challenge in expanding the intersections to include additional lanes.
- A roundabout does not seem practical at this location because of the diameter needed.
- The Pikeville Fire Department has a fire station and training facility between Chloe Creek Road and Summit Drive on KY 1426. They are willing to sell their Right of Way if needed.
- A split intersection was not seen as a good option because of signal timing inefficiencies.
- Through traffic from Summit Drive to Huffman Avenue was higher than expected. It was explained that motorists are likely traveling to Hambley Boulevard and dispersing from there.

8. Public Involvement

Brad Johnson discussed the public involvement. There will be one meeting with the local officials and key stakeholders. After this meeting there will be one public meeting. Both of these will be held near the end of the project to provide the local officials, stakeholders, and the public with an opportunity to provide input on the proposed alternatives.

The meeting was adjourned around 11:30 a.m.

AGENDA
Project Team Meeting
KY 1426 Transportation Study
Pike County

September 19, 2007

- | | |
|-------------------------------------|--------------------------------|
| 1. Welcome and Introductions | KYTC |
| 2. Purpose of Meeting | KYTC |
| 3. Project History | KYTC |
| a. Origin | |
| b. Purpose | |
| c. Group Discussion | |
| 4. Review of the Agenda | Wilbur Smith Associates |
| 5. Scope of Work | Wilbur Smith Associates |
| a. Tasks | |
| b. Responsible parties | |
| c. Schedule | |
| 6. Preliminary Data/Exhibits | Wilbur Smith Associates |
| a. Study Area | |
| b. Hourly Volumes and LOS | |
| c. Highway Crashes | |
| 7. Project Issues | Group Discussion |
| a. Study Area | |
| b. Local Issues | |
| c. Project Goals | |
| d. Geotechnical Concerns | |
| e. Environmental Justice | |
| 8. Alternative Concepts | Group Discussion |
| a. Rockfall along KY 1426 | |
| b. Intersection Improvements | |
| 9. Public Involvement | Group Discussion |
| a. Special groups | |
| b. Tasks | |
| c. Schedule | |
| 10. Q & A | Group Discussion |
| ADJOURN | KYTC |

MINUTES

Meeting

KY 1426 Transportation Study Pike County

KYTC District 12 Office
Pikeville, Kentucky
October 2, 2007
11:30 AM

A meeting for the KY 1426 Transportation Study in Pike County was held at 11:30 a.m. on Tuesday, October 2, 2007, in Pikeville, Kentucky. The purpose of the meeting was to discuss the Rockfall along KY 1426 in Pikeville. Participants in the meeting included the Kentucky Transportation Cabinet (KYTC) District 12 Office, the KYTC Geotechnical Branch, the consultant firm Geobrugg and the consultant firm, Wilbur Smith Associates (WSA). Meeting attendees included the following persons:

Kevin Damron	KYTC District 12, Preconstruction
Keith Damron	KYTC District 12, Planning
John Michael Johnson	KYTC District 12
Sean House	KYTC Geotechnical Branch
Christian Wallover	KYTC Geotechnical Branch
Michael Blevins	KYTC Geotechnical Branch
Darold Slone	KYTC District 12, Operations
Frank Amend	Geobrugg
Bill Gulick	Wilbur Smith Associates
Len Harper	Wilbur Smith Associates

A summary of the key components and discussion items for this meeting is provided below.

1. Welcome and Introduction

Kevin Damron began the meeting, welcoming the participants and introducing the project team members in attendance. He emphasized the Rockfall as being the primary purpose of the meeting.

2. Project History

Kevin Damron briefly discussed the history of the project. He discussed the long history of the rockfall problem on KY 1426. In 2007 rocks fell onto KY 1426 which resulted in its closure. The KYTC Maintenance Department also makes regular visits to the project site to clean up debris from the rock face.

3. Rockfall

Wilbur Smith Associates (WSA) provided aerial and topographic mapping of the project area. The primary area of concern is North of the rock cut where Dorsey's sits and South of the KY 1426/Town Mountain Road split, with the majority of rockfalls occurring around Sta. 70+00. When rockfalls occur they tend to be shale. The falling chunks of shale can get large in size. KYTC maintenance routinely visits the project area to clear rocks.

On average there is 16 feet between the edge of the northbound driving lane and the rockwall. At the outer corners of the project area this space decreases to 12 or 13 feet. Curb and gutter could be added to this portion of KY 1426 to achieve maximum spacing between the roadway and rockwall. With this type of spacing and rockwall slope, Frank Amend from Geobrugg North America recommended two types of catchment systems: (1) Catchment Fence/Barrier and (2) Catchment Drape.

The KYTC Geotechnical staff agreed to perform a rockfall analysis to help substantiate these catchment systems as reliable options. With this analysis Geobrugg will formulate reliable cost estimates.

Discussion items about the two recommended catchment systems were as follows:

- There is no access road to the top of the rockwall. This makes the Catchment Drape more difficult to install.
- Maintenance routinely visits the project site to clear rocks. Adding a drape or barrier catchment system will reduce maintenance work and costs at the project site. The rocks will be contained in a catchment area away from the road, reducing the number of trips required by maintenance and allowing them to clear the rocks as time permits.
- Installation cost of the catchment systems are about 125 percent of the material cost.
- A drape catchment system will have to extend 6 feet over the crest of the rockwall.
- Some sort of combined curb, gutter and concrete barrier will probably need to be constructed along the KY 1426 northbound edge of road to: (1) keep cars from parking on this side of the road and (2) allow the catchment fence to extend higher up the rockwall.
- If curb and gutter is added to the northbound portion of KY 1426, a sidewalk may not be needed.
- Access behind a catchment barrier system will have to be provided to allow maintenance to clear the rock build up.

WSA will look at benching as the third alternative for the rockfall. WSA will provide the KYTC Geotechnical office with the heights of the sandstone along the project area. The KYTC Geotechnical office will then formulate the

recommended bench depths and lift heights. WSA will take these recommendations and formulate a cost estimate for this alternative.

4. Intersection

After the rockfall field visit, Mr. Gulick and Mr. Harper met with the KYTC District 12 staff about the KY 1426 intersections with KY 1460 (Chloe Creek Road) and Summit Drive. To help insure that WSA was on a track that would produce a reasonable set of alternatives, Mr. Gulick suggested several control parameters: 1) School queue, (2) Remain cost conscience to insure a fundable project, (3) Stay out of the Civic Center boundary and (4) Reduce the project footprint. District 12 staff agreed with these parameters.

The meeting was convened around 3:30 p.m.

MINUTES

Second Project Team Meeting

KY 1426 Transportation Study Pike County

KYTC District 12 Office
Pikeville, Kentucky
October 17, 2007
10:00 AM

A project team meeting for the KY 1426 Transportation Study in Pike County was held at 10 a.m. (local time) on Wednesday, October 17, 2007, in Pikeville, Kentucky. The purpose of the meeting was to evaluate the Alternatives developed by WSA. Participants in the meeting included the Kentucky Transportation Cabinet (KYTC) Central Office, the KYTC District 12 Office, the consultant firm Summit Engineers, and the consultant firm Wilbur Smith Associates (WSA). Meeting attendees included the following persons:

Keith Damron	KYTC District 12, Planning
William Cuzzort	KYTC District 12, Planning
Kevin Damron	KYTC District 12, Preconstruction
John Michael Johnson	KYTC District 12, Preconstruction
Dewey Sammons	KYTC District 12, Preconstruction-Utilities
Joe Stanley	KYTC District 12, Operations
Charles Neeley	KYTC District 12, Traffic
Greg Couch	KYTC District 12, Traffic
Gina Bartley	KYTC District 12, Right-of-Way
Mary Westfall-Holbrook	KYTC District 12, Construction
Jim Wilson	KYTC Central Office, Planning
Brad Eldridge	KYTC Central Office, Highway Design
Matt Williams	Summit Engineers
Michael Hill	Summit Engineers
Brad Johnson	Wilbur Smith Associates
Bill Gulick	Wilbur Smith Associates
Len Harper	Wilbur Smith Associates

A summary of the key components and discussion items for this meeting is provided below. These minutes follow the agenda outline which is attached.

1. Welcome and Introduction

Keith Damron began the meeting, welcoming the participants and asking for formal introductions from all attendees. He emphasized the fast pace nature of the project.

2. Purpose of the Meeting

The purpose of the meeting was to evaluate the Alternatives developed by WSA.

3. Review of Existing Conditions

Mr. Johnson discussed the existing traffic, operational, and crash history data collected and analyzed by WSA. He noted the volume of traffic on KY 1426 (9,000+ ADT) and KY 1460 (7,000+ ADT). He also noted the high crash segment on KY 1426 between KY 1460 and Summit Drive.

Mr. Gulick discussed the overall controlling parameters/features for the rockfall and the KY 1426/KY 1460 (Chloe Creek Road) and KY 1426/Summit Drive intersections.

Mr. Johnson completed this discussion topic by noting that WSA was in the process of completing a GIS-based environmental footprint.

4. Purpose and Need of Project

The project team agreed that the overall purpose of the project was to address the safety and congestion issues along KY 1426. Though both the rockfall and intersections influence safety and congestion along the corridor, the two projects are not necessarily linked. A more refined purpose and need statement would need to be developed. The project team agreed to have one general statement of project purpose and need and then develop two separate, more defined purpose and need statements for each of the two defined projects.

The project team agreed that the overall focus of this project should be placed on the rockfall.

5. Proposed Rockfall Alternative

The existing rock cut is from the 1950's. The rockfall area of concern is along KY 1426 between Combs Avenue and the area where Dorsey's Restaurant sits. History and maintenance reports show that rockfalls are common along this stretch of KY 1426, but rockfalls with "large" rocks are not so common. Maintenance routinely visits the project site to clean up rockfall debris.

Mr. Gulick discussed the three rockfall alternatives developed by WSA:

1. Alternative A: Rockwall Benching
 - \$6 million construction cost estimate.
 - Would require right-of-way acquisition and a more in depth environmental review process, which could significantly delay the timeline of the project.
 - Would not require moving KY 1426.
 - Would require approximately 400,000 cubic yards of rock excavation and 40,000 cubic yards of common excavation.

- The rock benches for this method would not daylight out until the top of the mountain.
 - Once WSA provides the KYTC with the amount and location of the right-of-way acquisition required, the KYTC District 12 office will estimate its cost.
2. Alternative B: Rockfall Fence
- \$1.2 million construction cost estimate.
 - This method would not require right of way acquisition or movement of KY 1426.
 - Maintenance would not have as much room to maneuver when cleaning up rock debris behind the fence. This is estimated to be approximately 11 feet.
3. Alternative C: Rockfall Drape
- \$1.8 million construction cost estimate.
 - Would require right-of-way acquisition and a more in depth environmental review process, which could significantly delay the timeline of the project.
 - Would not require moving KY 1426.
 - Would require clearing and grubbing of the mountain side where the drape is to be placed. This needs to be completed prior to the drape contractor completing their work.
 - There is potential for cost creep due to the uncertainties related to right-of-way acquisition, clearing and grubbing, installation, and varying tie down points above the top of the rockwall.
 - Once WSA provides the KYTC with the amount and location of the right-of-way acquisition required, the KYTC District 12 office will estimate its cost.

There was a discussion as to what the validity and repercussions were to realigning KY 1426. The following question was raised: can KY 1426 be realigned far enough away from the rockwall so any future rockfalls would not land on the roadway itself? Field review and maintenance reports show that KY 1426 would need to be offset a minimum of 60 feet to prevent rockfall debris from bouncing or falling onto the roadway. This would require major realignment of the roadway, major utility relocations, modifying or replacing two bridge structures, filling and mitigating the adjacent stream, and right-of-way acquisitions that would include the relocation of several businesses. With these facts, the project team decided this was not a viable alternative.

Mike Hill, representing the City of Pikeville, noted that City officials would be concerned with the aesthetics of each alternative.

Mr. Gulick noted that Alternative B was recommended by the KYTC Geotechnical Branch and product vendor. The project team agreed that Alternative B (Rockfall Fence) was the preferred alternative. The project team then agreed that local

official, key stakeholder, and public input was needed before any alternative was selected for further evaluation.

6. Proposed Intersection Alternatives

The existing KY 1426/KY 1460 (Chloe Creek Road) and KY 1426/Summit Drive intersections each perform individually at a LOS C. The close proximity of the “T” shaped intersection at KY 1426 and KY 1460 and the full intersection at 1426 and Summit Drive cause the system as a whole to experience congestion along the corridor. There is also a high crash segment along KY 1426 between KY 1460 and Summit Drive.

Mr. Gulick discussed the six intersection alternatives developed by WSA:

1. Alternative 1:

- \$3.1 million preliminary construction cost estimate.
- Combines the two existing intersections along KY 1426 into one.
- Requires a large culvert (> 200 feet).
- Requires a bridge for Summit Drive.
- Requires purchase of the entire Fire Station complex.

2. Alternative 2:

- \$2.7 million preliminary construction cost estimate.
- Combines the two existing intersections along KY 1426 into one.
- Requires a large culvert (>200 feet).
- Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
- Congested left turn for drivers turning onto KY 1460 from the School Access Road.
- Protects the Fire Station, but takes the training facility.

3. Alternative 3:

- \$1.9 million preliminary construction cost estimate.
- Creates two “T” intersections along KY 1426.
- Congested left turn for drivers turning onto KY 1460 from Summit Drive.
- Protects the Fire Station, but takes the training facility.

4. Alternative 4:

- \$2.1 million preliminary construction cost estimate.
- Creates two “T” intersections along KY 1426.
- Limited internal storage between the two “T” intersections (KY 1426 & Huffman and KY 1426 & KY 1460) generates poor operations when compared to the other alternatives.
- Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
- Takes the entire Fire Station complex.

- Congested left turn for drivers turning onto KY 1460 from the School Access Road.
5. Alternative 5:
- \$2.3 million preliminary construction cost estimate.
 - Combines the two existing intersections along KY 1426 into one.
 - Requires KY 1460 to have a sharp 100 to 150 foot radius. This is not safe for a 45 mph 7,000+ ADT rural collector roadway. Common practice standards from KYTC suggest a minimum radius of 600 feet.
 - Compromises KY 1460 by turning it into an approach road to the School Access Road.
 - Requires a large culvert (>200 feet).
 - Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
 - Protects the Fire Station, but takes some of the training facility.
6. Alternative 6:
- \$2.0 million preliminary construction cost estimate.
 - Creates two “T” intersections along KY 1426.
 - Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
 - Congested left turn for drivers turning onto KY 1460 from the School Access Road.
 - Protects the Fire Station, but takes some of the training facility.
 - Alternative 6A would widen KY 1460 along its current alignment and would be less costly than Alternative 6.

Mr. Johnson then discussed the traffic operational concerns for each alternative. Network delay, delay per vehicle, and stops were presented in tabular format to the project team as a comparison tool. Alternative 4 was the only alternative that didn't show improvement over the existing condition during both the AM and PM peak periods. The inefficiency of the signal phasing due to the close proximity of the two “T” intersections causes the system to fail more quickly than the other intersections.

Specific to the AM peak period, multiple alternatives had degrading performance when compared to the existing condition. The primary reason was the queue backup created by school traffic. It is required to make either a left turn or right turn onto KY 1460 at an unsignalized intersection. One suggestion would be to consider a police officer controlling traffic during school peak. This improvement will be evaluated.

Based on the current design of Alternatives 3 and 6, vehicles would be able to queue up between intersections. Once volume exceeds the storage capacity between intersections, the timing of the intersections would need to be re-evaluated, most likely degrading the operations of the intersection at a quicker

pace when compared to a combined intersection. The drawback to the combined intersection is the expandability of the intersection given its close proximity to the rockwall, civic center, and former river bed.

The project team agreed that Alternative 5 was not a viable alternative because of the radius of curve along KY 1460. To achieve an acceptable curve radius, it would need to be pushed into the rockwall. This was seen as a fatal flaw. The project team then agreed that local official, key stakeholder, and public input was needed before any other alternatives were selected for further evaluation.

7. Discussion by Project Team

This was discussed as part of agenda items 5, 6, and 8.

8. Next Steps

The project team agreed that the next step was to get the local officials and the key stakeholder input on the rockfall and intersection alternatives. Furthermore, the District agreed to meet with City of Pikeville and Pikeville School Board officials prior to the Local Officials Meeting to get their preliminary thoughts on the alternatives. Following the public involvement process, the project team will select two to three intersection alternatives to move forward in the process for further evaluation and final recommendations.

The meeting was adjourned around 1:00 p.m.

AGENDA
KYTC Project Team Meeting
KY 1426 Transportation Study
Pike County
KYTC District 12 Office
Pikeville, Kentucky
October 17, 2007
10 a.m. EDT

- | | |
|--|---|
| 1. Welcome and Introductions | KYTC |
| 2. Purpose of Meeting | KYTC |
| 3. Review of Existing Conditions | Wilbur Smith Associates |
| a. Traffic and LOS | |
| b. Crash History | |
| c. Geometric Deficiencies | |
| d. Environmental Overview | |
| 4. Purpose and Need of Project | Wilbur Smith Associates |
| 5. Proposed Rockfall Alternatives | Wilbur Smith Associates |
| a. Review of Alternatives | |
| b. Cost Estimates | |
| c. Evaluation of Alternatives | |
| d. Recommendations | |
| 6. Proposed Intersection Alternatives | Wilbur Smith Associates |
| a. Review of Alternatives | |
| b. Traffic Analysis | |
| c. Cost Estimates | |
| d. Evaluation of Alternatives | |
| e. Recommendations | |
| 7. Discussion by Project Team | KYTC District 12/
Division of Planning |
| 8. Next Steps | KYTC/WSA |
| a. Tier 2 Evaluation | |
| b. Local Officials/Public Meeting | |
| 9. Adjourn | KYTC |

MINUTES

Stakeholders Meeting

KY 1426 Transportation Study Pike County

Pikeville Fire Department Training Center
Pikeville, Kentucky
November 8, 2007
2:00 p.m. Local Time

A stakeholders meeting for the KY 1426 Transportation Study in Pike County was held at 2 p.m. Local Time on Thursday, November 8, 2007, in Pikeville, Kentucky. The purpose of the meeting was to discuss the project purpose and history, the alternatives developed and stakeholder concerns. Participants in the meeting came from local stakeholder groups, the Kentucky Transportation Cabinet (KYTC) District 12 Office, and the consultant firm, Wilbur Smith Associates (WSA). Meeting attendees included the following persons:

Franklin Justice	Pikeville Mayor
Jerry Green	School Superintendent
Buddy Beeler	Pikeville School Board
Billy Rowe	Pikeville School Board
Donovan Blackburn	Pikeville City Manager
Gene Davis	Pikeville City Commissioner
Ronald Conn	Pikeville Fire Department, Fire Chief
Eddie Greenhill	Pikeville Fire Department, Fire Marshal
Bill Webb	Chloe Ridge Homeowners, President
James Hamilton	Resident
Gary Johnson	Resident
John Rasnick	Summit Building Owner
Jack Sykes	Summit Engineering, President
Michael Hill	Summit Engineering
Mark Westhill	Summit Engineering
Danl Hall	KYTC District 12
Keith Damron	KYTC District 12
Kevin Damron	KYTC District 12
John M. Johnson	KYTC District 12
Peggy Rasnick-Justice	KYTC District 12
Libby Carty	KYTC District 12
Diana Elswick	KYTC District 12
Willard Cuzzort	KYTC District 12
Charles Neeley	KYTC District 12
Jim Wilson	KYTC Central Office, Planning

Steve Ross

KYTC Central Office, Planning

Len Harper

Wilbur Smith Associates

Brad Johnson

Wilbur Smith Associates

Bill Gulick

Wilbur Smith Associates

A summary of the key components and discussion items for this meeting is provided below, following the agenda outline.

1. Welcome and Introduction

Keith Damron began the meeting, welcoming the participants. He talked about the fast pace nature of the project and stressed that it was a planning study, not a design project. Mr. Damron then had everyone in attendance introduce themselves.

2. & 3. Purpose

Bill Gulick briefly outlined the purpose of the project: to improve safety and reduce congestion along the Bypass Road. The purpose of this meeting was to get local input on the developed alternatives and input on any other concerns.

4. Project Description

To meet the purpose stated above, two fundamental goals must be met: (1) alleviate the rockfall impacts on Bypass Road and (2) improve traffic flow at the Bypass Road/Chloe Creek Road Intersection and Bypass Road/Summit Drive Intersection. It was originally thought, that by addressing either one of these goals you would inherently have to address the other. Further analysis has shown that this is not necessarily the case. You could, and probably should meet the outlined purpose and subsequent goals with two independent solutions.

5. Proposed Rockfall Alternatives

The existing rock cut is from the 1950's. The rockfall area of concern is along KY 1426 between Combs Avenue and the cut area immediately north of Dorsie's Restaurant. History and maintenance reports show that rockfalls are common along this stretch of KY 1426, but rockfalls with "large" rocks are not so common. Maintenance routinely visits the project site to clean up rockfall debris.

Mr. Gulick discussed the three rockfall alternatives developed by WSA:

1. Alternative A: Benching

- Total Cost = \$7.96 million
 - Construction Cost = \$7.40 million.
 - Right of Way Cost = \$0.02 million.
 - Utility Cost = \$0.54 million.
- Would require approximately 10.1 acres of right-of-way acquisition and a more in depth environmental review process, which could require a longer timeline for the project.

- Would not require moving KY 1426, but probably would require it to be closed during periods of construction.
 - Would require approximately 550,000 cubic yards of excavation.
 - The rock benches for this method would not daylight out until the top of the mountain.
2. Alternative B: Barrier
- Total Cost = \$1.25 million
 - Construction Cost = \$1.20 million.
 - Right of Way Cost = \$0.00 million.
 - Utility Cost = \$0.05 million.
 - This method would not require right of way acquisition or movement of KY 1426.
 - Maintenance would have limited space to maneuver when cleaning up rock debris behind the fence. This is estimated to be approximately 11 feet.
3. Alternative C: Drape
- Total Cost = \$2.06 million
 - Construction Cost = \$2.00 million.
 - Right of Way Cost = \$0.01 million.
 - Utility Cost = \$0.05 million.
 - Would require approximately 3.3 acres of right-of-way acquisition and a more in depth environmental review process, which could require a longer timeline for the project.
 - Would not require moving KY 1426.
 - Would require clearing and grubbing of the mountain side where the drape is to be placed.
 - There is potential for cost creep due to the uncertainties related to right-of-way acquisition, clearing and grubbing, installation, and varying tie down points above the top of the Rockwall.

There was a discussion as to what the validity and repercussions were to realigning KY 1426. The following question was raised: can KY 1426 be realigned far enough away from the Rockwall so any future rockfalls would not land on the roadway itself? Field review and maintenance reports show that KY 1426 would need to be offset a minimum of 60 feet to prevent rockfall debris from bouncing or falling onto the roadway. This would require major realignment of the roadway, major utility relocations, modifying or removing one bridge structure, filling and mitigating the adjacent stream, and right-of-way acquisitions that would include the relocation of several businesses. With these facts, the project team decided this was not a viable alternative.

Additional questions and discussion items:

- Q: How much consideration was given to the rockfall area south of Dorsie's Restaurant, in front of the cemetery?
A: Geotechnical experts examined the Rockwall along the bypass between Summit Drive and where KY 1426 and KY 1460 split. It was

determined that the primary area of concern was between Combs Avenue and the area where Dorsie's restaurant sits.

- Q: How tall will the barrier need to be in Alternative B?
A: 19 feet.
- Q: What is the distance between the edge of the driving lane and the barrier in Alternative B?
A: 3 feet.
- Q: How will the 3 feet effect driver safety?
A: History shows that this could potentially increase fender binders but should reduce the potential for fatal accidents.
- Q: What about the safety of the maintenance workers clearing rock debris between the Rockwall and the barrier in Alternative B?
A: Maintenance workers currently have to clear rock debris from this location so there is not an increased risk from that stand point. Although they are barricaded between the Rockwall and the barrier, they are also protected from Bypass traffic.
- Q: What about the maintenance costs of Alternative A, B and C?
A: Maintenance costs have only been looked at from a comparison standpoint. The major maintenance cost is that associated with the removal of rockfall debris. This debris must currently be removed when a rockfall occurs. The given Alternatives canalize the rock but still require maintenance to remove it, only now it can be done on a periodic basis rather than an emergency basis.
- Q: Will the drape in Alternative C work with large rockfalls?
A: Yes.
- Q: Are the performance of all the Alternatives the same?
A: Functionally yes.
- Q: What about Aesthetics?
A: This was discussed, but not considered a controlling parameter during the Alternatives evaluation process.
- Q: Does the benching from Alternative A effect the cemetery?
A: It is possible. At this level of detail, this cannot be substantiated and would require further study.

6. Proposed Intersection Alternatives

The existing KY 1426/KY 1460 (Chloe Creek Road) and KY 1426/Summit Drive intersections each perform individually at a LOS C. The close proximity of the "T" shaped intersection at KY 1426 and KY 1460 and the full intersection at 1426 and Summit Drive cause the system as a whole to experience congestion along the corridor. There is also a high crash segment along KY 1426 between KY 1460 and Summit Drive.

Mr. Johnson discussed the seven intersection alternatives developed by WSA:

1. Alternative 1:

- Total Cost = \$7.73 million
 - Construction Cost = \$3.10 million.

- Right of Way Cost = \$2.91 million.
 - Utility Cost = \$1.72 million.
 - Combines the two existing intersections along KY 1426 into one.
 - Requires a large culvert (> 200 feet).
 - Requires a bridge for Summit Drive.
 - Requires 5.6 acres of right of way acquisition.
2. Alternative 2:
- Total Cost = \$6.63 million
 - Construction Cost = \$2.70 million.
 - Right of Way Cost = \$2.21 million.
 - Utility Cost = \$1.72 million.
 - Combines the two existing intersections along KY 1426 into one.
 - Requires a large culvert (>200 feet).
 - Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
 - Congested left turn for drivers turning onto KY 1460 from the School Access Road.
 - Requires 4.5 acres of right of way acquisition.
3. Alternative 3:
- Total Cost = \$6.18 million
 - Construction Cost = \$1.90 million.
 - Right of Way Cost = \$2.56 million.
 - Utility Cost = \$1.72 million.
 - Creates two “T” intersections along KY 1426.
 - Congested left turn for drivers turning onto KY 1460 from Summit Drive.
 - Requires 4.6 acres of right of way acquisition.
4. Alternative 4:
- Total Cost = \$7.46 million
 - Construction Cost = \$2.10 million.
 - Right of Way Cost = \$3.64 million.
 - Utility Cost = \$1.72 million.
 - Creates two “T” intersections along KY 1426.
 - Limited internal storage between the two “T” intersections (KY 1426 & Huffman and KY 1426 & KY 1460) generates poor operations when compared to the other alternatives.
 - Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
 - Congested left turn for drivers turning onto KY 1460 from the School Access Road.
 - Requires 4.5 acres of right of way acquisition.
5. Alternative 5:
- Total Cost = \$7.71 million

- Construction Cost = \$2.00 million.
 - Right of Way Cost = \$3.99 million.
 - Utility Cost = \$1.72 million.
 - Creates two “T” intersections along KY 1426.
 - Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
 - Congested left turn for drivers turning onto KY 1460 from the School Access Road.
 - Requires 4.4 acres of right of way acquisition.
6. Alternative 6:
- Total Cost = \$5.33 million
 - Construction Cost = \$1.50 million.
 - Right of Way Cost = \$2.11 million.
 - Utility Cost = \$1.72 million.
 - Creates two “T” intersections along KY 1426.
 - Widens KY 1460 but preserves its alignment.
 - Requires a 40 to 60 foot radius and 16 percent grade on Summit Drive.
 - Congested left turn for drivers turning onto KY 1460 from the School Access Road.
 - Requires 3.9 acres of right of way acquisition.
7. Alternative 7:
- Total Cost = \$4.16 million
 - Construction Cost = \$0.95 million.
 - Right of Way Cost = \$1.49 million.
 - Utility Cost = \$1.72 million.
 - Keeps Summit Drive at same location.
 - Realigns the School Access Road to connect to KY 1460.
 - Widens KY 1460 but preserves its alignment.
 - Congested left turn for drivers turning onto KY 1460 from the School Access Road.

Mr. Johnson then discussed the traffic operational concerns for each alternative. He noted that network delay, delay per vehicle, and number of stops were analyzed as a comparison tool. Alternative 4 was the only alternative that didn’t show improvement over the existing condition during both the AM and PM peak periods. The inefficiency of the signal phasing due to the close proximity of the two “T” intersections causes the system to fail more quickly than the other intersections.

A long school queue makes AM peak hour performance measures increase and skews alternative evaluations. The alternatives showed operating conditions degrading below existing conditions. This is because each alternative is routing the school traffic through an unsignalized intersection. In particular, left-turn movements at the School Access Road experience significant delay. Gains in system performance are offset by increased delay at the School Access Road.

One suggestion would be to consider a police officer controlling traffic during school peak. This improvement will be evaluated.

Based on the current design of Alternatives 3, 5, 6 and 7, vehicles would be able to queue up between intersections. Once volume exceeds the storage capacity between intersections, the timing of the intersections would need to be re-evaluated, most likely degrading the operations of the intersection at a quicker pace when compared to a combined intersection. The drawback to the combined intersection is the expandability of the intersection given its close proximity to the Rockwall, civic center, and former river bed.

All the Alternatives include a proposed left turn lane south of the Bypass Road/Huffman Avenue Intersection.

Mr. Johnson ended his presentation by showing the SimTraffic simulations of the alternatives.

Additional discussion items:

- Representatives from the Chloe Ridge development preferred Alternative 7. A longer drive, potential 4-way stop, and the drive to Pikeville Elementary were cited as reasons for not preferring other alternatives.
- The City Commissioner's office was in favor of Alternative 1.
- Representatives from the school board:
 - Concerned with sight distance for the drivers turning onto KY 1460 if the School Access Road is connected to it.
 - Concerned with the potential backup on KY 1460 if the School Access Road is connected to it.
 - Q: Do all the alternatives replace the existing queue storage on the School Access Road.
A: Yes.

7. Discussion by Project Team

This was discussed as part of agenda items 5 and 6.

8. Next Steps

Keith Damron reminded everyone that this was a planning study. He thanked everyone for coming and for the input they provided. Their input will be used in conjunction with the public input to help refine and narrow down the Alternatives. The official study should be finished in the early parts of 2008 but the goal is to have Alternatives and reliable cost estimate finalized by December for inclusion into the KYTC six year planning process. Keith Damron then thanked everyone for coming and invited everyone to stick around for the public meeting at 5 p.m. local time.

The meeting was adjourned around 4:00 p.m. local time.

**RESOLUTION SUPPORTING THE SELECTION BY THE PIKEVILLE CITY
COMMISSION FOR THE ALTERNITIVES TO THE CHLOE CREEK
INTERSECTION REALIGNMENT AND THE BY-PASS ROCK-FALL AND TO
ASK THE KENTUCKY TRANSPORTATION CABINET TO SUPPORT
THE CITY OF PIKEVILLE SELECTION**

WHEREAS, Kentucky Route 1426 is located in the City of Pikeville and is known and traveled as the Pikeville Bypass Road & Route 1460 is known and traveled as the Chloe Road.

WHEREAS, the City of Pikeville recognizes that Chloe Road and By-pass intersection carries over 11,000 cars through this intersection daily. The By-pass Road has several operational and safety concerns with major rock-falls. This creates a very dangerous situation for the over 240,000 people that consider the City of Pikeville their service area along with our school children who travel this route daily.

WHEREAS, the congestion in the duel intersections of Chloe Road and Huffman Ave compounded with the Pikeville Elementary School and Summit Hills traffic creates major congestion and safety issue which has resulted in numerous delays and accidents. Many times the school is forced to start late delaying educational requirements. This is a burden on our community which puts the safety and education needs of our children first.

WHEREAS, the Pikeville Fire Station that is the primary safety mechanism that provides fire and EMT services for the City of Pikeville is located at the corner of Chloe – By-pass intersection. At times response to calls are delayed due to having to maneuver through the major congestion of this intersection.

WHEREAS, for the reasons mention above and after many meetings, debates and considerations the Mayor and City Commissioners endorses **Alternative 1** of KY 1426 Intersection realignment. Furthermore the Mayor and City Commissioners also endorse **Alternative B** of the KY 1426 Rock-fall alternative. The commission feels the alternatives they have selected would be the most economical and reasonable ways to address the issues that exist.

NOW, THEREFORE, BE IT RESOLVED the City of Pikeville fully endorses the Alternatives they have selected, outlined and attached to this resolution and asks the Kentucky Department of Transportation to support this request of the Commission.

Passed this 12th day of November, 2007.

Commissioner James Carter moved for the adoption of the foregoing resolution.

Commissioner Barry Chaney seconded the motion.

Upon roll call, the votes were as follows:

	<u>YES</u>	<u>NO</u>
FRANK JUSTICE, II MAYOR	<u>/</u>	<u> </u>
GENE DAVIS, COMMISSIONER	<u>/</u>	<u> </u>
DALLAS LAYNE, COMMISSIONER	<u>/</u>	<u> </u>
JIMMY CARTER, COMMISSIONER	<u>/</u>	<u> </u>
BARRY CHANEY, COMMISSIONER	<u>/</u>	<u> </u>

The Mayor declared the within resolution adopted.



FRANK JUSTICE, II MAYOR

ATTESTED:



KAREN HARRIS, CITY CLERK

SUMMARY
Public Involvement Meeting

Bypass Road (KY 1426) Transportation Study
Pikeville, Kentucky

Pikeville Fire Department
November 8, 2007 from 5:00-7:00 PM Eastern Time

A public involvement open house meeting was held on Thursday, November 8, 2007, from 5:00 p.m. to 7:00 p.m. at the Pikeville Fire Department in Pikeville, Kentucky. The purpose of the meeting was to update the public on the status of the project, present the rockfall and intersection alternatives, and seek their feedback. The following Kentucky Transportation Cabinet (KYTC) and consultant staff were in attendance:

Libby Carty	KYTC, Highway District 12
Keith Damron	KYTC, Highway District 12
Kevin Damron	KYTC, Highway District 12
Diana Elswick	KYTC, Highway District 12
John M. Johnson	KYTC, Highway District 12
Steve Ross	KYTC, Central Office, Division of Planning
Jim Wilson	KYTC, Central Office, Division of Planning
Bill Gulick	Wilbur Smith Associates
Brad Johnson	Wilbur Smith Associates
Len Harper	Wilbur Smith Associates

The format of this meeting was informal from 5:00 P.M. to 7:00 P.M. Eastern Time. Upon arrival, attendees were greeted at the door and asked to sign the attendance list. At this station, attendees were given a study information sheet with a study area map and description of the project. They were also provided a survey questionnaire.

The meeting room was arranged with a series of maps showing the proposed three (3) rockfall alternatives, proposed seven (7) intersection alternatives and two (2) summary boards that compared the rockfall and intersection alternatives. In addition there was a station displaying traffic simulations of the seven intersection alternatives and a station where all of the material could be viewed on a PowerPoint presentation, which looped continuously throughout the meeting. KYTC and consultant staff members were available throughout the room to answer questions and discuss issues.

A total of approximately 55 persons, including the project team, registered their attendance at the two-hour session. Questions and comments received during the meeting included the following:

- What are the impacts to the businesses along KY 1426 during construction of the rockfall alternatives? Most likely the barrier and drape alternatives will require one lane to be closed for one construction season. Access to businesses would be maintained. The benching alternative would take longer and may require additional lanes to be closed, particularly during blasting periods. Between the three alternatives, the barrier would result in the least amount of disturbance to the businesses along this portion of KY 1426.
- How effective will the rockfall catchment systems (drape and barrier) be? They are designed to hold back 90% or more of potential rockfalls.

- How were the outer edges of the rockfall area determined? History and maintenance reports were used to determine the length of the project area.
- Other comments received about the rockfall alternatives:
 - A few people believed the rockfall benches were more aesthetically appealing than the rockfall barrier and rockfall drape.
- Do any of the alternatives impact the cemetery? The rockfall benching alternative is the only alternative that could potentially impact the cemetery. Additional analysis is needed before a determination can be made. The intersection alternatives were designed to not impact the cemetery.
- Which intersection alternatives increase the driving time between the Chloe Ridge neighborhood and the Pikeville Medical Center? Alternative seven is the only alternative that does not modestly increase this distance.
- If the school traffic is redirected to KY 1460, what is the harm in leaving Summit Drive's access to KY 1426? As the traffic demand increases you lose the ability to run these signals efficiently. This increases the overall delay to the system, particularly along the Bypass.
- Other comments received about the intersection alternatives:
 - Any intersection alternative that does not eliminate a signal on the Bypass was not thought to be an overall improvement.
 - Adding a northbound left turn lane on KY 1426 at the Huffman Avenue Intersection was thought to be a good idea no matter which alternative was selected.

The meeting displays will be available at the KYTC District offices and additional public comments may be submitted. The public meeting information and comments received will be included in the official meeting record.

The meeting closed at 7:00 p.m.

MINUTES

Third Project Team Meeting

KY 1426 Transportation Study Pike County

KYTC Central Office
Frankfort, Kentucky
January 30, 2008
12:30 PM

A project team meeting for the KY 1426 Transportation Study in Pike County was held at 12:30 p.m. (local time) on Wednesday, January 30, 2008, in Frankfort, Kentucky. The purpose of the meeting was to discuss the public input, the tier 2 analysis performed by WSA and possible study recommendations. Participants in the meeting included staff from the Kentucky Transportation Cabinet (KYTC) Central Office, the KYTC District 12 Office and the consultant firm Wilbur Smith Associates (WSA). Meeting attendees included the following persons:

Keith Damron	KYTC District 12, Planning
Kevin Damron	KYTC District 12, Preconstruction
Jim Wilson	KYTC Central Office, Planning
Brad Eldridge	KYTC Central Office, Highway Design
Steve Ross	KYTC Central Office, Planning
Bill Gulick	KYTC Central Office
Robert Brown	KYTC Traffic Operations
Brad Johnson	Wilbur Smith Associates
Len Harper	Wilbur Smith Associates

A summary of the key components and discussion items for this meeting is provided below. These minutes follow the agenda outline which is attached.

1. Welcome and Introduction

Keith Damron began the meeting, welcoming the participants and asking for formal introductions from all attendees. He noted that this would be the last project team meeting.

2. Purpose of the Meeting

The purpose of the meeting was to look at the results from the public meeting, discuss the additional analysis performed by WSA, and agree to a set of alternative recommendations.

3 & 4. Review of Rockfall & Intersection Alternatives

Mr. Johnson briefly discussed the Rockfall and Intersection Alternatives. Everyone from the project team was familiar with these Alternatives so not much discussion was warranted.

5. Public Meeting Survey Results

A stakeholders meeting was held at 2:00 pm Local Time on Thursday, November 8, 2007 at the Pikeville Fire Department in Pikeville, Kentucky. This meeting was followed by a public involvement open house from 5:00 p.m. to 7:00 p.m. at the Pikeville Fire Department in Pikeville, Kentucky. WSA gathered the comments and survey results from these meetings and presented this information to the group. The following is a summary of those results:

- The majority of people surveyed said KY 1426, KY 1460 and the School Road should be improved. They also felt the intersections of KY 1426 & KY 1460 and KY 1426 & Summit Drive should be improved.
- 8 out of 13 people felt Summit Drive should not be improved.
- When asked about the existing problems in the study area; the surveys revealed the rockfall as being the biggest concern. The surveys also showed congestion, narrow lanes and safety as being major concerns.
- Preferred alternatives:
 - When asked which intersection alternative they liked the best, Alternative 7 was the preferred alternative on 12 of the 19 surveys.
 - When asked which rockfall alternative they liked the best, Alternative A (Benching) was the preferred alternative on 10 of the 17 surveys. Alternative B (Barrier) was the preferred alternative on the other 7 surveys.
- The Mayor and City Commissioners endorsed Alternative 1 as the preferred alternative to improve the intersections in question and Alternative B as the preferred alternative to fix the rockfall in question. The commission felt the alternatives they selected would be the most economical and reasonable way to address the issues that exist.

It should be noted that the public involvement open house was heavily attended by an organized group from the Chloe Ridge Development Home Owners Association. The Chloe Ridge Development sits at the top of Summit Drive.

6. Tier 2 Evaluation

The Tier 2 Evaluation focused on the intersection alternatives, specifically looking at additional crash and operations analysis. The crash analysis was reviewed, specifically at the high crash segment along KY 1426 at and between the KY 1460 and Summit Drive intersections. WSA found that 21 of the 27 accidents in this segment involved two or more vehicles and resulted in a variety of crash types. Of these accidents, 18 occurred during dry conditions. This suggests that reducing the number of stops and reducing conflict points has the potential to improve crash occurrences at this location.

WSA evaluated the proposed left turn lane on KY 1426 at the Huffman Avenue intersection and presented the findings. They found that the left turn lane gave the study area a 5 to 6 percent reduction in system delay. If the proposed intersection alternatives were completely constructed, you achieve an additional 5 to 10 percent reduction in system delay. This leads to the conclusion that the intersection alternatives get about a third to a half of their derived operational benefit from the \$200,000 to \$300,000 left turn lane. This turn lane would also have the potential to reduce crashes shown to occur at this intersection. It was suggested that WSA look at a way to quantify the crash reduction potential of adding a left turn lane.

Additional operations analysis was also conducted on the AM traffic volumes. When these AM volumes were initially looked at, the traffic simulation models showed the overall operations performance getting worse for the majority of the alternatives. A deeper look at the school traffic showed that the majority of the school traffic does not use KY 1460, but instead come from KY 1426 and Huffman Avenue. If the School Access Road is realigned to "T" with KY 1460, a good portion of that traffic is now being forced to use KY 1460. When you combine this school traffic with the KY 1460 morning rush hour traffic there is a negative effect on the overall traffic operations of the study area. WSA evaluated the intersection with a signal to simulate a traffic cop at the intersection, but this provided little system benefit.

7. Study Recommendations

After careful consideration of all the parameters, public input, analysis and project issues, the Project Team recommended Alternative B as the preferred rockfall alternative. While constructing the barrier it is recommended that a northbound left turn lane be added to KY 1426 at the Huffman Avenue intersection. Adding this turn lane would also require some additional overlay and restriping.

Due to the current state budgetary concerns, the Project Team has decided not to recommend an intersection alternative at this time, but instead would recommend Alternatives 1 and 7 be evaluated in more detail at a future date as funding becomes more readily available. At which time special consideration should be given to the school traffic and its direct impact on traffic operations within the study area.

8. Project Priorities

Correction of the rockfall was identified as the top priority. As previously stated, the Project Team recommends Alternative B. In order to eliminate the possibility of multiple disruptions to KY 1426, the proposed northbound left turn lane could be added to KY 1426 at the Huffman Avenue intersection at the same time as the rockfall alternative is constructed. Otherwise it would be considered the second project priority.

As traffic increases and at which time funding becomes available Alternatives 1 and 7 should be evaluated further.

9. Potential Issues

Two additional questions were asked concerning the crash analysis. What is the quantitative safety benefit of the left turn lane on KY 1426? What time of day are the accidents occurring along the high crash segment and what can be inferred from this?

WSA will take a deeper look at these questions and include the findings in the report.

10. Group Discussion

Most of the group discussion occurred as each topic was presented. No additional discussion was warranted.

11. Next Steps

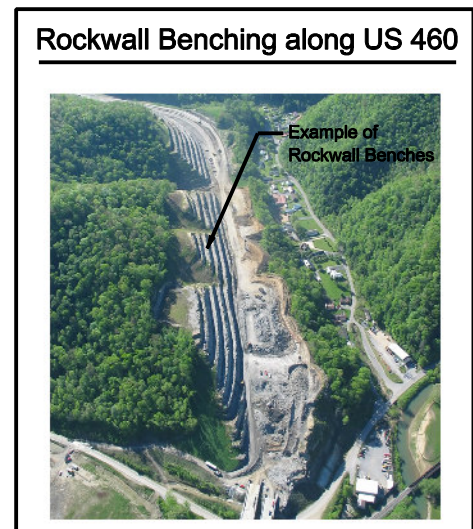
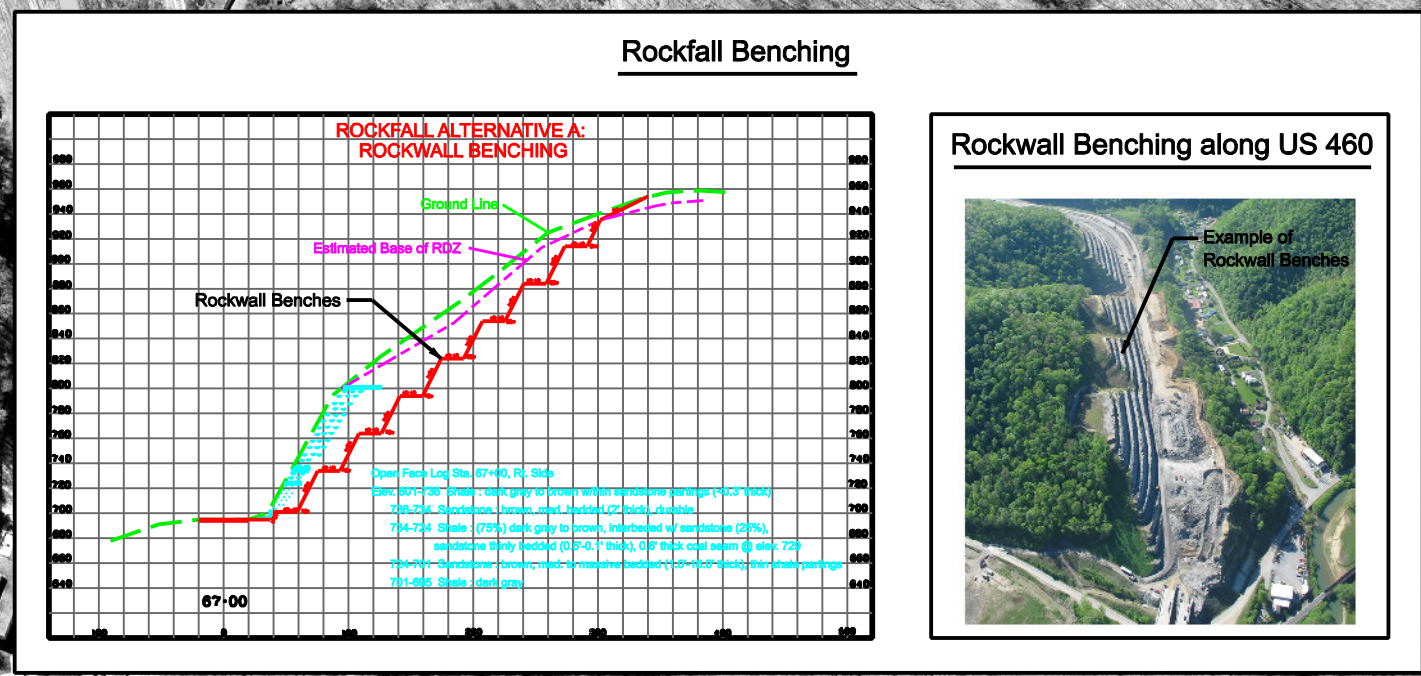
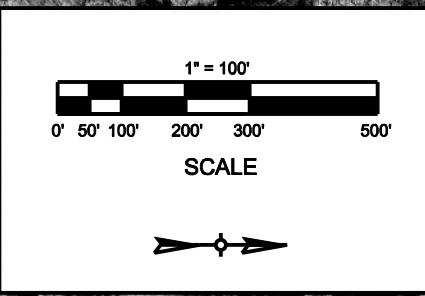
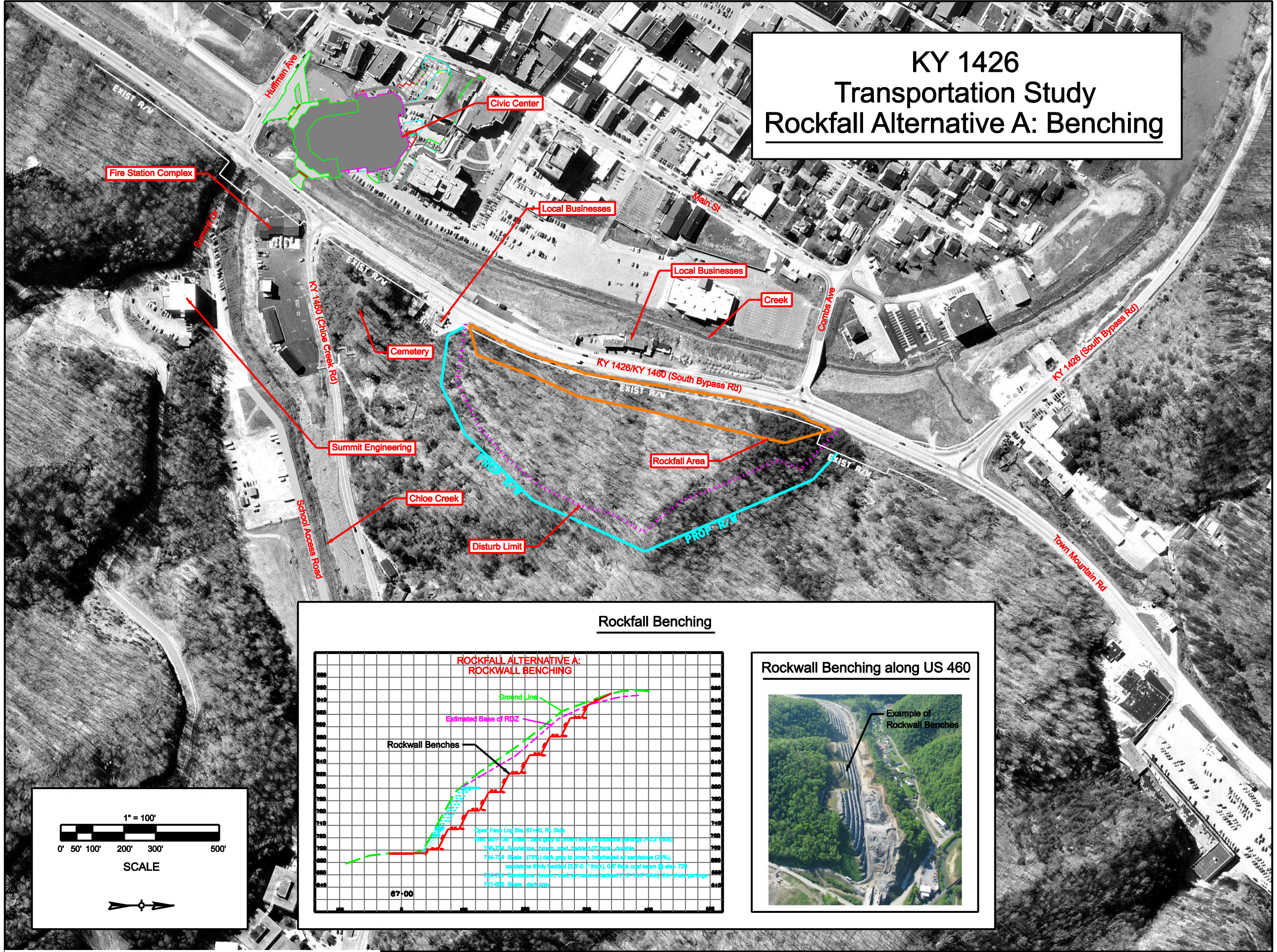
WSA will address the project teams concerns and continue writing the report. The Draft Report will be provided to the Project Team for review in February.

The meeting was adjourned around 2:30 p.m.

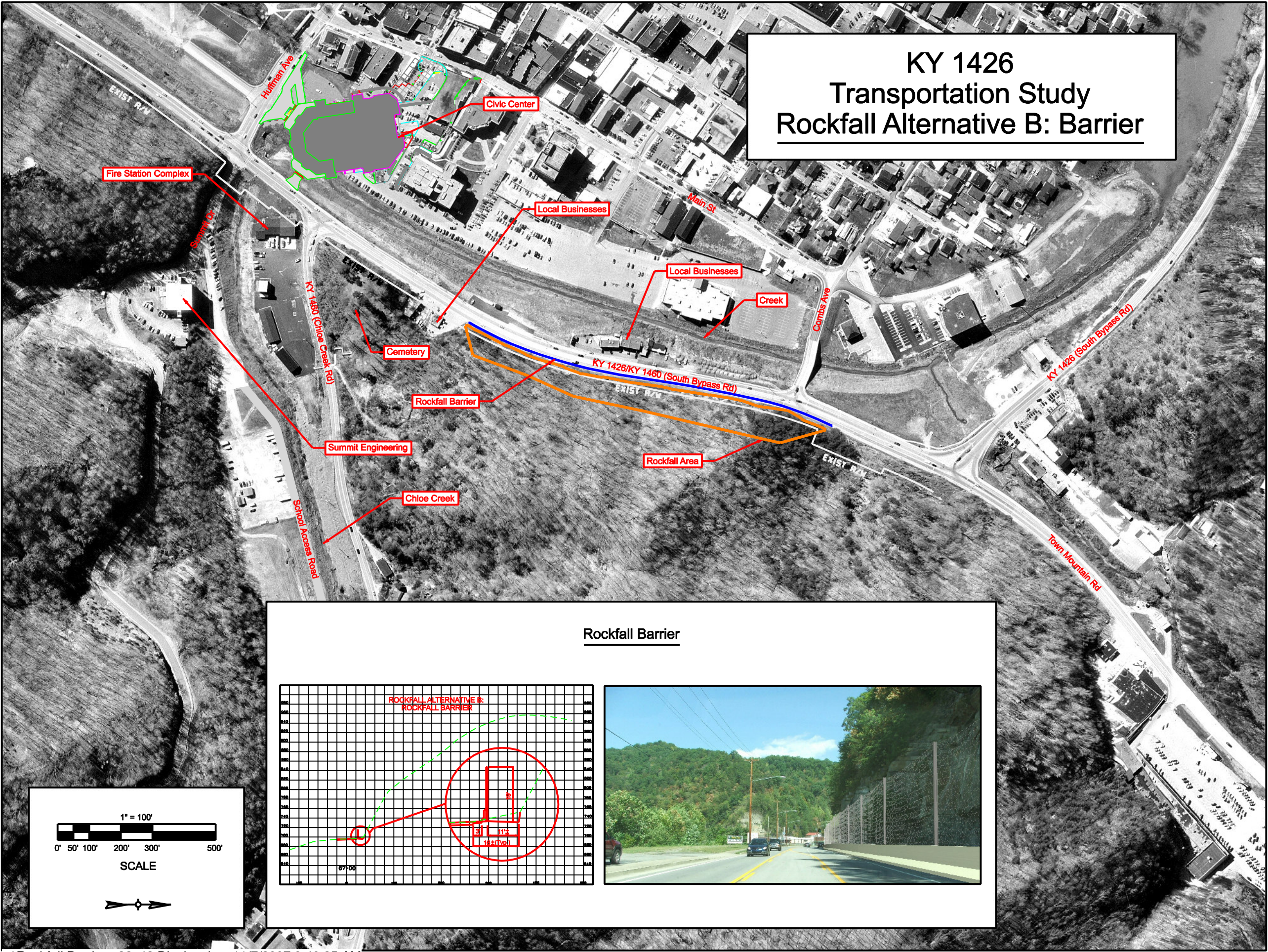
AGENDA
KYTC Project Team Meeting
KY 1426 Transportation Study
Pike County
KYTC Central Office
Frankfort, Kentucky
January 30, 2008
12:30 p.m.

- | | |
|--|---|
| 1. Welcome and Introductions | KYTC |
| 2. Purpose of Meeting | KYTC |
| 3. Review of Rockfall Alternatives | Wilbur Smith Associates |
| 4. Review of Intersection Alternatives | Wilbur Smith Associates |
| 5. Public Meeting Survey Results | Wilbur Smith Associates |
| 6. Tier 2 Evaluation | Wilbur Smith Associates |
| a. Crash Analysis | |
| b. Operations Analysis (incl. Left-Turn Only) | |
| 7. Study Recommendations | Wilbur Smith Associates |
| 8. Project Priorities | Wilbur Smith Associates |
| 9. Potential Issues | Wilbur Smith Associates |
| 10. Group Discussion | KYTC District 12/
Division of Planning |
| 11. Next Steps | KYTC/WSA |
| 12. Adjourn | KYTC |

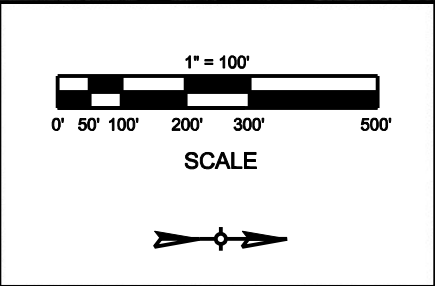
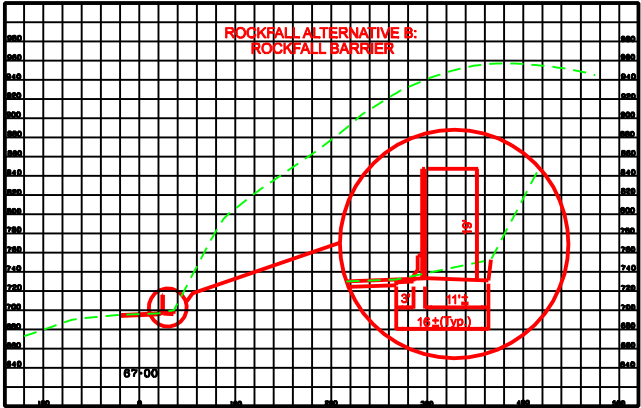
KY 1426 Transportation Study Rockfall Alternative A: Benching



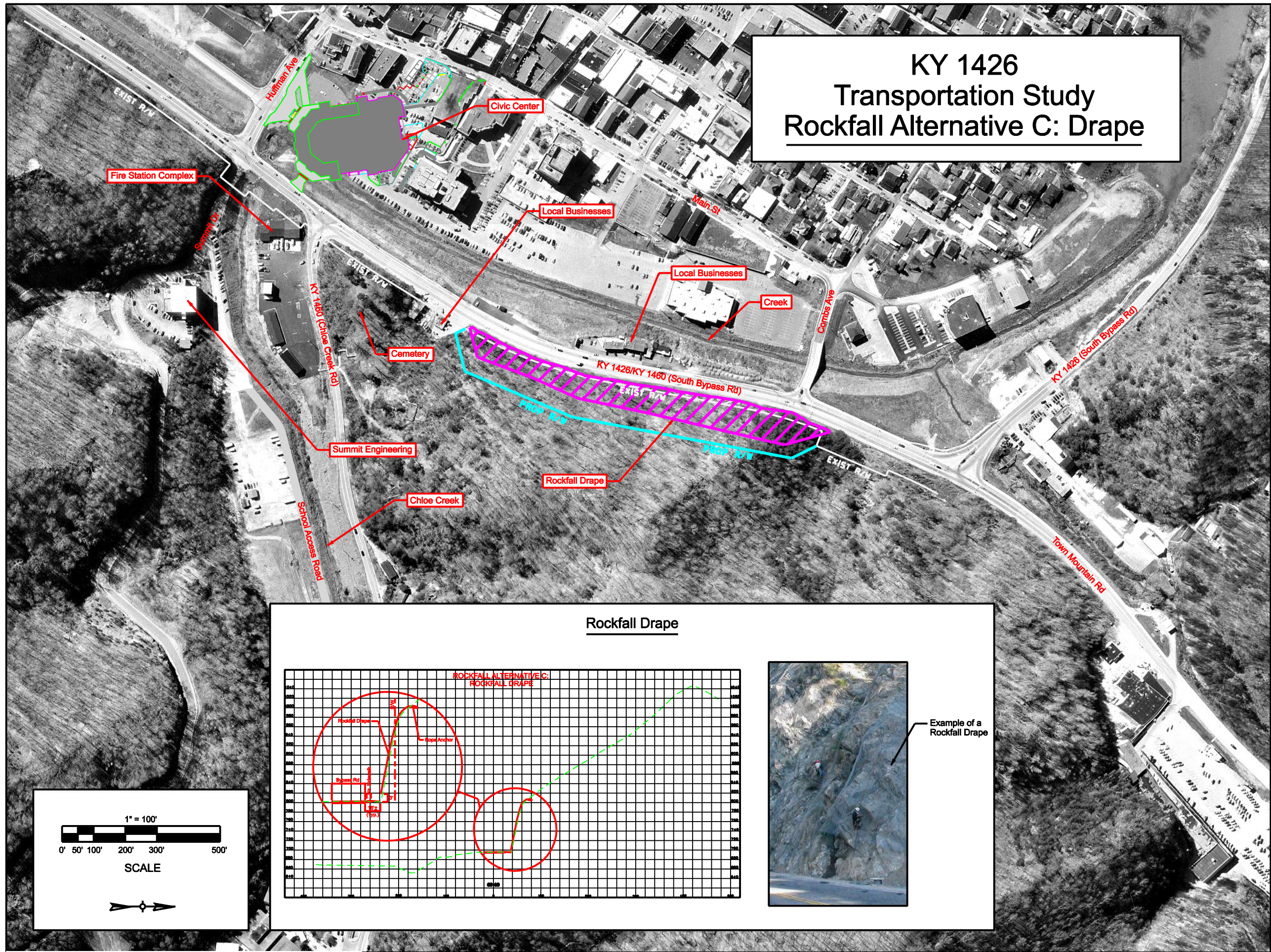
KY 1426
Transportation Study
Rockfall Alternative B: Barrier



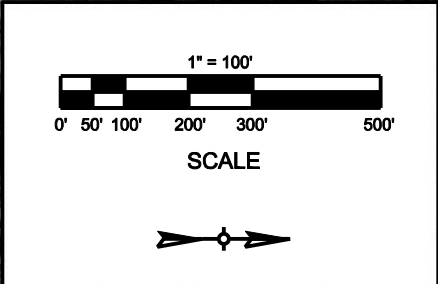
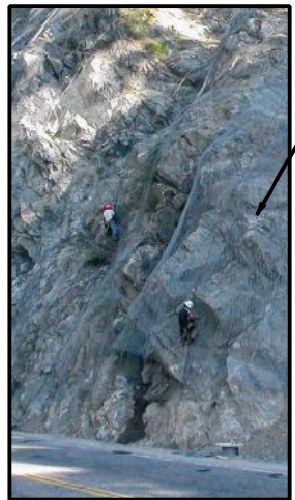
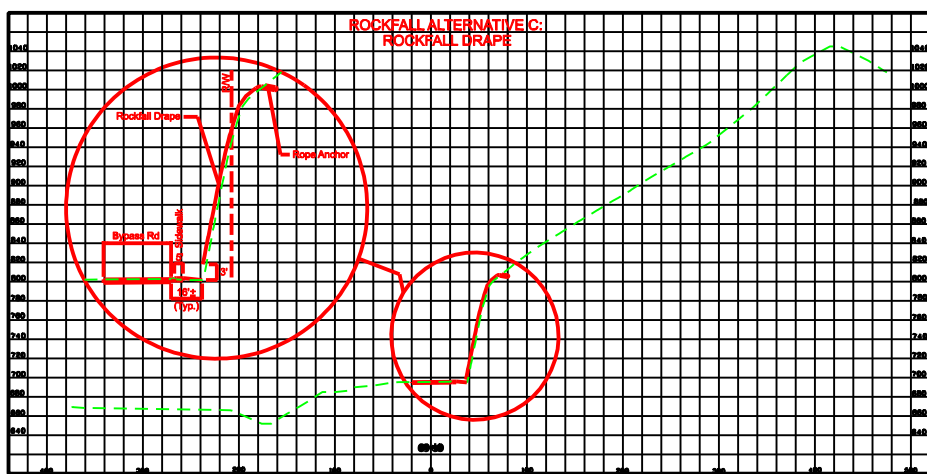
Rockfall Barrier

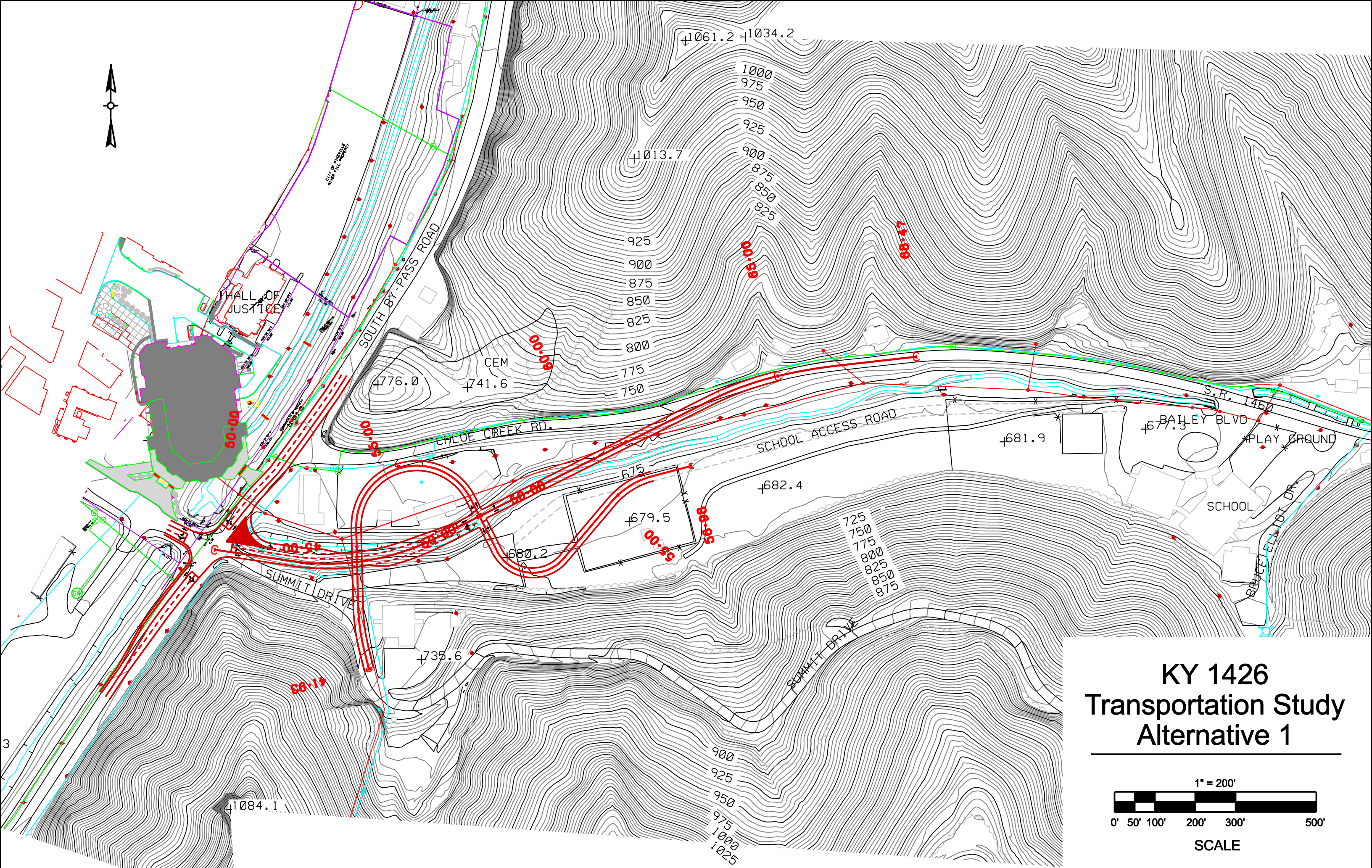


KY 1426
Transportation Study
Rockfall Alternative C: Drape

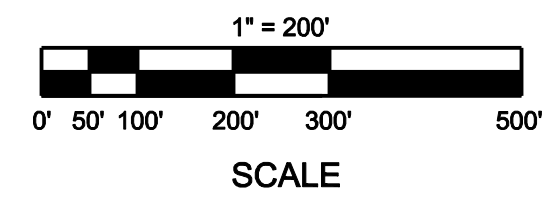


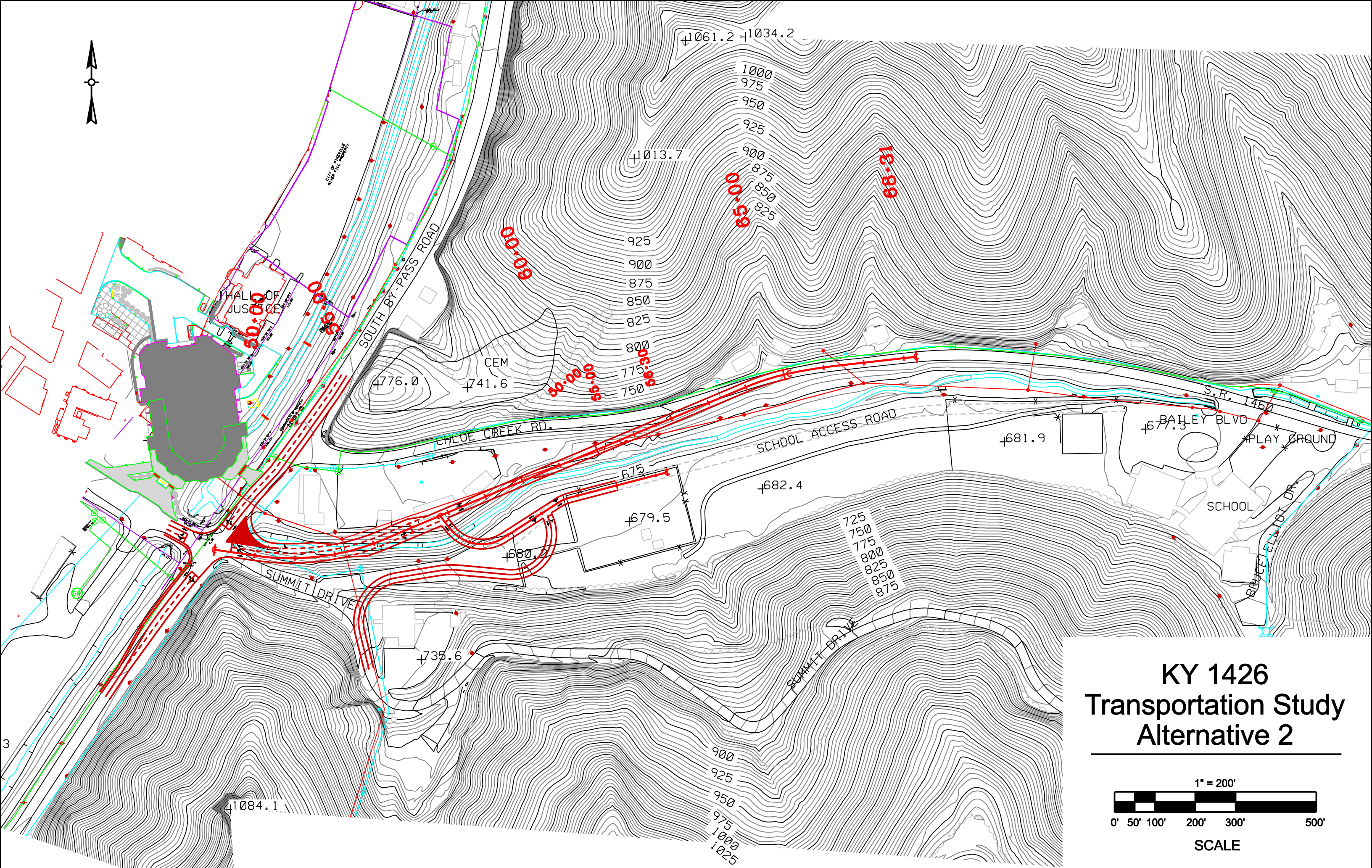
Rockfall Drape



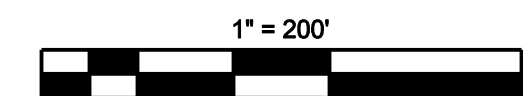


KY 1426 Transportation Study Alternative 1



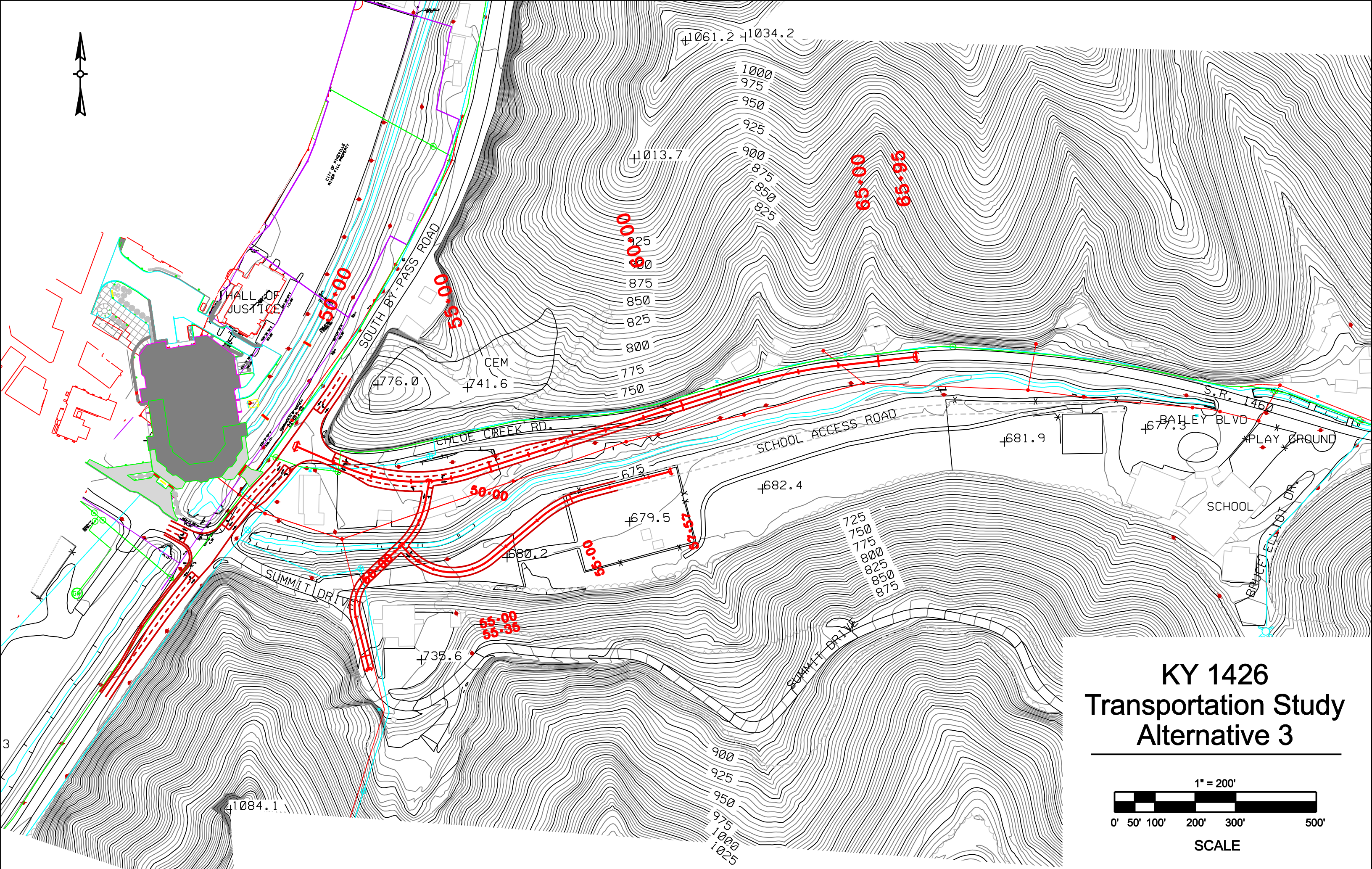


KY 1426 Transportation Study Alternative 2

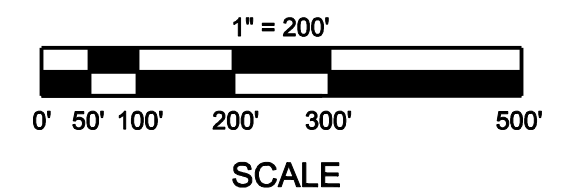


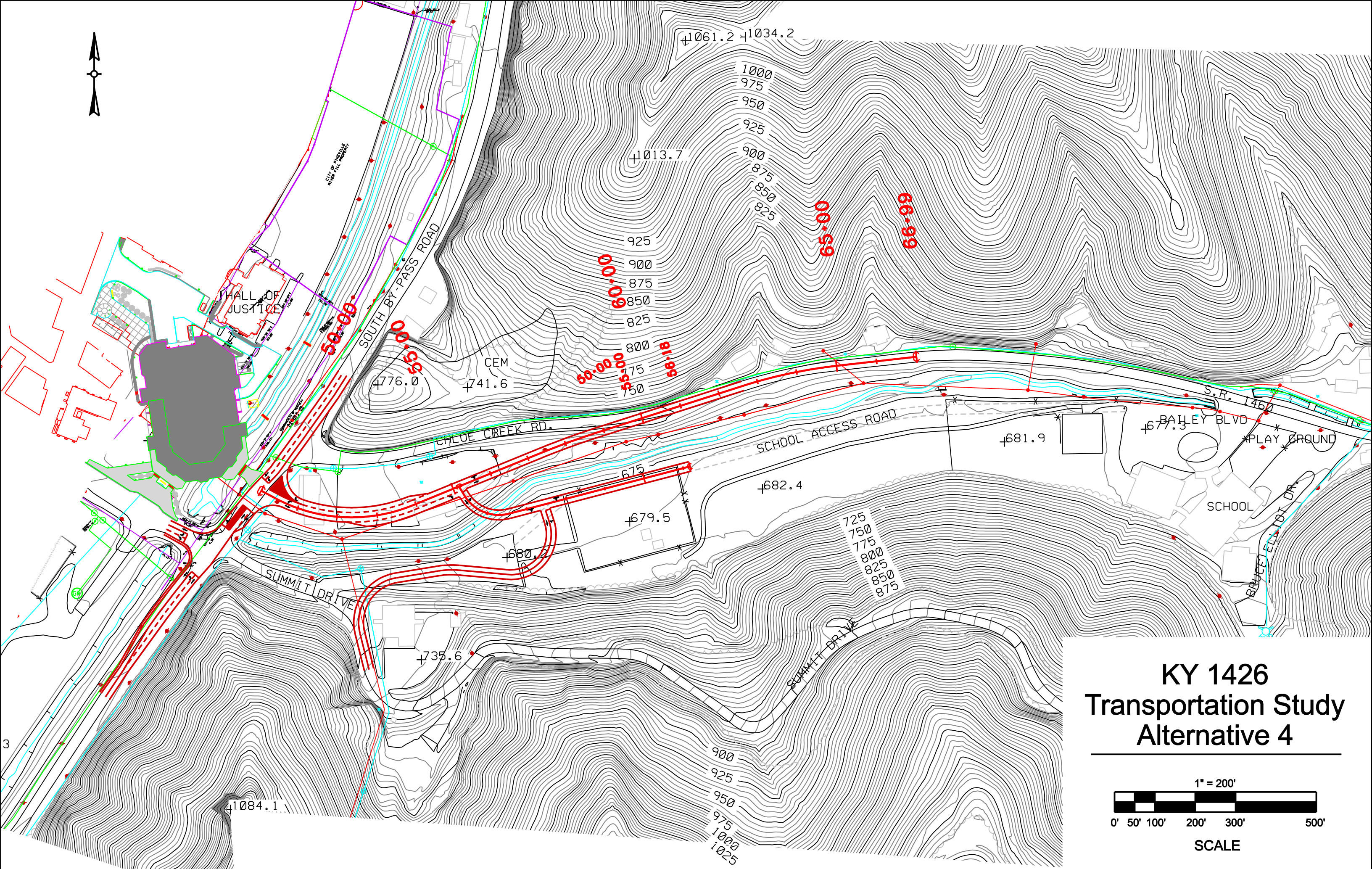
1" = 200'

SCALE

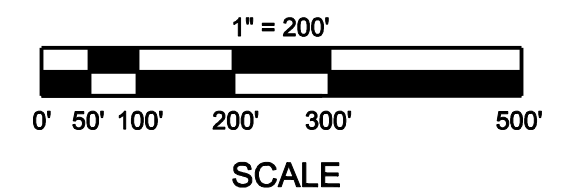


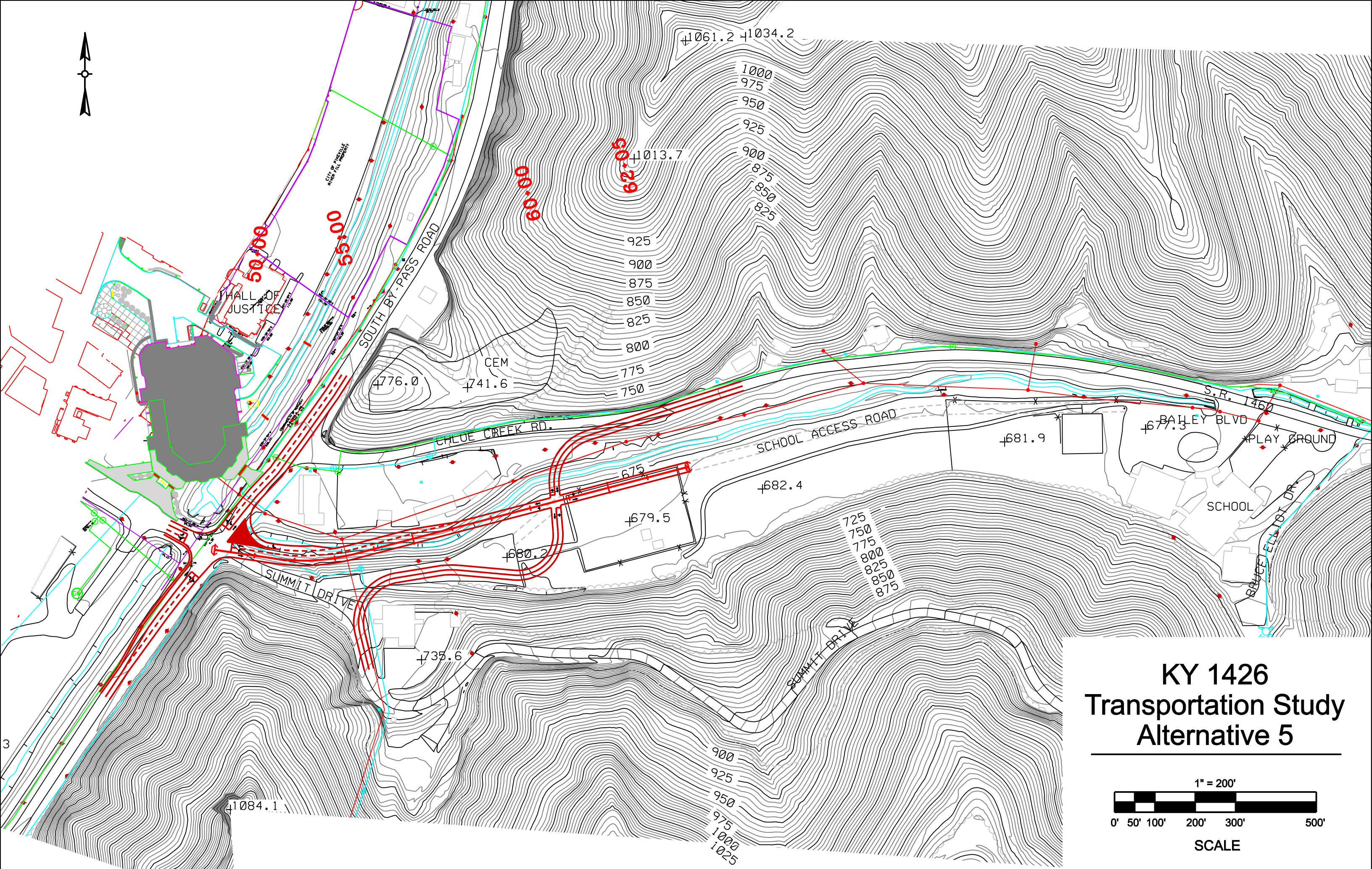
KY 1426 Transportation Study Alternative 3



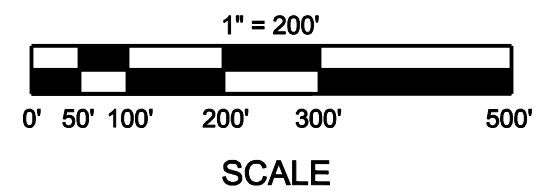


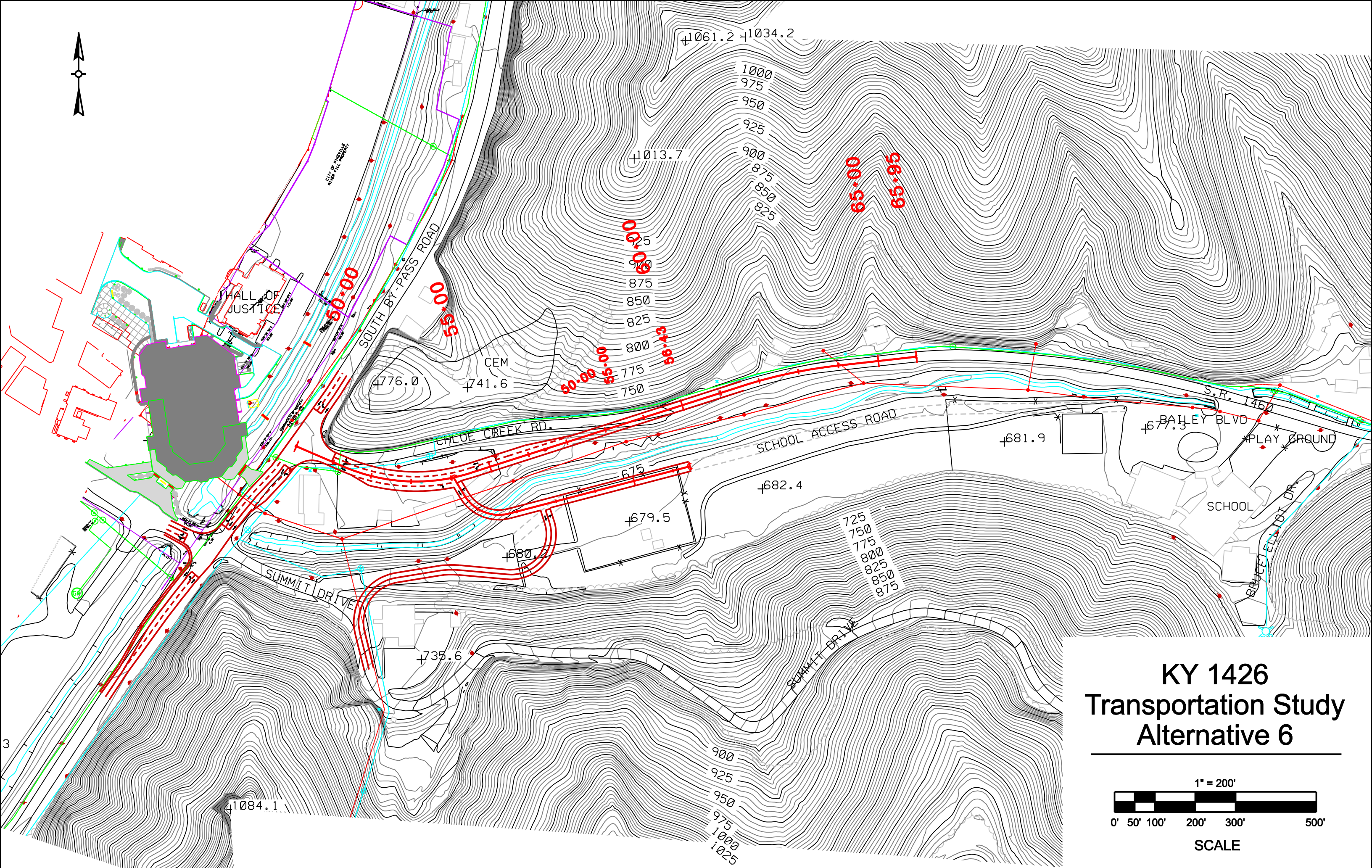
KY 1426 Transportation Study Alternative 4



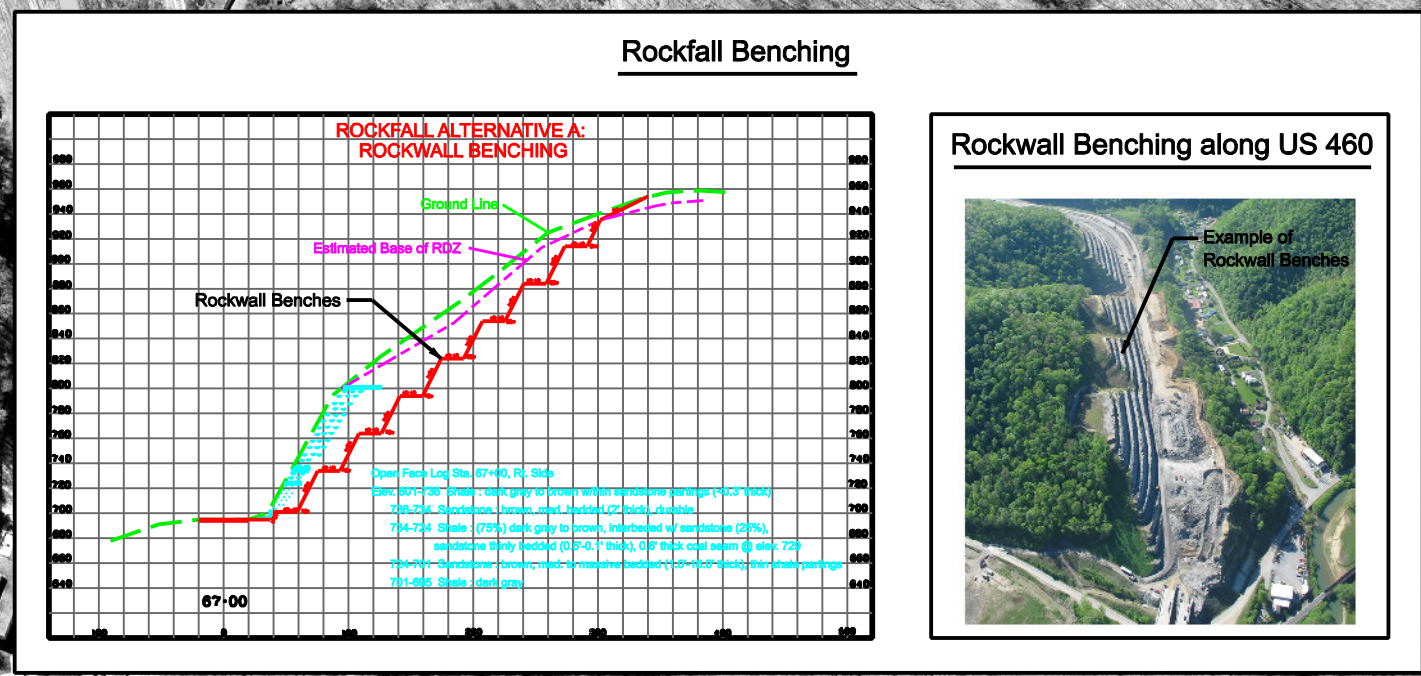
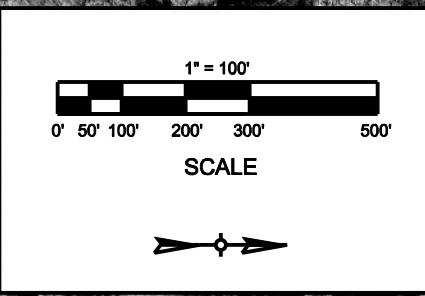
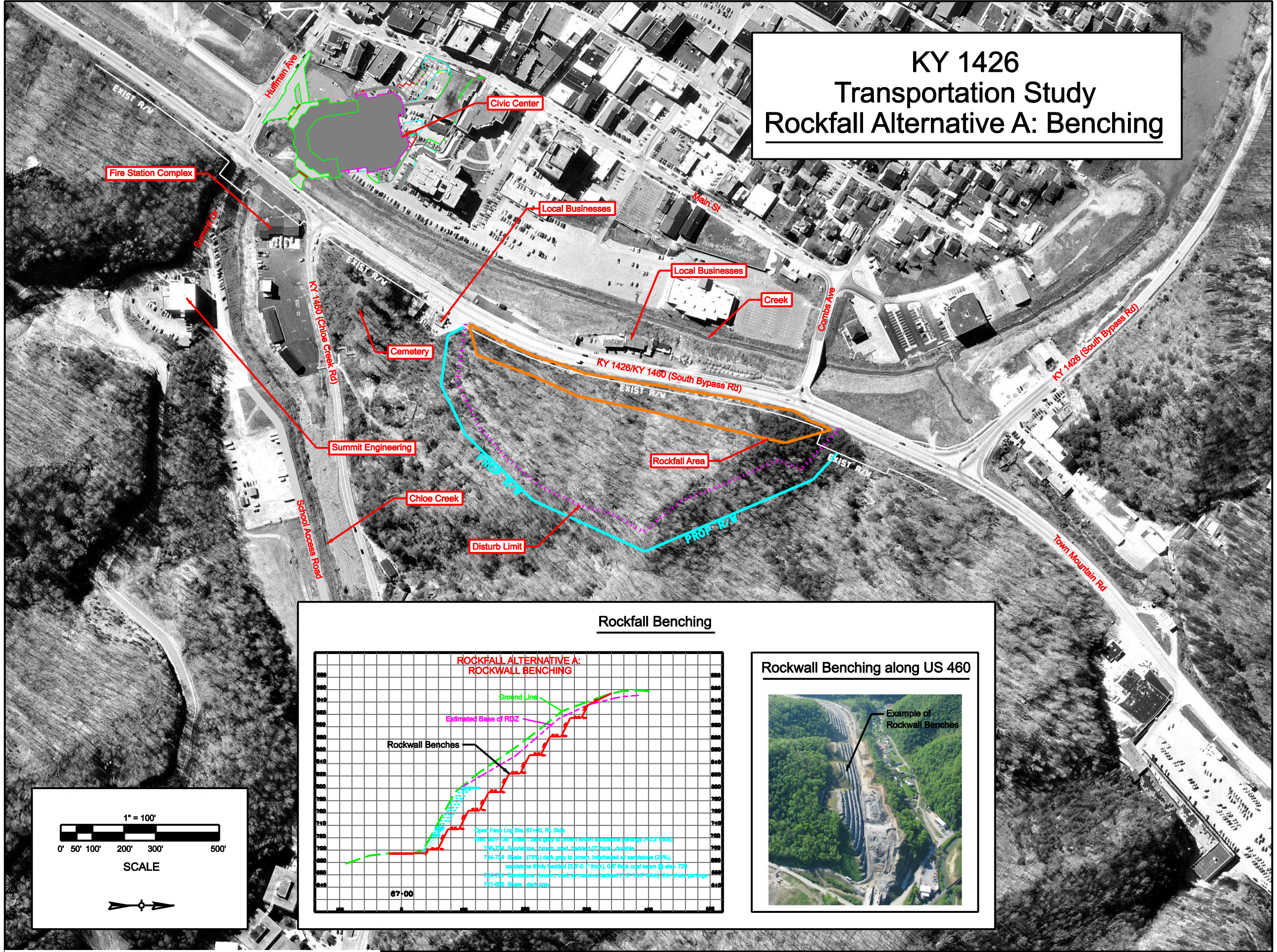


KY 1426 Transportation Study Alternative 5





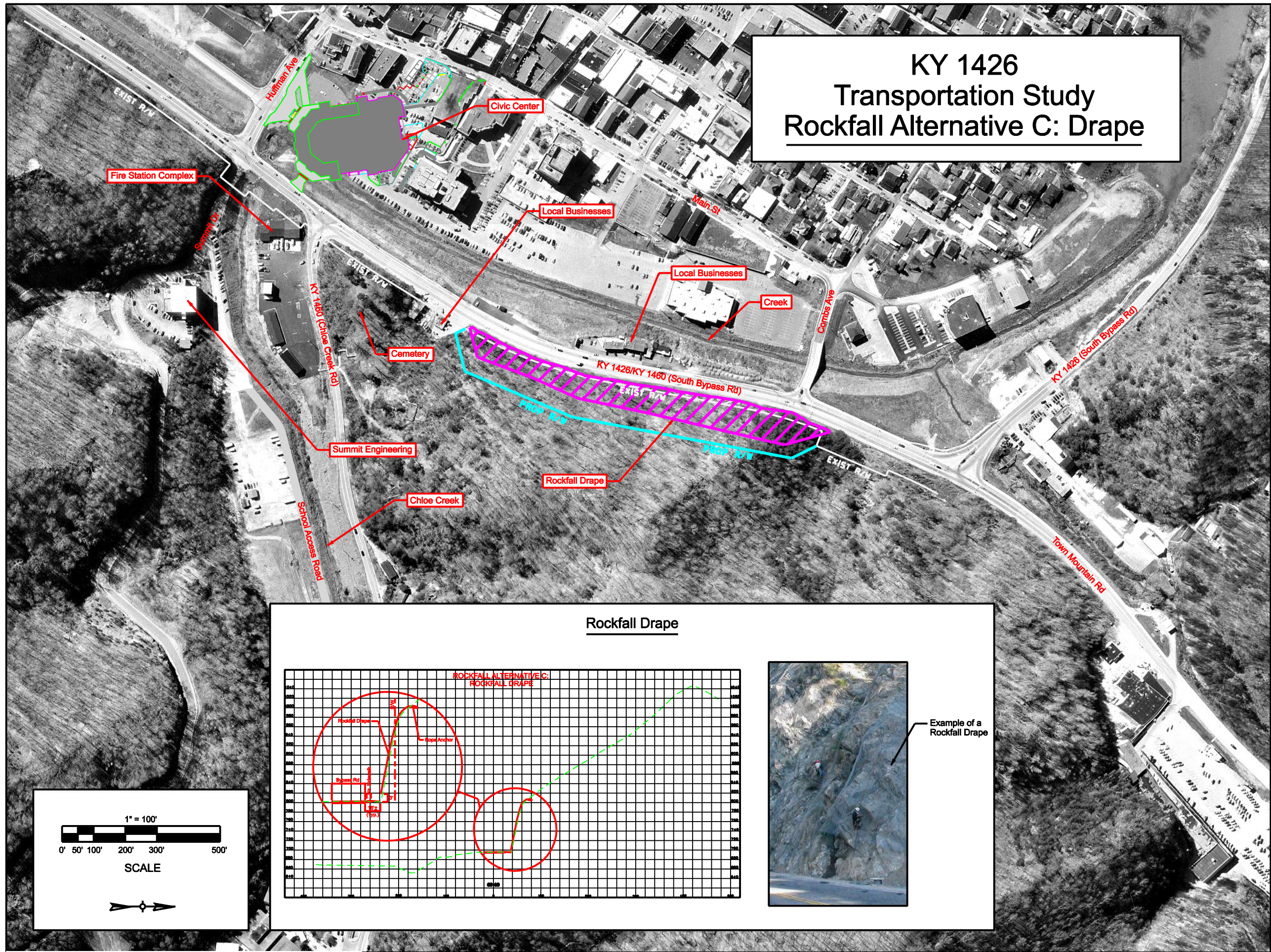
KY 1426
Transportation Study
Rockfall Alternative A: Benching



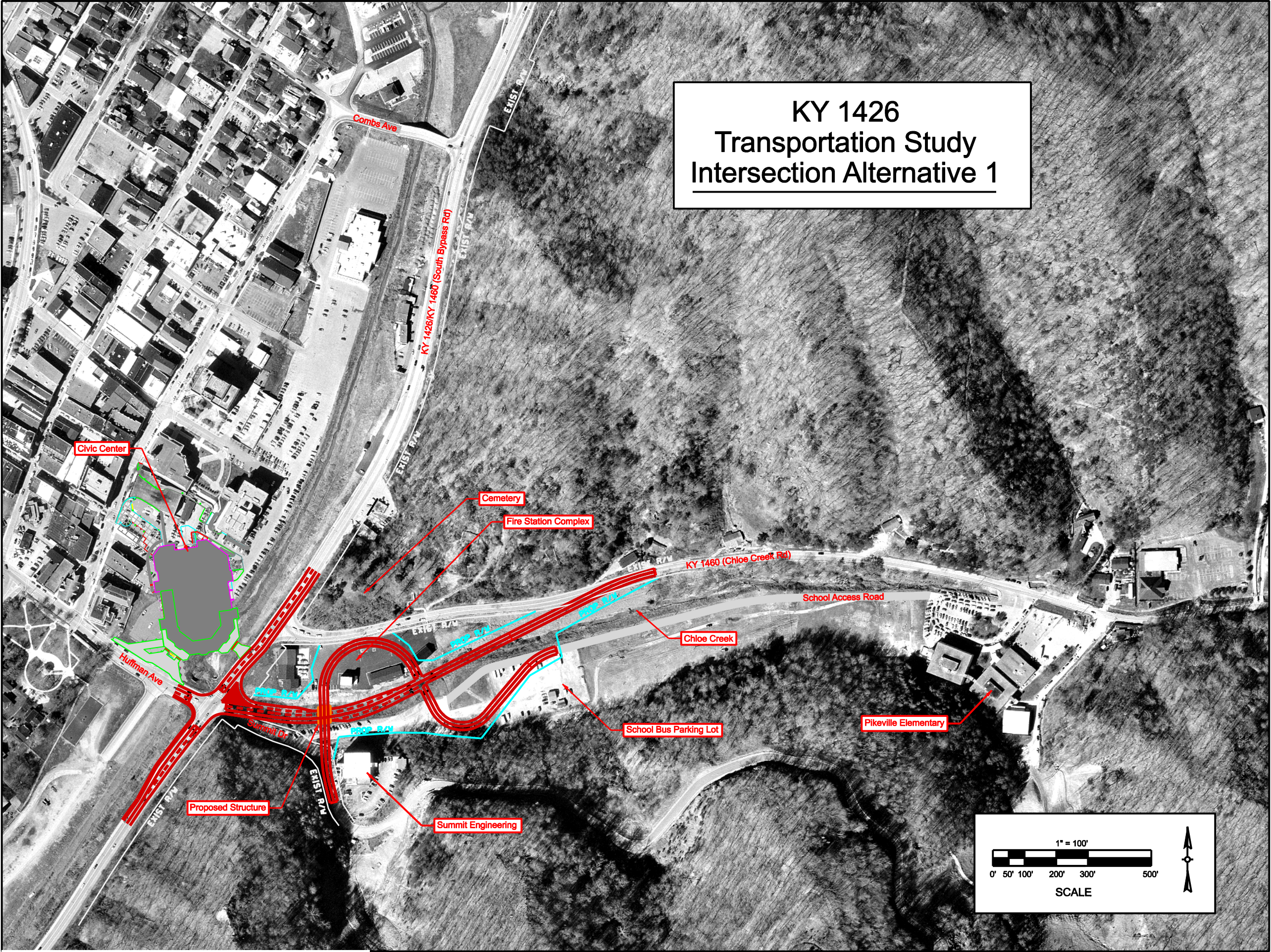
KY 1426 Transportation Study Rockfall Alternative B: Barrier



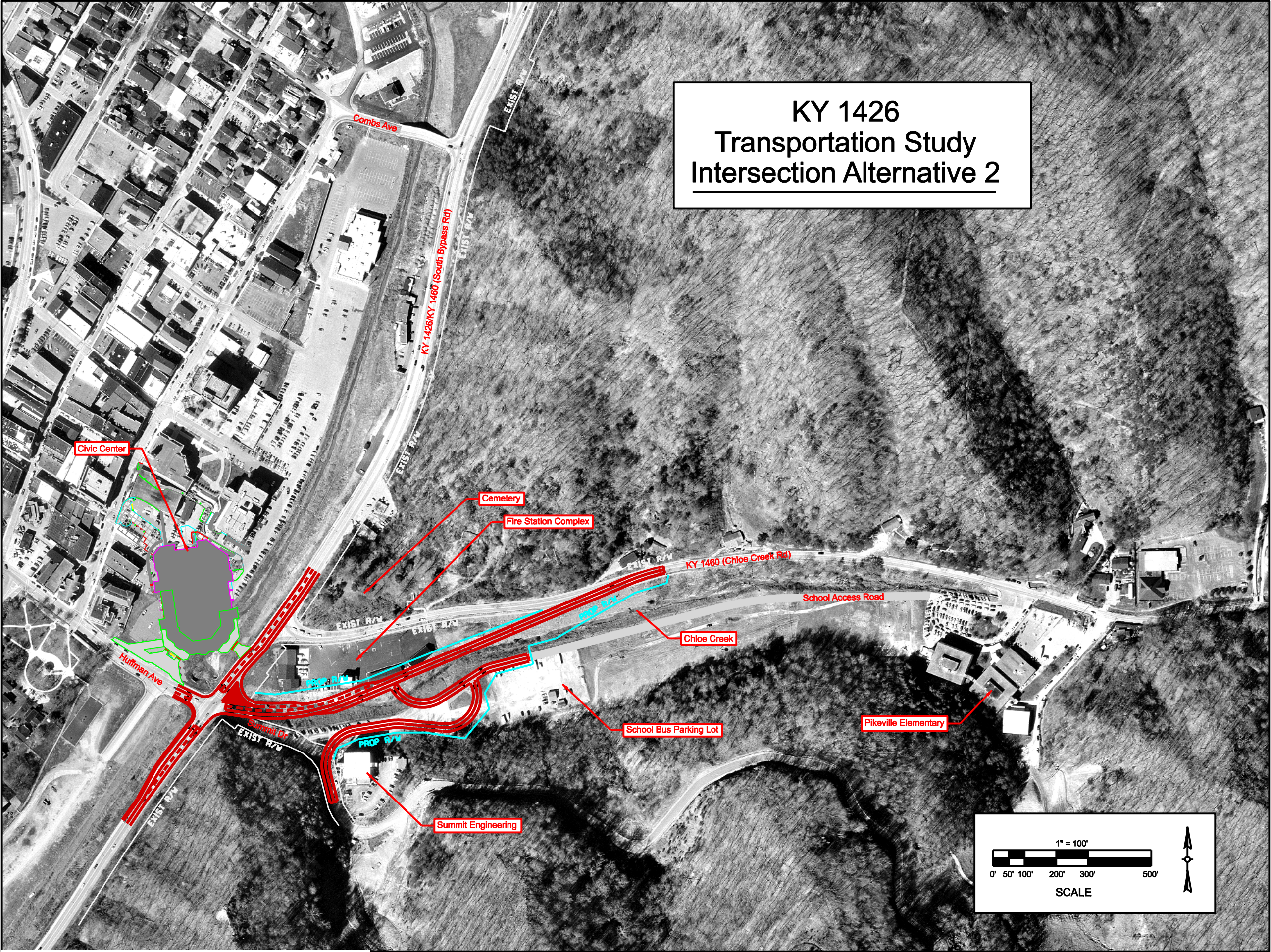
KY 1426 Transportation Study Rockfall Alternative C: Drape



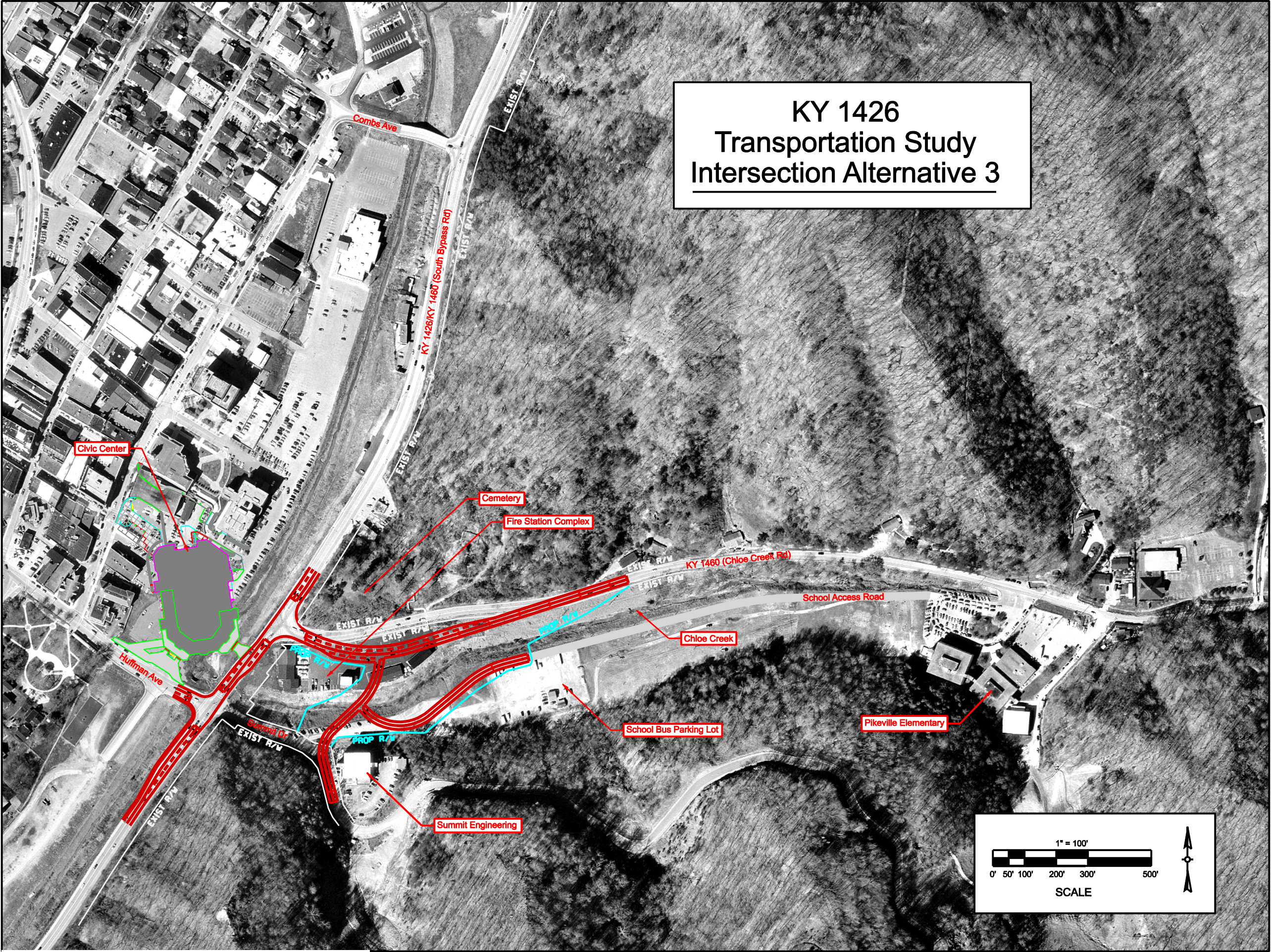
KY 1426
Transportation Study
Intersection Alternative 1



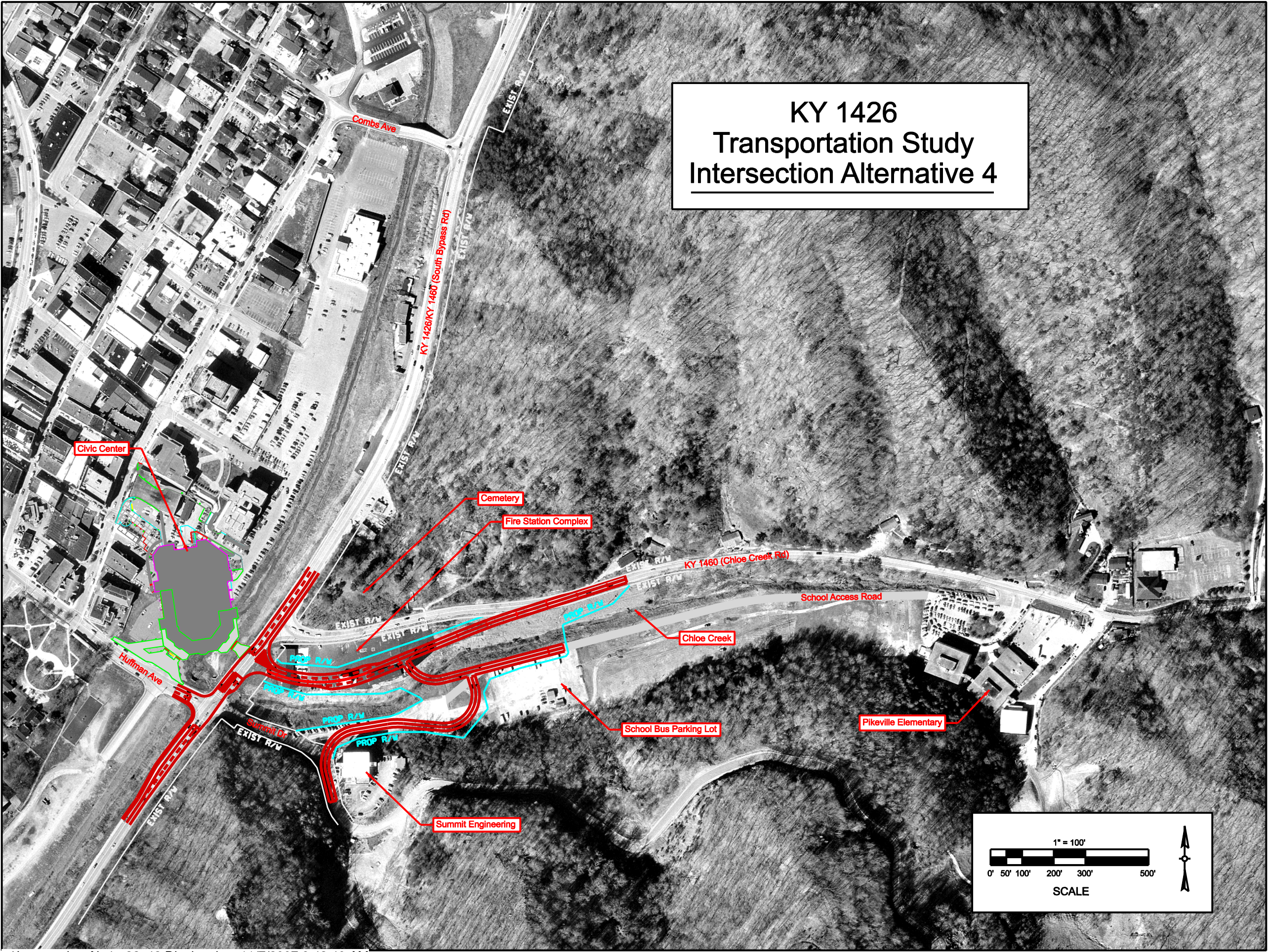
KY 1426
Transportation Study
Intersection Alternative 2



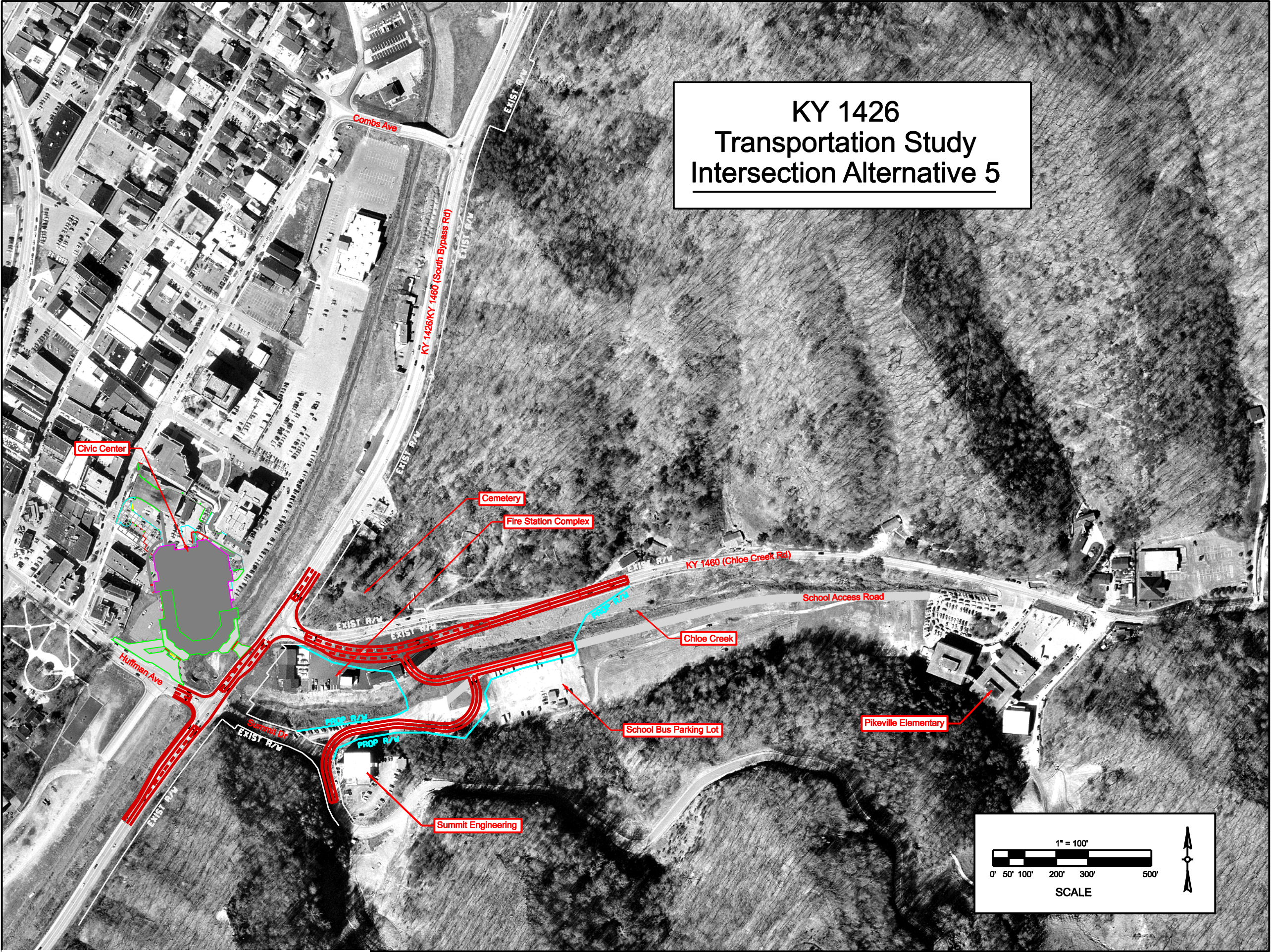
KY 1426
Transportation Study
Intersection Alternative 3



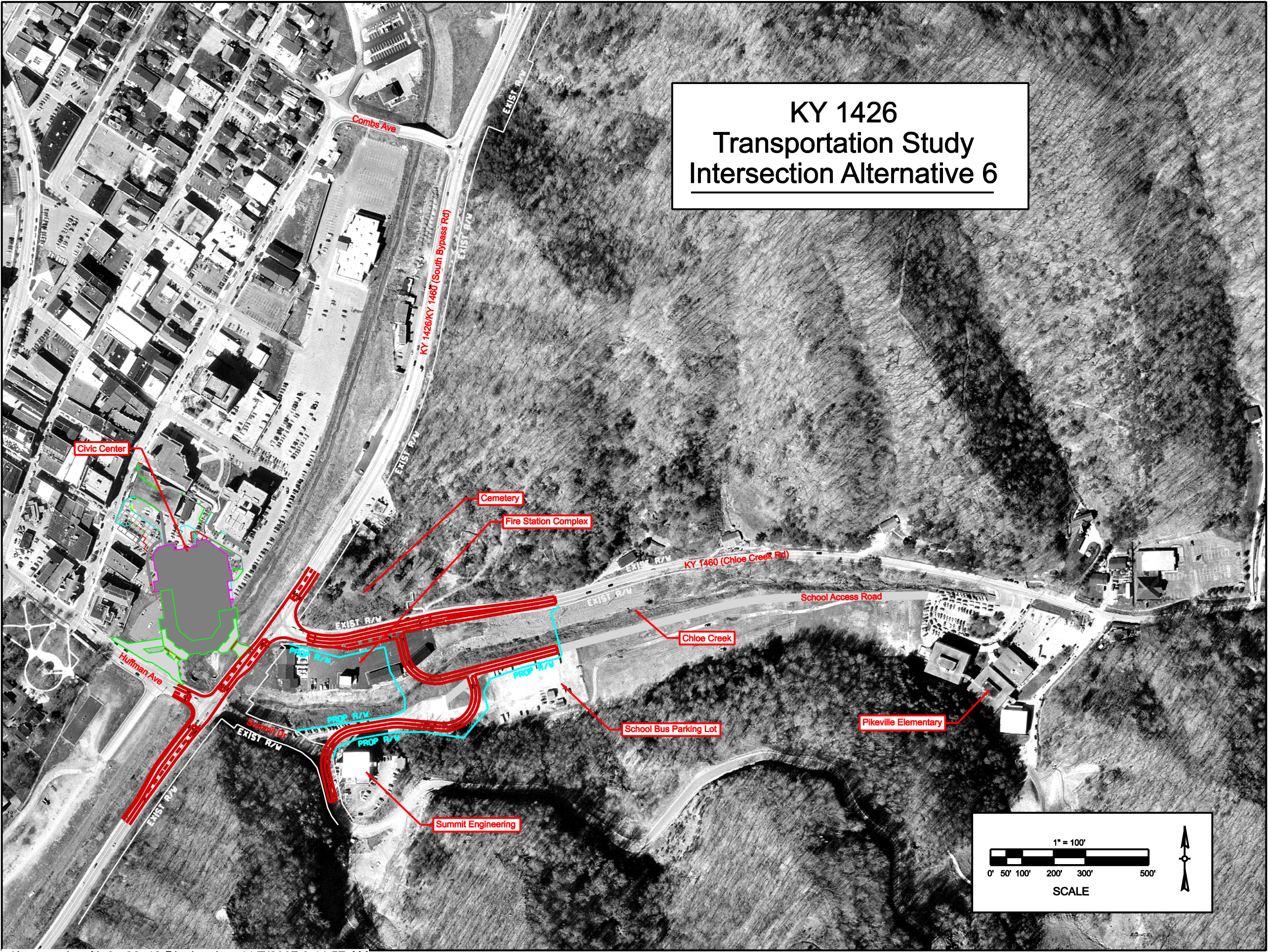
KY 1426
Transportation Study
Intersection Alternative 4



KY 1426
Transportation Study
Intersection Alternative 5



KY 1426
Transportation Study
Intersection Alternative 6



KY 1426
Transportation Study
Intersection Alternative 7

