Alpha
ARCHITECTS ENGINEERS

WEST VIRGINIA UNIVERSITY
MONONGALIA COUNTY, WEST VIRGINIA

FEASIBILITY STUDY
FOR
GRUMBEIN'S ISLAND

A.A.I. PROJECT NO. 1006077.00

OCTOBER, 2011

PREPARED FOR:

WEST VIRGINIA UNIVERSITY
Morgantown, West Virginia 26506

And

MORGANTOWN MONONGALIA
METROPOLITAN PLANNING ORGANIZATION
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Grumbein's Island Feasibility Study
Steering Committee Members:

West Virginia University:	Bob Merow Hugh Kierig
Morgantown Monongalia MPO:	Bill Austin
West Virginia Department of Highways:	Perry Keller Bryan Radabaugh Alanna Slack Rhonda Banks
City of Morgantown:	Terry Hough Don Spencer Damien Davis
Morgantown Pedestrian Safety Board:	Christiaan Abildso
WVU Student Government:	Nelson France
Alpha Associates, Incorporated:	Rick Colebank Chuck Branch Steve Buchanan Charlie Luttrell

Introduction

Grumbein's Island and the pedestrian crossing in front of the Mountainlair Plaza has long been a safety concern and congestion problem for University Avenue and the downtown campus. Heavy pedestrian volumes conflict with vehicular traffic to produce an unsafe, troublesome situation in the center of West Virginia University's downtown campus.

Grumbein's Island originally took shape in 1934, when the University saw the area as a traffic hazard and a concern for pedestrian safety. The island concept was proposed by John B. Grumbein during the Turner administration. Professor Grumbein was the department head of Steam, Gas and Experimental Engineering in 1929, and Superintendent of Building and Grounds from 1932 to 1945.

West Virginia University has asked Alpha Associates to study the situation and provide a feasibility study for potential solutions. As part of the process, Alpha has surveyed the site, provided alternative solutions and associated cost estimates.

Project Description

To facilitate the study, a steering committee was assembled which included: WVU Planning, WVU Parking, WVU Student Government, Alpha, The West Virginia Department of Transportation, The City of Morgantown, Morgantown MPO, Morgantown Pedestrian Board and the Morgantown Traffic Commission. The committee met to discuss and provide input to the feasibility study. As a result, the committee developed a Grumbein's Island Feasibility Study Problem Statement:

> *The Grumbein's Island Feasibility Study Steering Committee seeks to create an alternative configuration for the study corridor that improves the safety and security of users while minimizing the delay for all modes of transportation using the corridor. This should be accomplished by minimizing vehicular and pedestrian conflicts while creating the most desirable path for pedestrians to access their destination. The proposed configuration should be fiscally feasible and it should enhance the sustainability and utility of the corridor to the university community and the community at large.*

To manage the project, Alpha broke the project into five general tasks:

1. Survey/Existing Information Collection
2. Pedestrian/Traffic Data Collection
3. Identification of Potential Solutions
4. Analyzing Potential Solutions
5. Renderings

Survey/Existing Information Collection:
To collect the survey data, Alpha had the area mapped using aerial photography. From the flight data, a contour and topographic map was assembled to use as a base. In addition to the aerial mapping, Alpha performed additional ground surveys and utility investigations to determine finer details and utility locations.

For the utilities, Alpha collected data from West Virginia University, and the local utility providers to determine approximate locations. In addition, Alpha employed an independent utility locating firm to identify the exact location of existing subsurface utilities in the project area. These locations were marked on the ground then transferred to the base mapping by Alpha's surveyors. Alpha's surveyors also obtained exact elevation information at all tie-in locations, the finish floor elevation of surrounding buildings, and any other critical areas within the project limits.

The final base mapping information is provided in the appendix of this report.

Pedestrian/Traffic Data Collection:
To evaluate the pedestrian/vehicular interactions, it was necessary to accurately count the vehicles and pedestrians using the crossing. To do this, Alpha chose a representative day to tally the number of vehicles and the number of pedestrians passing through Grumbein's Island. The representative day chosen was Wednesday, March 2, 2011. It was a cool, clear

morning that turned unseasonably warm in the afternoon; a perfect day to maximize the number of pedestrians and vehicles.

Alpha chose to evaluate the vehicular counts at three locations; the intersection of University Avenue and Prospect Street; the intersection of University Avenue and College Avenue; and vehicles passing through Grumbein's Island. Pedestrian counts were done for people moving from E. Moore Hall toward the Mountainlair and people moving from the Mountainlair toward E. Moore Hall. Traffic volumes at the two intersections studied were counted in 15 minute intervals from 7:00 am to 9:00 am and 4:00 pm to 6:00 pm. Vehicles and pedestrians were counted at Grumbein's Island in 15 minute intervals from 10:00 am to 4:00 pm. This data is presented in the Results section of this report.

In addition to the pedestrian and vehicular counts, Alpha conducted origin/destination interviews with pedestrians and conducted traffic delay timings through the project area. These results are presented in the Results section of this report.

Identification of Potential Solutions

Once the information gathering was complete, Alpha began the work of identifying potential solutions. Several solutions were explored, each having pros and cons. It became apparent that it was necessary to separate pedestrian and vehicular traffic using a grade separation. Several options were investigated which lowered University Avenue, taking it below the plaza level. This configuration made it difficult to maintain the connection with College Avenue and the Service Road to Martin Hall. This solution was investigated in Alternatives 1 through 5. Alternative 6 explored the possibility of raising University Avenue above the level of the plaza and provided a walkway under the road to cross from the Mountainlair to E. Moore Hall. The final option explored, Alternative 7, was a "no build" option. Each of these options are presented and detailed later in this report.

Analyzing Potential Solutions

Each of the alternatives was analyzed, looking closely at pedestrian and vehicular safety, constructability, cost, and aesthetics to evaluate the overall potential of each possible solution. Once all the alternatives were analyzed and explored, two preferences became clear. Alternative 1 lowered University Avenue and extended the Mountainlair Plaza over the road. Alternative 6 raised University Avenue over the plaza. The pedestrian plaza would cross under University in a tunnel structure. Each of these two options was developed in more detail, and will be presented later in this report.

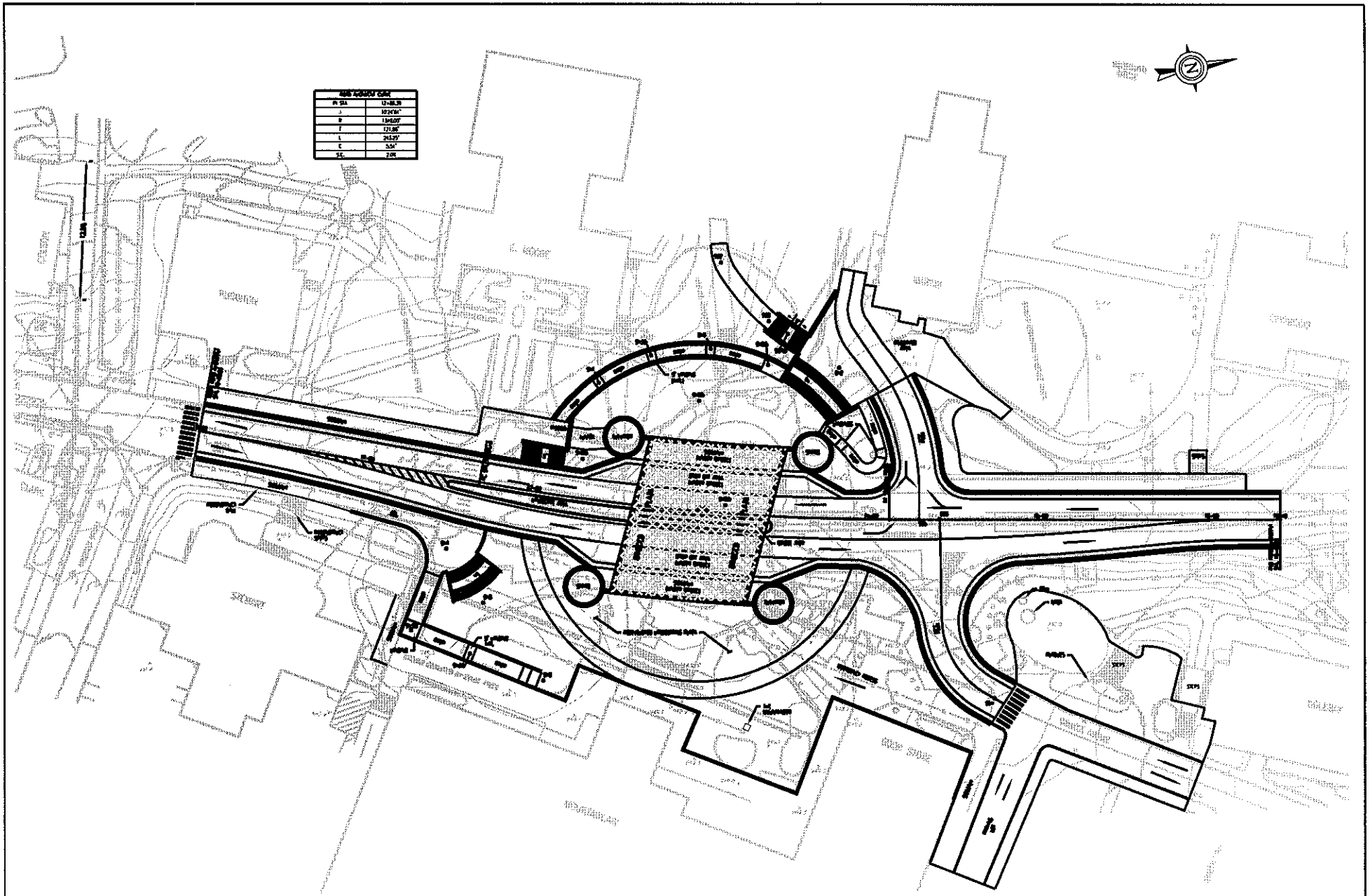
Renderings

After the two preferred options were selected, Alpha produced detailed, color renderings. The renderings are included in this report.

Evaluation Options

Alternative 1

Alternative 1 proposes to extend the threshold elevation of the Mountainlair across the plaza and lower University Avenue below the level of the new plaza. Vehicular traffic would remain below the plaza level and no pedestrian interaction would occur. The University Avenue relocation extends approximately 640 feet, beginning just north of Prospect Street and ending just before the service drive to Oglebay Hall. Because University is lowered, the connection to College Avenue and the service drive to Martin Hall is made steeper. The College Avenue connection is approximately 12% and the Martin Hall service drive is about 10%. Included in this alternative are stair and elevator towers to move pedestrians from the University Avenue drop-off areas below, to the Mountainlair plaza. A profile for University Avenue and a site plan for this option is included below.

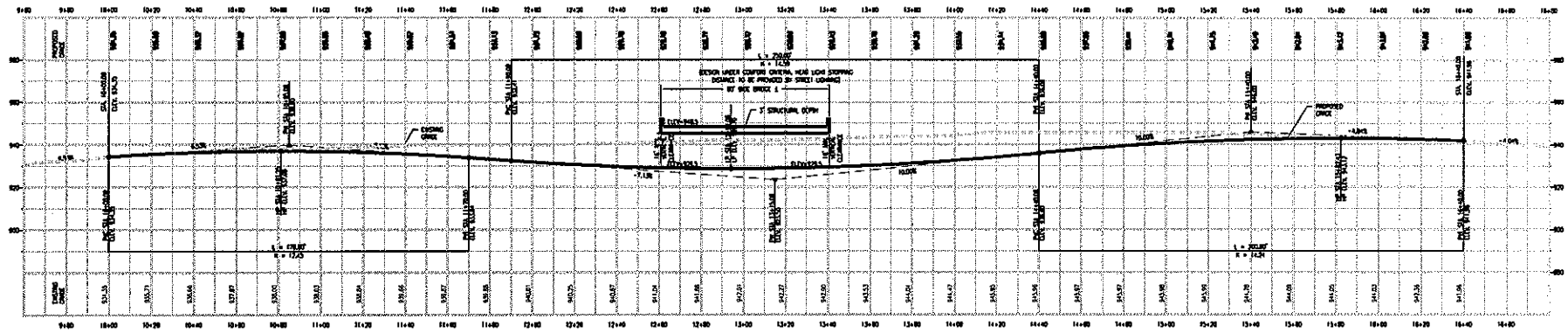


ALPHA ASSOCIATES, INCORPORATED
engineers · planners · surveyors

SCALE: 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 1 CONCEPTUAL PLAN



ROAD PROFILE STA: 10+00 TO STA: 16+40

DESIGN SPEED = 25 MPH

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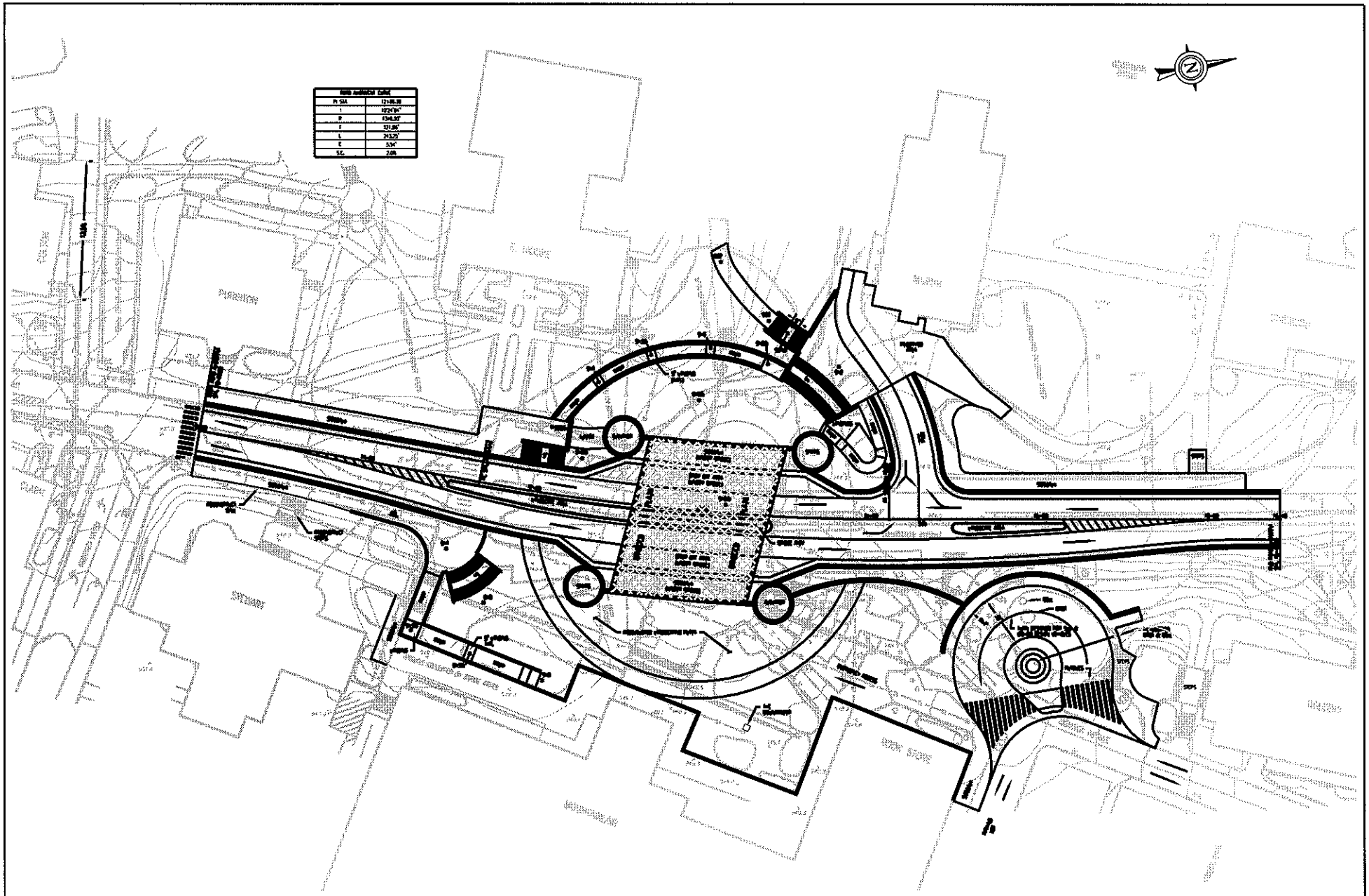
SCALES: 20' 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 1 PROFILE

Alternative 2

Alternative 2 provides a very similar solution as Alternative 1. The main difference is the connection between University Avenue and College Avenue. In Alternative 2 College Avenue is disconnected from University and a cul-de-sac is used to terminate College Avenue. A site plan of this option is included below.



ALPHA ASSOCIATES, INCORPORATED

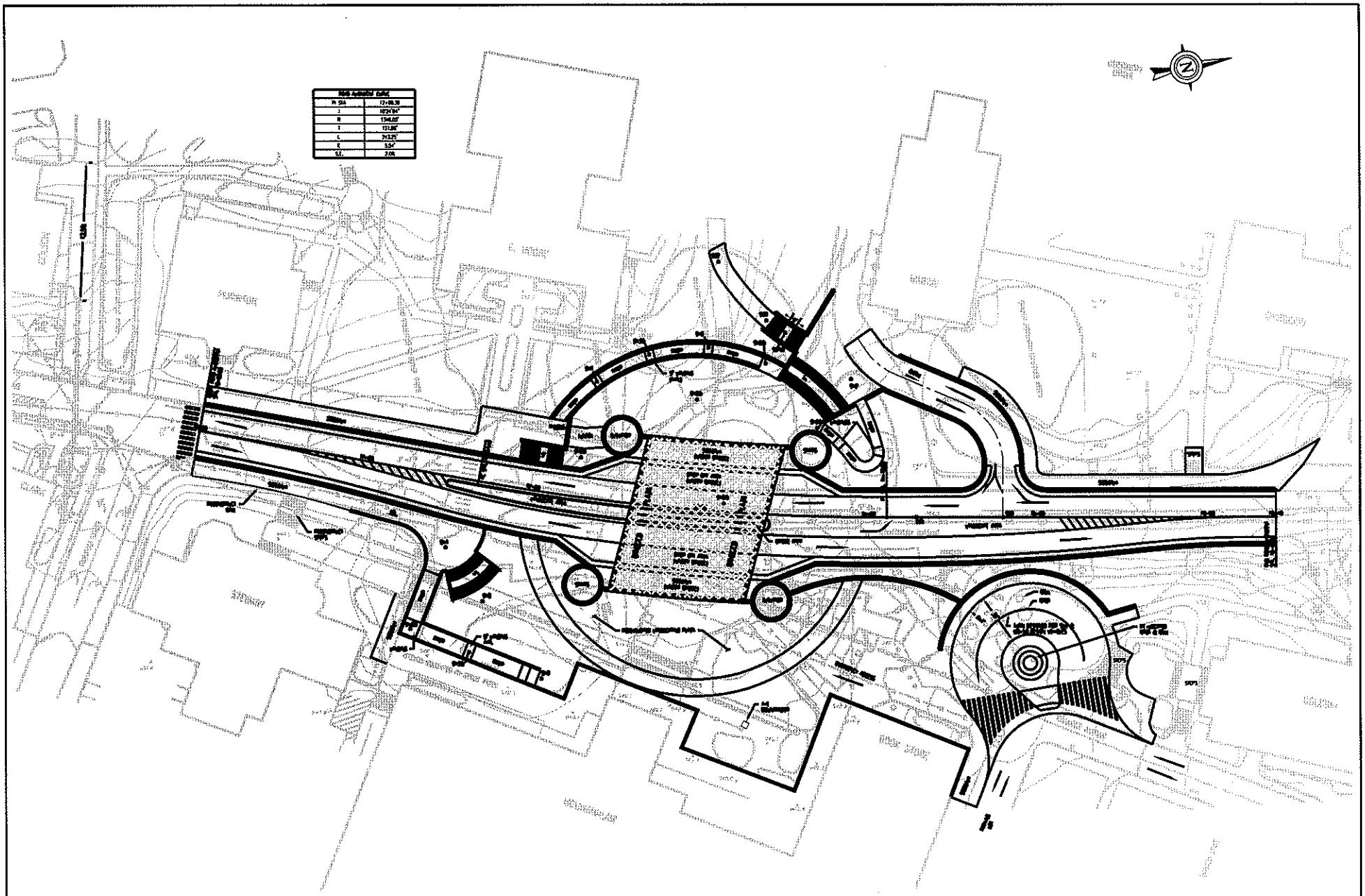
SCALE: 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 2 CONCEPTUAL PLAN

Alternative 3

Alternative 3 is similar to Alternative 2, with the only difference being the connection of the service drive from Martin Hall to University Avenue. In Alternative 3, the Martin Hall service drive/University Avenue intersection is moved north to lessen the slope into the service drive. In this option, the slope on the Martin Hall service drive is approximately 6.0%. A site plan of this option is included below.



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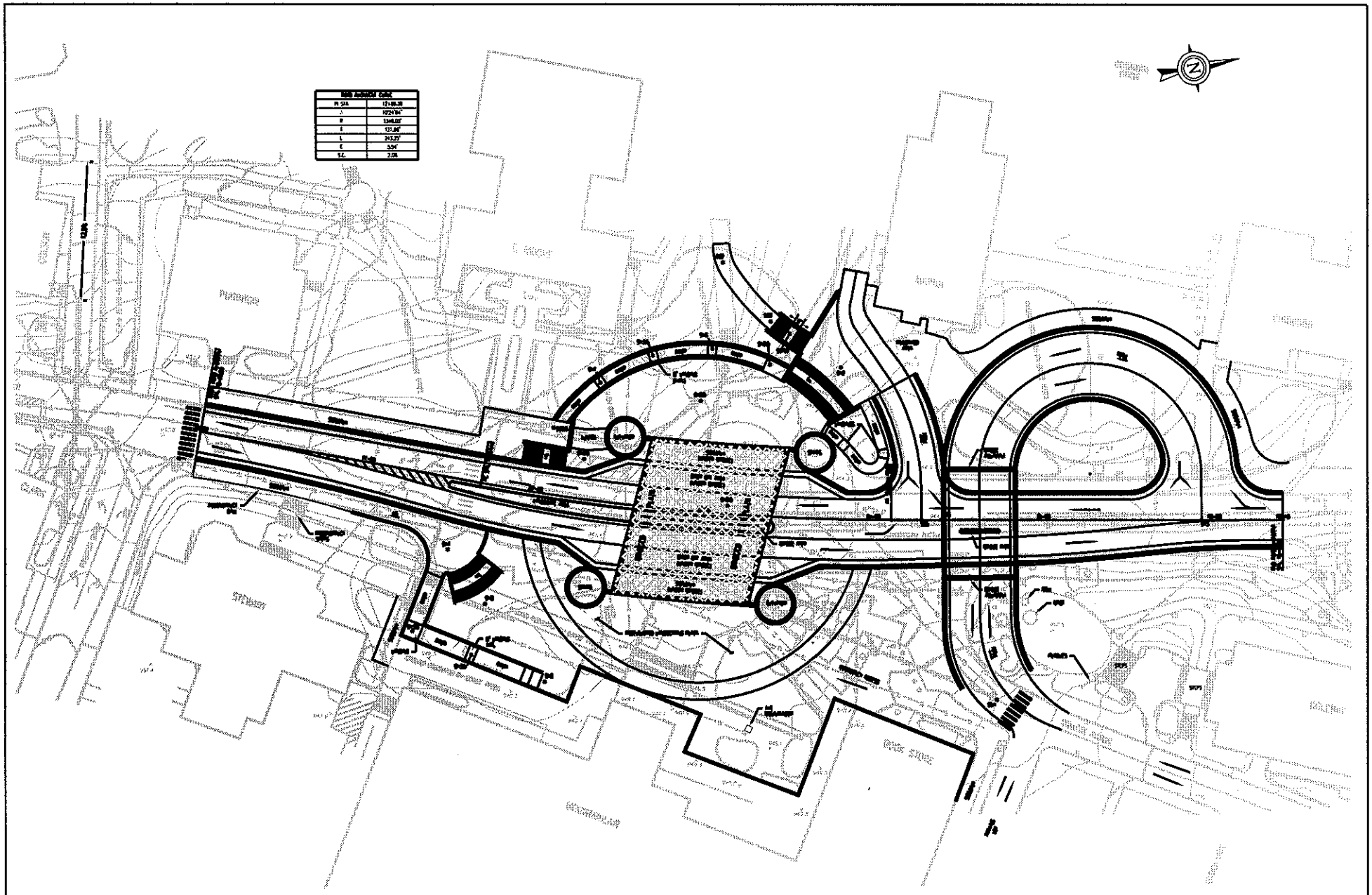
SCALE: 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 3 CONCEPTUAL PLAN

Alternative 4

Alternative 4 is very similar to Alternatives 1, 2, and 3, except College Avenue is now a flyover which spans University Avenue and loops around in front of Martin and Chitwood Halls and ties back into University on the west side of the road. This option lessens all of the slopes on College Avenue, but would be costly and take up a great deal of open space on the campus. A site plan of this option is included below.



ALPHA ASSOCIATES, INCORPORATED

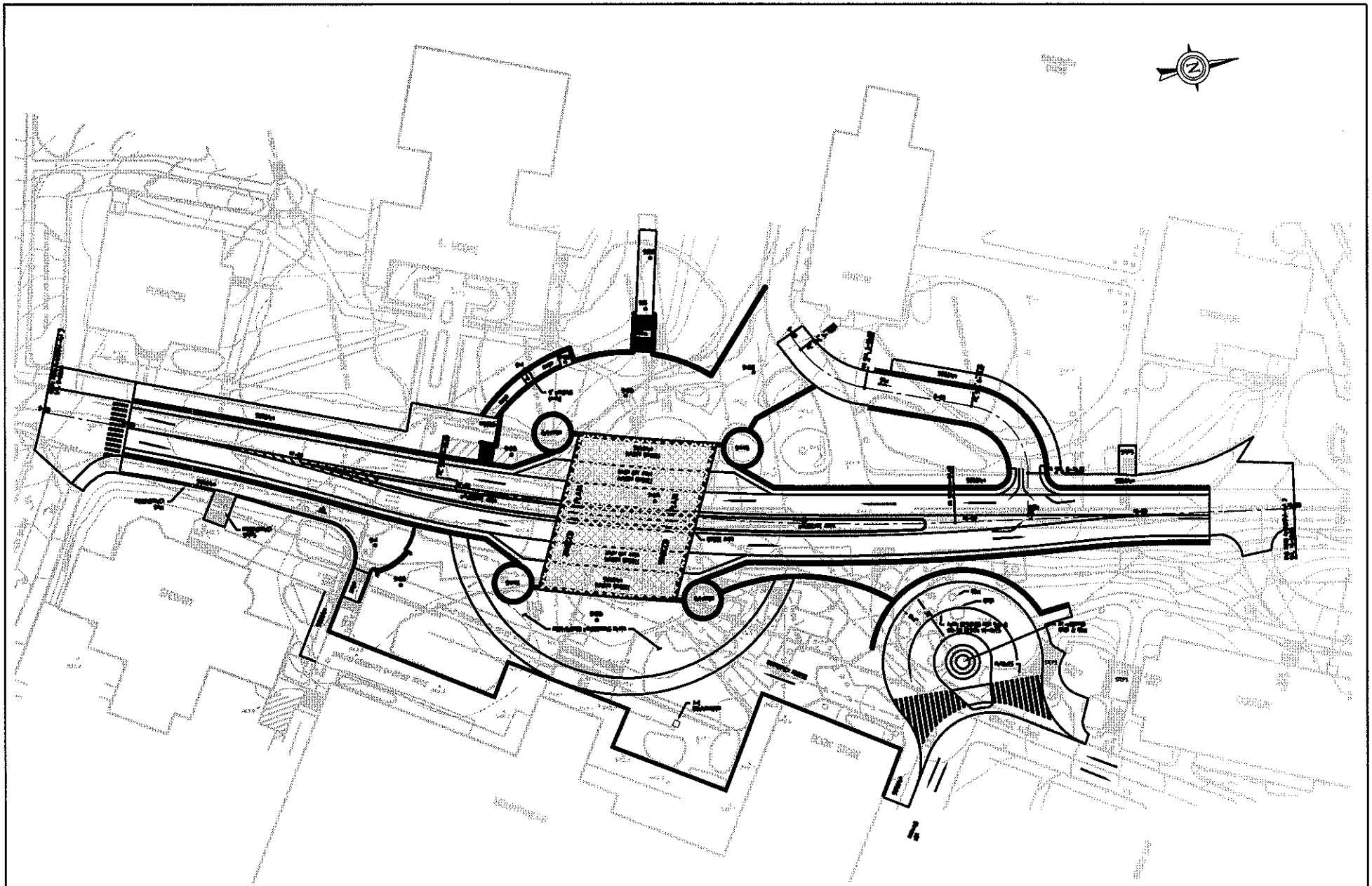
SCALE: 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 4 CONCEPTUAL PLAN

Alternative 5

Alternative 5 is very similar to Alternative 2. University Avenue is lowered below the plaza and College Avenue is terminated in a cul-de-sac. The significant difference is the elevation of the plaza. In Alternative 5, the stairs leading up to the Mountainlair are maintained and the plaza elevation is approximately 6' lower than the previous alternatives. This maintains the approximate existing elevation of the plaza and extends the relocation length of University Avenue. A site plan and profile of this option is included below.



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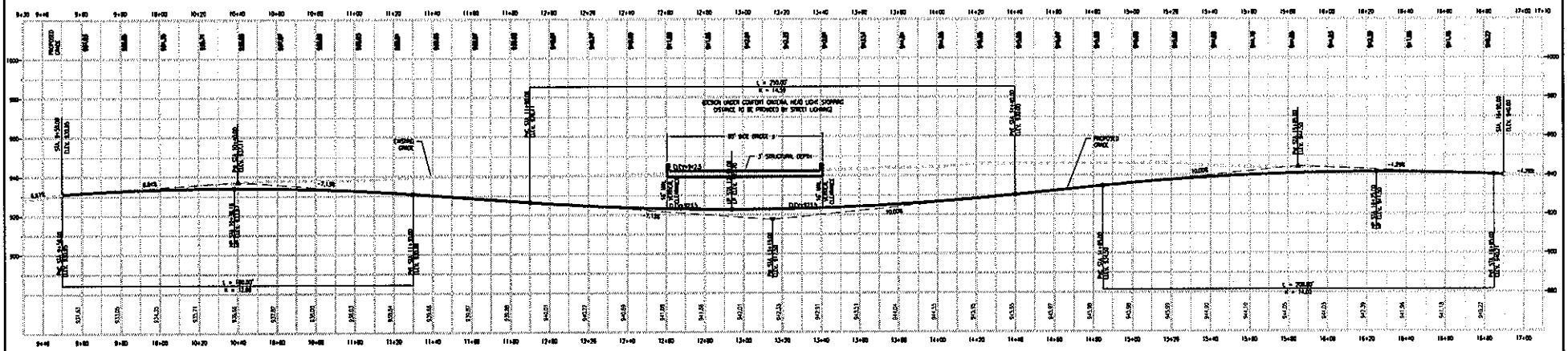
SCALE: 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 5 CONCEPTUAL PLAN



ROAD PROFILE STA: 9+50 TO STA: 16+90

DESIGN SPEED = 25 MPH

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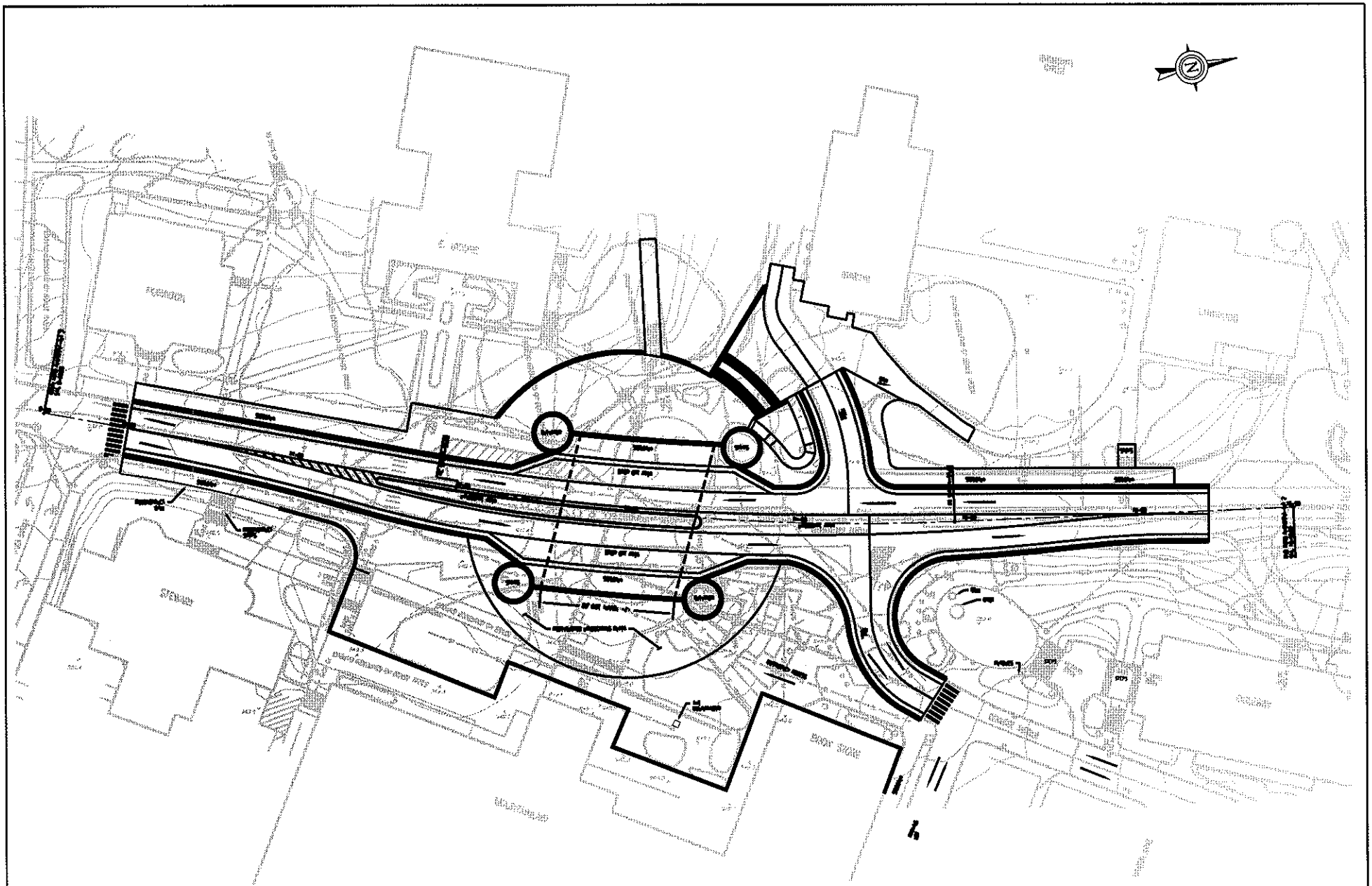
WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 5 PROFILE

Alternative 6

Alternative 6 is the single solution that elevates University Avenue above the level of the plaza, and provides a tunnel structure for pedestrians below University Avenue. The limits of the University Avenue relocation are approximately the same as Alternatives 1 through 4, tying back in north of Prospect Street and south of the Oglebay Hall service drive. A profile of University Avenue and site plan of this option is included below.

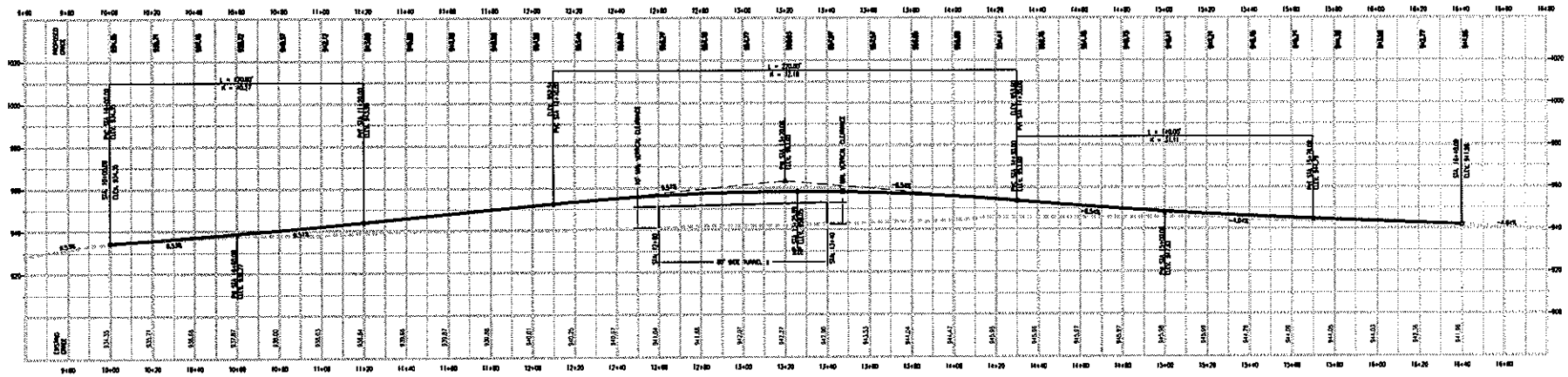


ALPHA ASSOCIATES, INCORPORATED

SCALE: 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 6 CONCEPTUAL PLAN



ROAD PROFILE ALT. 6 STA: 10+00 TO STA:16+40

DESIGN SPEED = 25 MPH

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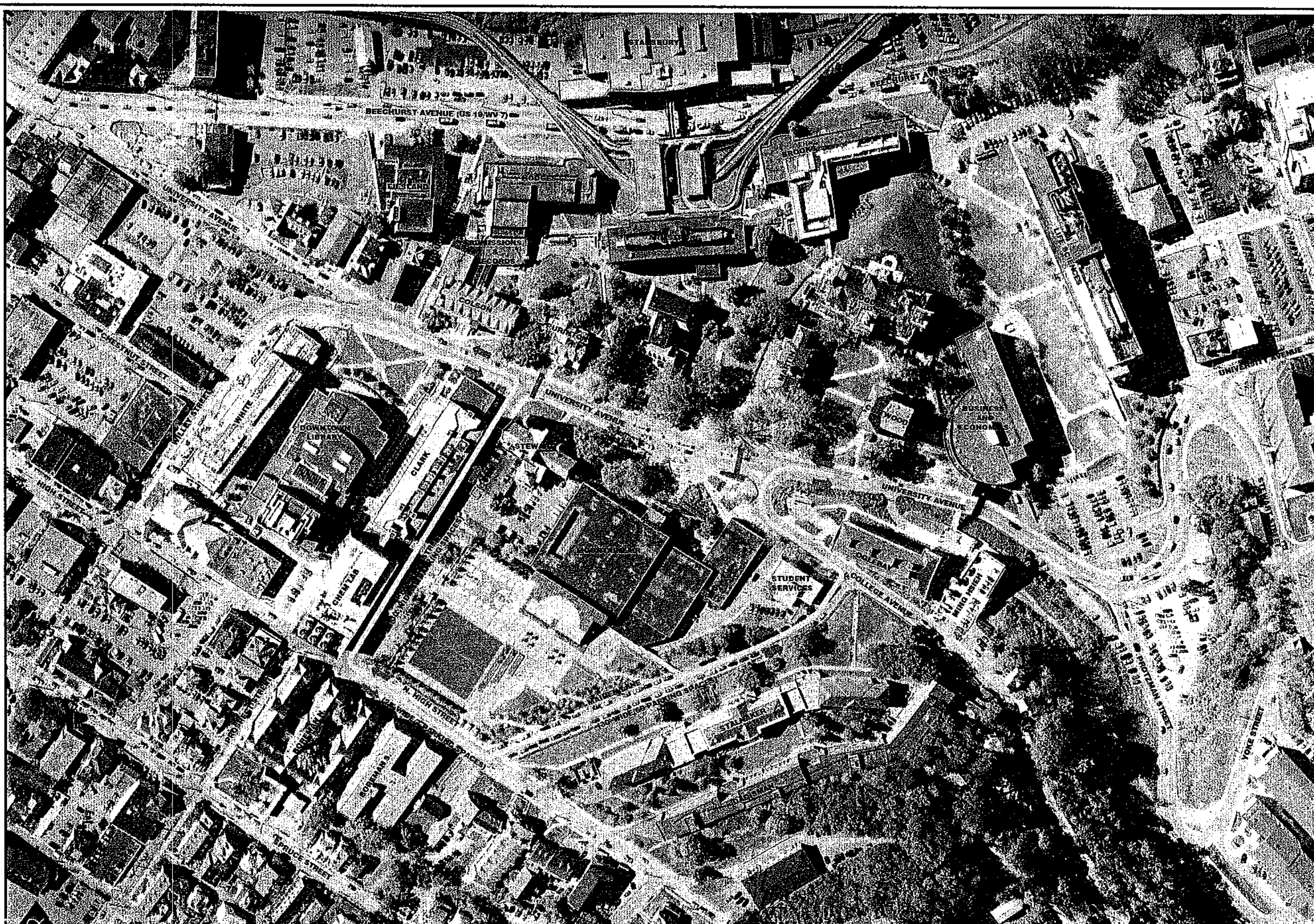
SCALES: 20' 0 20'

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 6 PROFILE

Alternative 7

Alternative 7 is not a structural solution, but calls for closing University Avenue to vehicular traffic in front of the Mountainlair. Traffic would be rerouted around the area on Prospect Street and Maiden Lane. A map of this option is included below.



ALPHA

WEST VIRGINIA UNIVERSITY GRUMBEIN'S ISLAND

ALTERNATIVE 7 CONCEPTUAL PLAN

Results and Conclusions

Information regarding the pedestrian and vehicular volumes obtained by Alpha during the information gathering phase is presented below with the following observations:

Traffic Counts at Two Intersections:

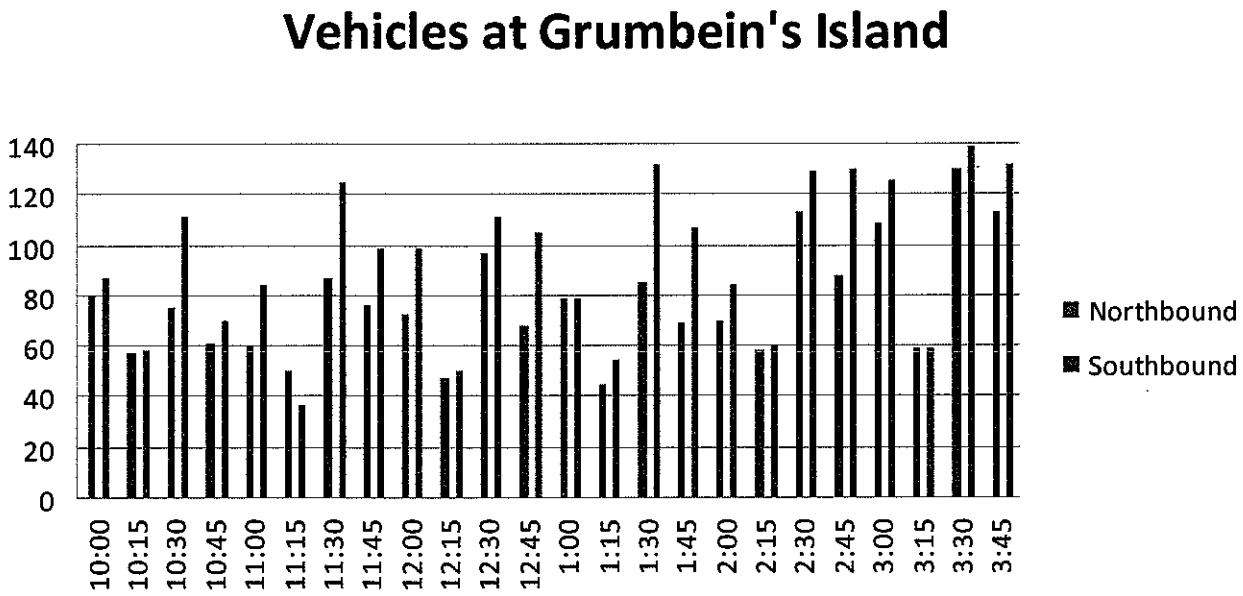
- The intersections of Prospect Street/University Avenue and College Avenue/University Avenue are highly utilized, especially in the AM and PM peak hours.
- The AM peak hour along University Avenue at Prospect Street was from 7:15 to 8:15 with a combined north/south volume of 887 vehicles.
- The PM peak hour along University Avenue at Prospect Street was from 4:45 to 5:45 with a combined north/south volume of 924 vehicles.
- The AM peak hour along University Avenue at College Avenue was from 7:00 to 8:00 with a combined north/south volume of 936 vehicles.
- The PM peak hour along University Avenue at College Avenue was from 4:45 to 5:45 with a combined north/south volume of 1335 vehicles.

Pedestrian Vehicle Counts at Grumbein's Island:

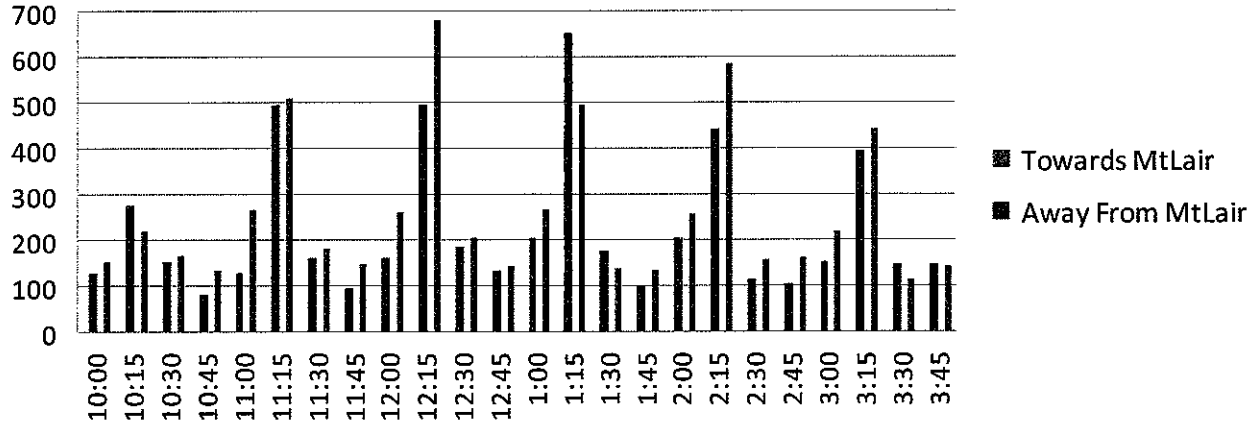
- Pedestrian volume crossing Grumbein's Island peaked at twenty minutes after the hour, each hour counts were taken.
- During the spikes in the pedestrian counts, the average delays to vehicles were as follows:

10 AM	131 seconds
11 AM	119 seconds
Noon	128 seconds
1 PM	214 seconds
2 PM	180 seconds
3 PM	178 seconds

- The single longest delay was 491 seconds (8 minutes) at 3:25 PM. One pedestrian/vehicle "collision" was observed without incident or even acknowledgement.



Pedestrians Crossing at Grumbein's Island



Origin/Destination Interviews

Alpha also performed Origin/Destination interviews with pedestrians using the plaza and Grumbein's Island. 428 interviews were performed the day of the survey. Of the interviews conducted, 61 pedestrians indicated that the Mountainlair was their origin and 94 people indicated that the Mountainlair was their destination. A relatively small number of pedestrians indicated that the PRT was their origin. Most PRT users went directly from the PRT to classes in buildings west of University Avenue then, afterwards, went from those buildings to the Mountainlair or other destinations on the east side of University Avenue. It was also observed that many pedestrians made numerous crossings throughout the study period.

Estimates

The Steering Committee agreed to move forward with two of the Alternatives; Alternative 1 and Alternative 6. Alternative 1 lowered University Avenue and extended the Mountainlair Plaza over the road. Alternative 6 raised University Avenue over the plaza. The pedestrian plaza would cross under University in a tunnel structure. Each of these two options was explored further and costs were applied.

Cost Summary:

Alternative 1	**$ 10,408,653**
Alternative 6	**$ 9,534,485**

The cost of construction included all work associated with the relocation of University Avenue and College Avenue, utility relocations and all necessary construction associated with the project. Full cost breakdowns are attached.

WEST VIRGINIA UNIVERSITY
MORGANTOWN, WEST VIRGINIA
GRUMBEIN'S ISLAND FEASIBILITY STUDY
AAI PROJECT NO. 1006077.00
PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

ALTERNATE 1

4/20/2011

PREPARED BY: CHUCK BRANCH

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
GENERAL REQUIREMENTS					
1	GENERAL REQUIREMENTS	1	LS	$ 452,150.25	$ 452,150.25
				SUBTOTAL	**$ 452,150.25**
UTILITIES					
2	12" WATER LINE RELOCATION	1200	LF	$ 120.00	$ 144,000.00
3	SANITARY SEWER LINE RELOCATION	1600	LF	$ 70.00	$ 112,000.00
4	NATURAL GAS LINE RELOCATION	1400	LF	$ 48.00	$ 67,200.00
5	FIBER OPTIC LINE RELOCATION	800	LF	$ 65.00	$ 52,000.00
6	ELECTRIC LINE RELOCATION	1000	LF	$ 60.00	$ 60,000.00
7	TELECOMMUNICATION LINE RELOCATION	650	LF	$ 42.00	$ 27,300.00
8	STEAM LINE RELOCATION	600	LF	$ 240.00	$ 144,000.00
				SUBTOTAL	**$ 606,500.00**
SITE WORK					
4	FINE GRADING	12000	SY	$ 4.00	$ 48,000.00
5	UNCLASSIFIED EXCAVATION	7500	CY	$ 15.00	$ 112,500.00
6	ASPHALT WEARING COURSE	293	TON	$ 110.00	$ 32,230.00
7	ASPHALT BASE COURSE	878	TON	$ 110.00	$ 96,580.00
8	AGGREGATE BASE COURSE	600	CY	$ 60.00	$ 36,000.00
9	FABRIC FOR SEPARATION	3600	SY	$ 1.50	$ 5,400.00
10	CONCRETE SIDEWALK	43700	SF	$ 6.00	$ 262,200.00
11	EXTERIOR CONCRETE STAIR	1400	LFRISER	$ 60.00	$ 84,000.00
11	PATTERNED CONCRETE SIDEWALK	2750	SF	$ 12.50	$ 34,375.00
12	CONCRETE RAMP	555	SF	$ 8.50	$ 4,717.50
13	ROADWAY RETAINING WALL	17000	SF	$ 90.00	$ 1,530,000.00
14	SIDEWALK RETAINING WALL	2800	SF	$ 75.00	$ 210,000.00
15	HANDRAIL	480	LF	$ 225.00	$ 108,000.00
16	FALL PROTECTION RAILING	2145	LF	$ 300.00	$ 643,500.00
17	RECONSTRUCT EXISTING STONE WALL	600	SF	$ 350.00	$ 210,000.00
18	8" WVDOH TYPE I CONCRETE CURB	2100	LF	$ 40.00	$ 84,000.00

WEST VIRGINIA UNIVERSITY
MORGANTOWN, WEST VIRGINIA
GRUMBEIN'S ISLAND FEASIBILITY STUDY
AAI PROJECT NO. 1006077.00
PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

ALTERNATE 1

4/20/2011

PREPARED BY: CHUCK BRANCH

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
19	SIDEWALK BED COURSE MATERIAL	1200	CY	$ 75.00	$ 90,000.00
20	TRAFFIC SIGNAGE	1	LS	$ 15,000.00	$ 15,000.00
21	MAINTENANCE OF TRAFFIC ALLOWANCE	1	LS	$ 100,000.00	$ 100,000.00
22	STORM DRAINAGE	1	LS	$ 250,000.00	$ 250,000.00
23	SEDIMENT AND EROSION CONTROL ALLOWANCE	1	LS	$ 50,000.00	$ 50,000.00
24	SEED AND MULCH	1	LS	$ 15,000.00	$ 15,000.00
25	LANDSCAPE ALLOWANCE	1	LS	$ 500,000.00	$ 500,000.00
				SUBTOTAL	**$ 4,521,502.50**
BUILDING COMPONENTS					
26	STAIR TOWER	2	LS	$ 250,000.00	$ 500,000.00
27	ELEVATOR TOWER	2	LS	$ 350,000.00	$ 700,000.00
28	BRIDGED PLAZA STRUCTURE	1	LS	$ 474,600.00	$ 474,600.00
29	BRIDGED PLAZA DECK	1	LS	$ 180,000.00	$ 180,000.00
				SUBTOTAL	**$ 1,854,600.00**

SIDEWALK CONSTRUCTION	**$ 7,434,752.75**
CONTINGENCY, 15%	$ 1,115,212.91
PROFIT, 10%	$ 743,475.28
OVERHEAD, 15%	$ 1,115,212.91
SIDEWALK CONSTRUCTION TOTAL	**$ 10,408,653.85**

ALPHA ASSOCIATES, INCORPORATED

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MORGANTOWN, WEST VIRGINIA
GRUMBEIN'S ISLAND FEASIBILITY STUDY
AAI PROJECT NO. 1006077.00
PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

ALTERNATE 6

4/20/2011

PREPARED BY: CHUCK BRANCH

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
GENERAL REQUIREMENTS					
1	GENERAL REQUIREMENTS	1	LS	$ 346,258.80	$ 346,258.80
				SUBTOTAL	**$ 346,258.80**
UTILITIES					
2	12" WATER LINE RELOCATION	1200	LF	$ 120.00	$ 144,000.00
3	SANITARY SEWER LINE RELOCATION	1600	LF	$ 70.00	$ 112,000.00
4	NATURAL GAS LINE RELOCATION	1400	LF	$ 48.00	$ 67,200.00
5	FIBER OPTIC LINE RELOCATION	800	LF	$ 65.00	$ 52,000.00
6	ELECTRIC LINE RELOCATION	1000	LF	$ 60.00	$ 60,000.00
7	TELECOMMUNICATION LINE RELOCATION	650	LF	$ 42.00	$ 27,300.00
8	STEAM LINE RELOCATION	600	LF	$ 240.00	$ 144,000.00
				SUBTOTAL	**$ 606,500.00**
SITE WORK					
4	FINE GRADING	12000	SY	$ 4.00	$ 48,000.00
5	UNCLASSIFIED EMBANKMENT	6000	CY	$ 20.00	$ 120,000.00
6	ASPHALT WEARING COURSE	293	TON	$ 110.00	$ 32,230.00
7	ASPHALT BASE COURSE	878	TON	$ 110.00	$ 96,580.00
8	AGGREGATE BASE COURSE	600	CY	$ 60.00	$ 36,000.00
9	FABRIC FOR SEPARATION	3600	SY	$ 1.50	$ 5,400.00
10	CONCRETE SIDEWALK	48313	SF	$ 6.00	$ 289,878.00
11	EXTERIOR CONCRETE STAIR	550	LFRISER	$ 60.00	$ 33,000.00
12	ROADWAY RETAINING WALL	14000	SF	$ 90.00	$ 1,260,000.00
13	SIDEWALK RETAINING WALL	600	SF	$ 75.00	$ 45,000.00
14	HANDRAIL	200	LF	$ 225.00	$ 45,000.00
15	FALL PROTECTION RAILING	2145	LF	$ 300.00	$ 643,500.00
16	RECONSTRUCT EXISTING STONE WALL	600	SF	$ 350.00	$ 210,000.00
17	8" WVDOH TYPE I CONCRETE CURB	2100	LF	$ 40.00	$ 84,000.00
18	SIDEWALK BED COURSE MATERIAL	1120	CY	$ 75.00	$ 84,000.00
19	TRAFFIC SIGNAGE	1	LS	$ 15,000.00	$ 15,000.00

WEST VIRGINIA UNIVERSITY
MORGANTOWN, WEST VIRGINIA
GRUMBEIN'S ISLAND FEASIBILITY STUDY
AAI PROJECT NO. 1006077.00
PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

ALTERNATE 6

4/20/2011

PREPARED BY: CHUCK BRANCH

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
20	MAINTENANCE OF TRAFFIC ALLOWANCE	1	LS	$ 100,000.00	$ 100,000.00
21	STORM DRAINAGE	1	LS	$ 250,000.00	$ 250,000.00
22	SEDIMENT AND EROSION CONTROL ALLOWANCE	1	LS	$ 50,000.00	$ 50,000.00
23	SEED AND MULCH	1	LS	$ 15,000.00	$ 15,000.00
24	LANDSCAPE ALLOWANCE	1	LS	$ 500,000.00	$ 500,000.00
				SUBTOTAL	**$ 3,962,588.00**
BUILDING COMPONENTS					
25	STAIR TOWER	2	LS	$ 200,000.00	$ 400,000.00
26	ELEVATOR TOWER	2	LS	$ 300,000.00	$ 600,000.00
27	PRECAST CONCRETE TUNNEL STRUCTURE	1	LS	$ 895,000.00	$ 895,000.00
				SUBTOTAL	**$ 1,895,000.00**

SIDEWALK CONSTRUCTION	**$ 6,810,346.80**
CONTINGENCY, 15%	**$ 1,021,552.02**
PROFIT, 10%	**$ 681,034.68**
OVERHEAD, 15%	**$ 1,021,552.02**
SIDEWALK CONSTRUCTION TOTAL	**$ 9,534,485.52**