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INTERMODAL TRANSPORTATION
CENTER STUDY

IOWA STATE UNIVERSITY

AMES, IOWA

November 22, 2005
Walker project # 21-3236.00

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IOWA STATE UNIVERSITY

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Prepared for:
ROBERT HOLZWARTH

PROJECT NO. 21-3236.00
NOVEMBER 22, 2005

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EXECUTIVE SUMMARY

The Intermodal Transportation Center Study for Iowa State University has been conducted to provide a conceptual design for the proposed Intermodal, and to verify that the proposed site is of adequate size and has appropriate roadway connections. Considerations of the Campus Master Plan, programmable space needs, and the recent *Campus Parking Supply and Demand Feasibility Study* are integrated into the Option 1 Intermodal Transportation Center conceptual design.

The basic program requirements are to provide structured parking for 500 – 900 vehicles and provide for up to 24,700 square feet of programmable building space within a single facility. The site was loosely defined to be north of the Industrial Education 2 Building, south of the North Campus Chiller, and west of Stange Road, and was also to be respectful of future building sites as shown in the Campus Master Plan. Discoveries during the course of the project that drove additional site limitations are the North Campus Chiller supply and return lines that now provide the western site bounds, and the request of staff to limit the building height to approximately 4 stories or a 55'-0 maximum (preferably 45'-0).

With these criteria, Option 1 Intermodal Transportation Center design was conceived. The concept design provides for a maximum of approximately 840 parking stalls in six tiers with two levels of integrated programmable space, totaling 24,700 square feet. Adequate site setbacks and roadway connections are provided for in the plan. The plan holds a logical travel route for inter-city and campus busing systems, and provides appropriate traffic separation for buses and private vehicles. The programmable space has convenient parking and an intuitive location along the pedestrian path to campus with shared elevator service. The bus loading area is logically located and connected to trunk roadways with adequate site lines and vehicular stacking areas. The bus loading area serves a dual purpose as loading zone and entry plaza for the programmable building space.

Additionally, the conceptual Intermodal Transportation Center plan has flexibility in programmable space square footage areas and parking stall capacities. The basic structure layout is flexible to convert programmable space to stall quantities or to limit total building height based on stall quantities required without site layout modifications. This gives the owner the advantage of a flexible program delivery where final program decisions can be delayed until financial appropriations are defined.

In summary the conceptual design solution Option 1 clearly displays that an Intermodal Transportation Center designed to meet program requirements can be acceptably constructed on the proposed site. The site is capable of providing adequate building areas and roadway connections to meet program requirements with a logical, serviceable building plan.

INTRODUCTION

PROGRAM PROCESS

Iowa State University (ISU) has engaged Walker Parking Consultants to provide a conceptual design for an Intermodal Transportation Center located in the North Central Parking Zone as referenced in the Walker Parking Consultants *Campus Parking Supply and Demand Feasibility Study* dated May 12, 2005.

The goal of this study is to provide a site-specific conceptual design for an intermodal transportation center/parking facility to meet the program requirements of Iowa State University.

The basic program requirements were identified through meetings with the following University staff.

Cathy Brown, Robert Holzwarth
Dean Morton; Facilities Planning and Management
Doug Houghton, Parking Division

Elements of the Intermodal Transportation Center program have been driven by the submission process to acquire federal funding through the Federal Transit Administration - Section 5306 program. This program requires a local funding component that would be matched by Iowa State University's Parking Division. Assistance from this program will be essential for construction of an Intermodal Transportation Center facility. It is likely that prior to implementation, any funding mechanism would require conceptual level facility planning that confirms site capability. Therefore, this report intends to conceptually confirm that the site has the required size and roadway connection capabilities to meet the Intermodal Transportation Center program requirements.

The Intermodal Transportation Center would be a local connection point for inter-city transportation provided by Burlington Trailways, Jefferson Bus Lines and other potential carriers to and from Ames, Iowa. Similarly, the Intermodal Center would serve as an identifiable local campus hub for short term and long term parkers to change mode of transportation to reach a campus or city destination via CyRide, bicycles, pedestrians and taxis. CyRide provides on campus bus service as well as service to and from remote parking facilities and services around the City of Ames.

The facility would provide a central point for visitor access, information, and a systematic connection between transit modes currently not available on campus.

PROGRAM ELEMENTS

As identified in the Campus Master Plan, the proposed Intermodal Transportation Center is to be located in the North Central Zone of the campus. (See Figures 1 and 2).

The basic program elements include the following:

- Provide parking stalls for 500 – 900 vehicles.
- Provide up to 24, 700 Sq.ft. of Programmable building (office/retail) space.
- Intercity bus connection with waiting area.
- CyRide hub connection.
- Bicycle storage area.
- Visitor Information.
- Future rail service connection point.
- Taxi service connection point.
- Vanpool service connection point.
- Provides future flexibility to add stalls to the structure.
- Preservation of North Central campus Master Plan 2000 building sites.

In addition to these basic program elements, the Iowa State University Campus Master Plan 2000 Update and planning staff have offered additional conceptual criteria.

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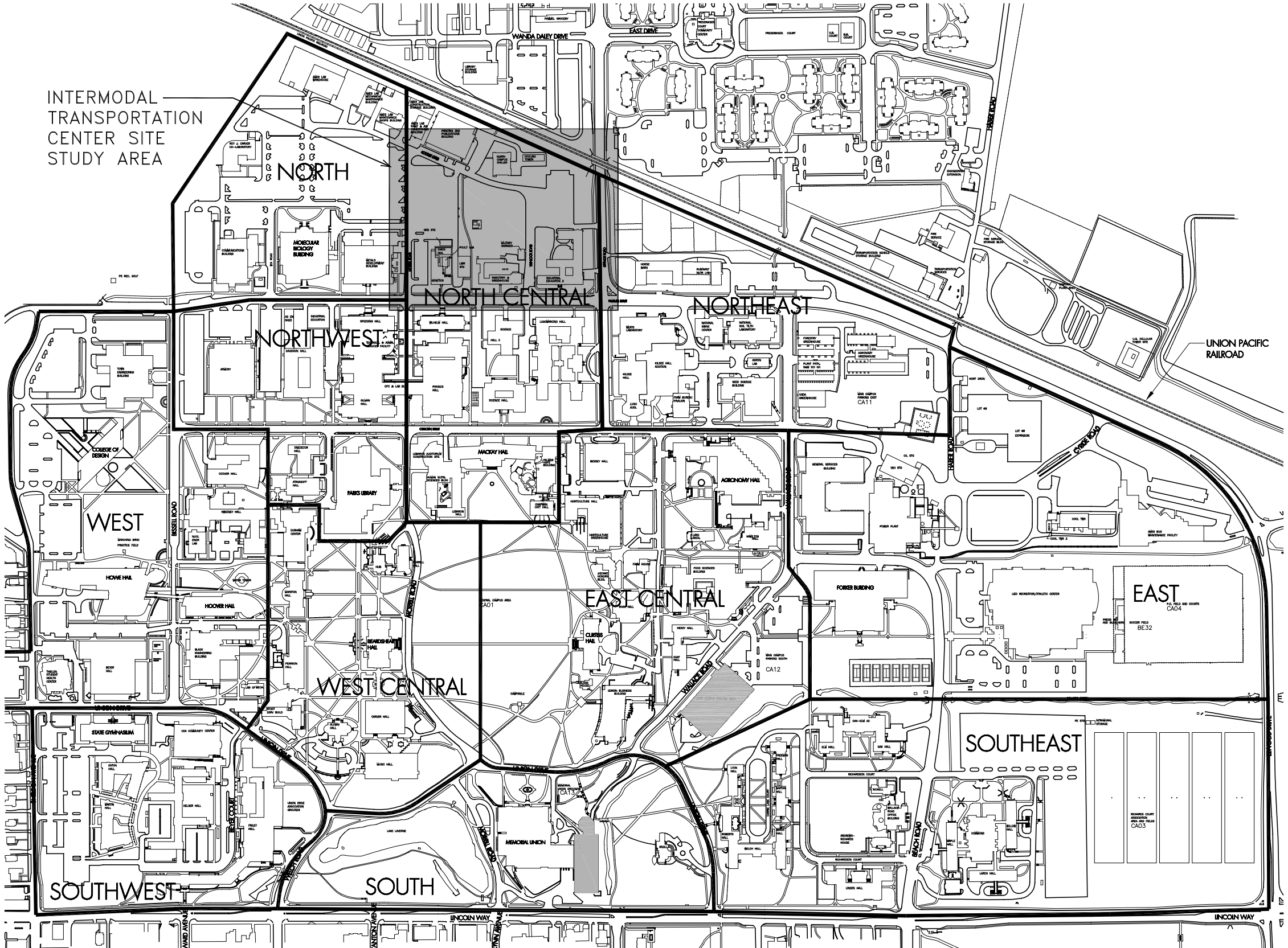
CAMPUS MAP



LEGEND

NORTH

Scale: None

Figure 1

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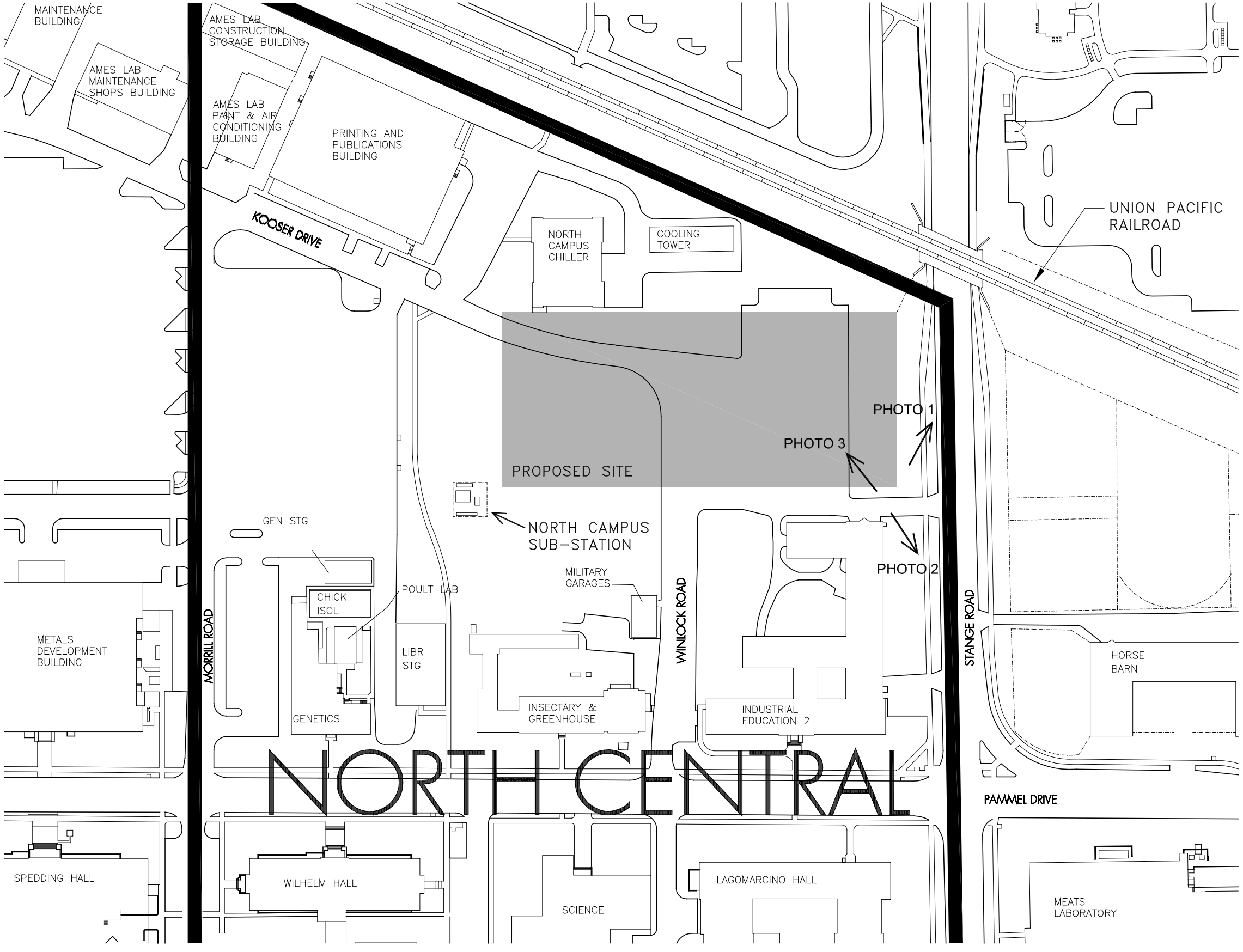

PROPOSED INTERMODAL SITE

PHOTO 1

CURB CUT TO SITE AT STANGE ROAD LOOKING NORTH

PHOTO 2

CURB CUT TO SITE AT STANGE ROAD LOOKING SOUTH

PHOTO 3

EXISTING SITE LOOKING NORTHWEST

LEGEND

NORTH

Scale: None

Figure 2

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The Old Library Storage building is anticipated to be demolished in the future to make way for the construction of a new north/south campus connector road to serve future academic buildings, the future Intermodal Transportation Center and the recently constructed North Campus Chiller. This connector road will provide a connection point for the future Intermodal, and will also align with the curb cut on the south side of Pammel Drive currently servicing Wilhelm Hall and Science Hall II.

The North Campus Chiller site holds an area for the addition of a future cooling tower. This portion of the chiller site must be preserved. The chiller site outlined by the current fencing identifies the future site limits. Additionally, an adequate setback from this site limit must be maintained from the Intermodal as to not require fire separation walls, and maintain a future pedestrian corridor. These criteria define the northern edge for the Intermodal site. The sub-surface chilled water supply and return lines are identified on the Option 1-5 conceptual plans. It was requested to respect the line locations and not construct over them, thus setting the western edge of the Intermodal site.

The current buildings south of the Intermodal site hold future opportunities for site development with larger structures. Because of this, it has been requested to maintain a sizable offset from the north edge of the Industrial Education building to maximize future site redevelopment and to maintain existing access to the buildings overhead doors.

To the east, the offset from Stange Road has been set approximately equivalent to the east wall of the Industrial Education 2 building. This offset provides for site entry drive grade changes required because of the Stange road railroad underpass. It also maintains the pedestrian sidewalk adjacent to the west side of Stange Road.

Passages from the design guidelines of the Campus Master Plan have been interpreted by ISU staff to show interest in limiting the design concepts of the Intermodal structure to 45 feet in height ideally, with an upper bound of 55 feet. This height limitation is to approximate the building heights of a future modern 3 to 4 story academic facility. Additionally, the most architecturally sensitive facades will be on the western, southern and eastern facades.

Pedestrian movements are anticipated to be concentrated in the southwestern corner of the new facility, with most future pedestrian destinations to the west and south of the proposed site.

DESIGN ASSUMPTIONS

The primary users of the Intermodal Transportation Center facility will be a combination of students, faculty, staff and visitors.

The facility will not have controlled access (gates) at the entry or exit points in the foreseeable future, but future control points shall be accommodated in the conceptual design. Parking fees would be collected with a combination of multi-space metering and contract parking. A small percentage of users would likely be long-term parkers who contract for longer duration parking during University holiday periods. By providing multiple duration parking opportunities, the facility would serve as the collection point for periodic shuttles to Des Moines International Airport.

The new facility would operate like a north campus hub for CyRide. With this new boarding point, CyRide's regular routes would be modified to better serve the northern and western campus areas where the campus currently has its largest parking deficits, as defined in the *Campus Parking Supply and Demand Feasibility Study* for ISU, dated May12, 2005. The development of a north campus CyRide stop at the Intermodal Transportation Center has the opportunity to reduce total campus traffic as southbound parkers no longer need to traverse through central campus to park-and-ride facilities on the southeastern corner of the campus. The majority of the users of this facility will likely have free access to the CyRide, making switching modes of transportation palatable to all users. Once the users board CyRide, they can deeply penetrate campus and be delivered to destinations on limited access routes.

The proposed Programmable Building Space (office/retail) for the facility has the following approximate square footage usage:

Parking staff	7,000	sq.ft.
Campus Police	15,000	sq.ft.
Intercity Bus line	2,400	sq.ft.
Student/Visitor Info	300	sq.ft.
Total	24,700	sq.ft

Programmable Building Space would provide for relocating and consolidating University staff, as well as providing space to private vendors. This increased facility activity will provide additional security for transit passengers and Intermodal parkers.

DESIGN STUDY OPTIONS

Multiple conceptual designs were studied as identified herein. The design concepts attempted to display different solutions to meet the program requirements. Site area limits were studied to confirm building setbacks and structure height relationships. Entry/exit points and busing route requirements were considered to minimize the impact of the facility on the adjacent trunk roads. Also, options for the programmable space - internally and externally to the facility were studied. The ISU staff support the concept of providing the programmable space within the facility to more closely follow the master plan, and to provide a more cohesive facility.

OPTION 2 – APPENDIX 1

- Three bay structure with Programmable Space integrated into the footprint of the Intermodal Facility.
- Two trunk roadway connection points provided to separate the automobile and bus traffic.
- Elongated site footprint, spanning over the North Campus Chiller supply and return lines in an attempt to limit building height.
- The setback from the chiller is reduced to preserve the Industrial Education 2 building site area.
- The existing North Campus Substation location is preserved with the new bus route roadway diverting to the south.

OPTION 3 – APPENDIX 2

- Three bay structure with reduced footprint to respect existing improvements (Chiller lines).
- To achieve programmable space square footage program, a portion of the programmable space was put into an adjacent grade level structure fronting along the new north/south connector roadway.
- The sloped parking bay comprising the vehicular vertical transportation system for the facility is placed in the northern bay central to the structure to preserve the facilities horizontal architectural facades on its most prominent elevations.

OPTION 4 – APPENDIX 3

- Partial four bay structure attempting to utilize a larger building footprint to minimize building height, and to conceal the sloped ramp providing a horizontal building façade on all exterior elevations.
- The building height steps down towards the south side, making the facility appear smaller in scale from the typical pedestrian view corridor.
- Structure limits impinge on the future North Campus Chiller cooling tower expansion area.
- Programmable space requirements are accommodated completely within the footprint of the Intermodal facility, providing a cohesive design solution.

OPTION 5 – APPENDIX 4

- Four bay structure transversely located on the site to maximize footprint and minimize building height.
- Entry access road penetrates the facility to provide a covered transition point for CyRide patrons and vehicular entry into the parking area.
- Transverse layout partially preserves North Campus Chiller Cooling Tower site.
- Programmable space embedded within Intermodal without identifiable exterior elevation.
- Large building footprint compromises future build-out capability of adjacent building sites to the south.
- Building height minimized while providing covered storage area of Intercity and CyRide buses.

OPTION 1 & 1A – FIGURES 3 & 4 (PREFERRED OPTION)

Option 1 is the preferred option to meet the client's program needs.

The conceptual design is a two bay structure with a reduced footprint to respect the North Campus Chiller supply and return lines to the west and the North Campus Chiller Cooling Tower site to the north.

The Programmable Space is partially internal to the facilities footprint and accommodates the total program square footage requirement of 24,700 square feet via a two-story build out. The partial embedment of the space provides for simplified areas for HVAC systems.

Pedestrian vertical transportation is provided via a shared stair/elevator in the southwest corner of the Intermodal Center.

Access to the programmable space areas is via a large front entry sidewalk and canopy. Sheltered vehicular loading and waiting areas are provided inside the lobby, or under the sidewalk canopy area directly adjacent to the core pedestrian circulation path, creating an intuitive facility destination with enhanced passive security.

A single trunk roadway connection point has been designed to minimize existing Stange Road traffic disruption. At this time, a Stange Road northbound left turn lane into the facility is not being proposed. A second roadway connection is provided off of a future north/south connector roadway that will serve as both a redundant entry and primary bus exit. This concept allows automobile traffic to enter the site from Stange Road in combination with Intercity and CyRide buses, but immediately separates the vehicles traffic flows. Exiting traffic onto the north/south connector road will allow traffic to disperse east or west along Pammel Drive, and allow for ample queuing on the north/south connector, and for the Stange and Pammel intersection.

The internal function of the facility is a single threaded helix, such that only one parking bay is sloped. This sloped bay has two-way traffic with a 90 degree parking angle providing dual function as both vertical circulation and parking area. This function provides the most efficient building area use to minimize facility costs. Architectural facades will remain horizontal to exterior elevations on the west, south, and east areas. The structure can be designed for future vertical additions to meet stall quantity requirements without modifying any functional aspect of the facility. This feature allows lower first costs and building heights, but does not compromise original program goals.

To achieve Programmable Space square footage requirements, the space has been provided on two levels. At Level One, a rear loading door is provided at each programmable space protected by a 3'-6" wide elevated curb. Programmable Space is modular. To provide for differing programmable space square footage areas, the area can be provided in varying lengths and in one or two story varieties to provide required areas. Programmable spaces would provide internal circulation between the stories within its demising walls. All Programmable space public entry doorways are from the sidewalk along the buildings south façade.

Fire separation walls and roof structures are provided between the differing occupancies. This feature maintains independent building occupancy groups resulting in lower total project construction costs. The parking area retains the code advantages of an "Open Parking Structure", while only the separated programmable space is required to meet the more stringent requirements of its occupancy.

Safety and security enhancements of the plan entail the use of Glass-back elevators with site lines into the elevator shafts from outside the structure. Also, the stairs should be located to maximize passive security. Enclosing the stairs in transparent materials adjacent to the programmable spaces and visible to the structures primary travel path provides maximum passive security effectiveness.

The parking access and revenue control systems are anticipated to be a combination of contract and multi-space metered stalls. No access control gates are anticipated to be provided at this time. Design provisions are in place to accommodate the possible installation of barrier gates in the future. Minor construction of canopies (if desired), concrete curb islands, and electrical provisions could be added in the future.

Option 1A provides and alternative layout for the Future North / South Connector roadway to traverse around the North Campus Sub-Station thereby eliminating the need to relocate this existing improvement. Other than this roadway routing modification, no other elements of the design were changed.

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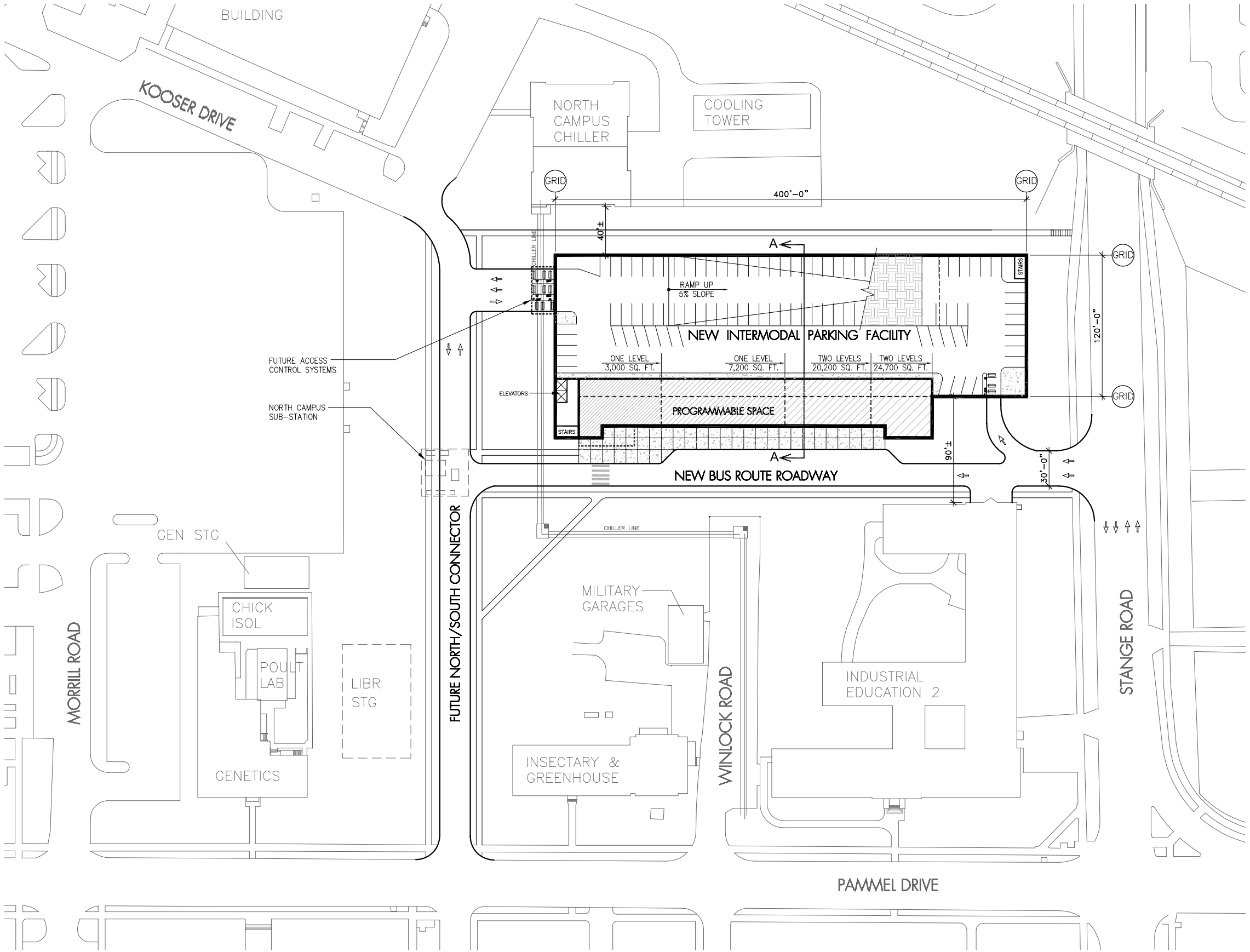


PROPOSED SITE
Option 1

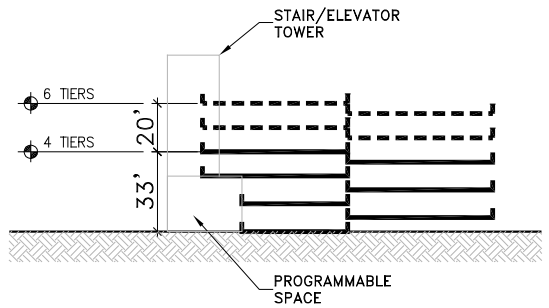
CAR TABULATIONS

24,700 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 510 STALLS
5 TIERS 675 STALLS
6 TIERS 840 STALLS

20,200 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 520 STALLS
5 TIERS 685 STALLS
6 TIERS 850 STALLS

7,200 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 555 STALLS
5 TIERS 720 STALLS
6 TIERS 885 STALLS

3,000 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 565 STALLS
5 TIERS 730 STALLS
6 TIERS 895 STALLS



SECTION A-A

LEGEND

NORTH

0 40 80
1" = 40'

Scale: 1" = 40'
Figure 3

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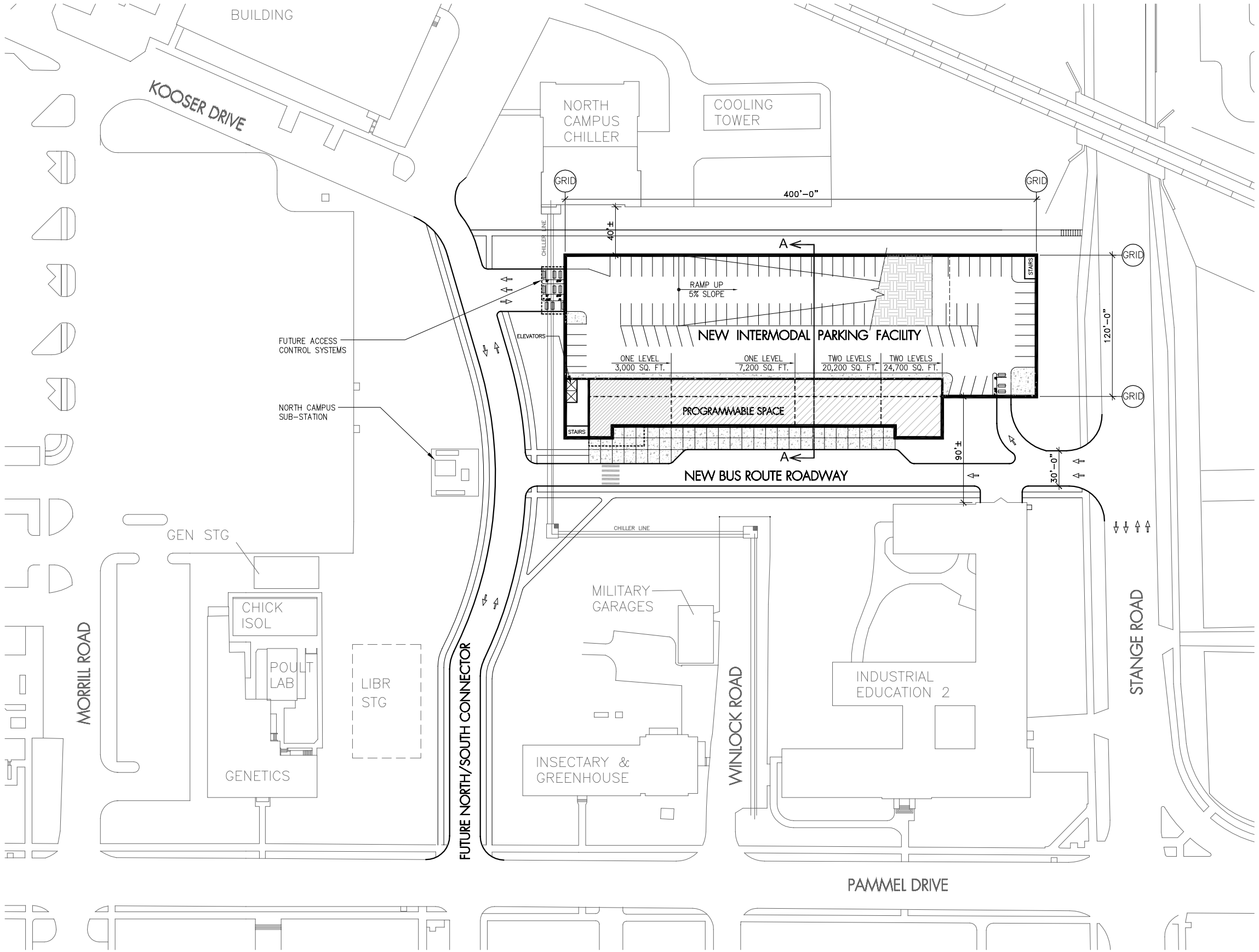


PROPOSED SITE
Option 1A

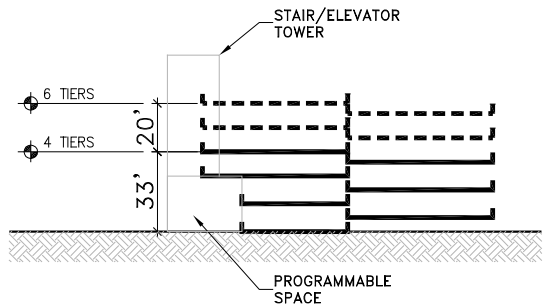
CAR TABULATIONS

24,700 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 510 STALLS
5 TIERS 675 STALLS
6 TIERS 840 STALLS

20,200 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 520 STALLS
5 TIERS 685 STALLS
6 TIERS 850 STALLS

7,200 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 555 STALLS
5 TIERS 720 STALLS
6 TIERS 885 STALLS

3,000 SQ. FT. PROGRAMMABLE SPACE
4 TIERS 565 STALLS
5 TIERS 730 STALLS
6 TIERS 895 STALLS



SECTION A-A

LEGEND

NORTH

0 40 80
1" = 40'

Scale: 1" = 40'
Figure 4

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CONCEPTUAL COST ESTIMATES

CONCEPTUAL ESTIMATE OF PROBABLE COSTS FOR CONSTRUCTION

The Probable Cost of Construction estimate for Option 1 is based upon square footage costs in a Midwest location, without regard to construction type. Typical construction types for the facility should include cast-in-place post tensioned concrete, or pre-cast concrete utilizing long span construction. Framing elements would include nominal 24" square columns, 16 x 34" beams and a 6" slab. Equivalent Pre-cast concrete systems include nominal 24" square columns, 28" deep x 10'-0 precast tees with bearing spandrels, and 34" deep inverted tee beams with interior light walls.

PROBABLE SQUARE FOOTAGE COST FOR INTERMODAL TRANSPORTATION CENTER, YEAR 2005:

Typical parking area structural cost per square foot including mechanical, electrical and plumbing:	$31.90
Architectural facade treatments (Brick):	$1.58
Deep foundation system (Drilled piers):	$1.35
Total square foot construction cost for parking area:	$34.83
Programmable Space, cost per square foot: (Base building shell without fixtures)	$150.00
Soft Costs (Design and Testing) – Defined as percentage of Construction Cost:	20%

Probable costs do not include removing existing improvements or acquiring the site. Costs do not reflect any assumption of providing Phase One environmental site analysis, or costs to mitigate contaminated materials. *Cost includes relocation of the North Campus Substation.* The University staff has provided a conceptual cost to relocate the North Campus Substation.

BUILDING AREAS	**STALL QUANTITY**	**COST TOTALS *(MILLIONS)***
265,750 sqft	840	266K x $34.83 = $9.30M
24,700 sqft Programmable Space	N/A	25K x $150.00 = $3.75M
North Campus Substation Re-Location	N/A	1 x $ 2,000,000 = $2.00M

TOTAL PROBABLE CONSTRUCTION COST ESTIMATE 2005

840 stalls and 24,700 square feet Programmable Space. Sum the following:

Buildings	= 9.30M + 3.75M
Site Improvements	= .60 M + 2.00M
Soft Costs	= .20 x Costs of Construction
Project Total	= $18, 800,000.00

CONCEPTUAL DESIGN SCHEDULE

SCHEDULE

Overall, the construction schedule for the proposed Option 1 Intermodal Transportation Center Option 1 will follow the basic schedule for a typical parking structure. The relative form of a Parking structure schedule may vary based on what construction materials are selected to build the structure. Typical construction materials are either cast-in-place or pre-cast concrete. The cast-in-place method requires more time of construction in the field, whereas the pre-cast construction method requires more time during shop drawing approval and product fabrication making the construction methods similar in total construction duration. Similarly, the elevator installation sequence typically defines the final occupancy schedule for construction, such that both methods generally produce an equivalent total of construction schedule durations. The parking structure design period generally is not modified based on construction material selected.

PROJECT SCHEDULE

DESIGN	**WEEKS**
Pre-design/Final Programming, (Including Surveying & Geotechnical)	16 weeks
Schematic	4 weeks
Design Development	6 weeks
Contract Documents	12 weeks
Owner review	4 weeks
Bid advertisement	4 weeks
Award & mobilize	2 weeks
Sub Total	48 weeks

CONSTRUCTION	WEEKS
Site work	3 weeks
Foundations	9 weeks
Frame & elevator tower	28 weeks
Prog. Space (concurrent with garage)	
Prog. Space Build-outs (tenants)	5 weeks
Sub Total	45 weeks

Conceptual Total Project Duration = 1 year, 9 months
Design + Construction

Note: Project schedules may vary based on the decision making process of the owner, season of construction, local market conditions at time of construction, site conditions and material selections. The schedule defined herein is typical for this type, size and location of project. *Assumptions integrated into the above schedule is that any construction activity duration or decision making process relating to the North Campus Substation or programmable space fixturing would be in addition to the Conceptual Schedule provided. Significant schedule durations should be anticipated relating to the procurement of the substation electrical equipment.*

CONCLUSION

CONCLUSION

Option 1 as shown in Figure 3 best meets the basic project program requirements expressed by ISU staff and the Campus Master Plan. The Estimate of Probable Construction Cost based on 2005 dollars is $18.8 million and would require approximately 1 year and 9 months from beginning of design to beneficial occupancy. Additional schedule would be required to fixture the programmable space to meet the needs of the individual users. This schedule could vary considerably bases on type of user.
Additionally, the schedule for the North Campus Sub-Station has not been added to this schedule as concurrent work and decision making process of University cannot be reasonably estimated.