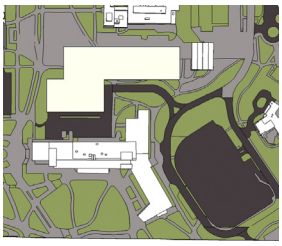
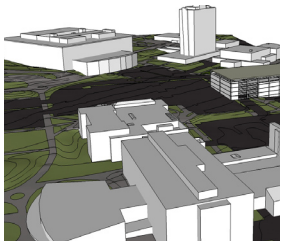
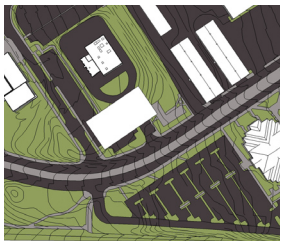
THE UNIVERSITY OF UTAH







Parking Structure Site Options Study

University Of Utah

Project Number 21294

12 | 18 | 2012

Prepared by

EDA Architects

Executive Summary

a. Introduction

The Proposed Parking Structure Site Options Study explores the viability of a number of possible sites for two proposed new parking structures on the University of Utah campus. In response to State Legislature approval for a new structure to serve the Health Sciences Center (HSC) as well as a new structure for the Main Campus, this Study casts a wide net over the whole campus, further examining sites identified for parking structure use in the 2008 Campus Master Plan as well as sites not previously considered. The goal for these structures is to provide approximately 600-800 cars on the HSC and 800 to 1,000 cars to serve the Main Campus.

This effort included examination of a total of six sites on the HSC and twelve sites on the Main Campus. Of these, one emerged as the most viable option for meeting the immediate parking needs of the HSC, and seven were determined to be initial candidates for parking structure locations on the Main Campus. It is important to note that none of these sites are identified as being set-aside for future academic building development in the Campus Master Plan.

The Task Force agreed that, although these eight sites represent the best near-term locations for immediate parking structure development, several of the remaining sites are good long-term prospects for future locations and should augment the potential parking structure locations identified in the 2008 Master Plan.

Initial site evaluation efforts centered on determining a single location for the proposed new structures on both the Health Sciences Center and the Main Campus. As the process unfolded however, the notion of distributing the 1,000 parking spaces earmarked for the Main Campus into two separate parking structures began to gain traction. The appeal of distributing the Main Campus parking spaces into two separate locations was generated by the recognition that this approach would "capture" a much wider campus area for the 1,000 spaces, thus maximizing the amount of building net square area served. At the same time, this would increase the number of destination buildings that would fall within a comfortable 5-minute walking radius.

Project participants represented a broad spectrum of campus interests and included representatives from University of Utah Facilities Management, Campus Planning, Auxiliary Services, and Commuter Services.

b. Process

The Site Options planning process included:

Initial Evaluation of possible sites. This evaluation considered the following criteria: *Overview of Soils Conditions*, *Fault Proximity*, *and ADA accessible routes:* This overview included review of overall campus maps to reveal any special concerns regarding the suitability of soils to support a new parking structure, proximity to faults, and access to pedestrian paths that meet the slope criteria for ADA accessibility.

Prototype Test Fit:
The test fit analyzed the size of parking structure that each site could support in terms of building footprint size. In keeping with concerns regarding campus scale and massing, the Task Force felt it was appropriate to limit the parking structure height to four stories. With this height limitation in place, the quantity of parking spaces then became a function of available floor plate size multiplied by four. Thus, the resulting test prototypes yielded a range of parking counts, from approximately 400 spaces on small sites like Sutton Geology to over 1,000 spaces on large sites such as the Business Loop.

It is important to note that these counts included re-capturing the displaced surface parking lost to the placement of the new structure, and so actual net gains varied widely over the different sites under consideration.

Campus Connections:
This topic included examination of the adjacency of each site to its destination buildings. Also considered was ease of vehicular access to each site as well as the availability of pedestrian access from the proposed parking structure location to campus destination points.

Traffic Impact:
This criterion looked at the impact of up to 1,000 vehicles on the performance of nearby intersections and the peak capacity of arterial feeders. Where applicable, the impact of each site's vehicle demand on adjacent neighborhoods was also noted.

Impact on Utilities:
The impact of new parking structures on the existing utilities at each site is included in this evaluation. This analysis utilized information from the University's GIS data base, which is diagrammatic in nature. Upon determination of the final recommended sites, actual "Alta" surveys should be prepared to confirm the actual locations and extent of existing utilities.

Detailed Evaluation of one site for both the Health Sciences Center and seven sites for the Main Campus. This phase of the evaluation focused on the eight preferred sites that emerged from the initial evaluation process. This more detailed study included:

Detailed Test Fit:
These test fits included refinement of the proposed building footprints to more closely respond to actual site configuration and slope. Three-dimensional massing studies were produced to gauge the aesthetic impact of the proposed parking structures on surrounding buildings. With the larger sites, opportunities to increase footprint size were explored with the goal of lowering the total number of stories to lessen the visual impact of the proposed parking structure on its neighbors.

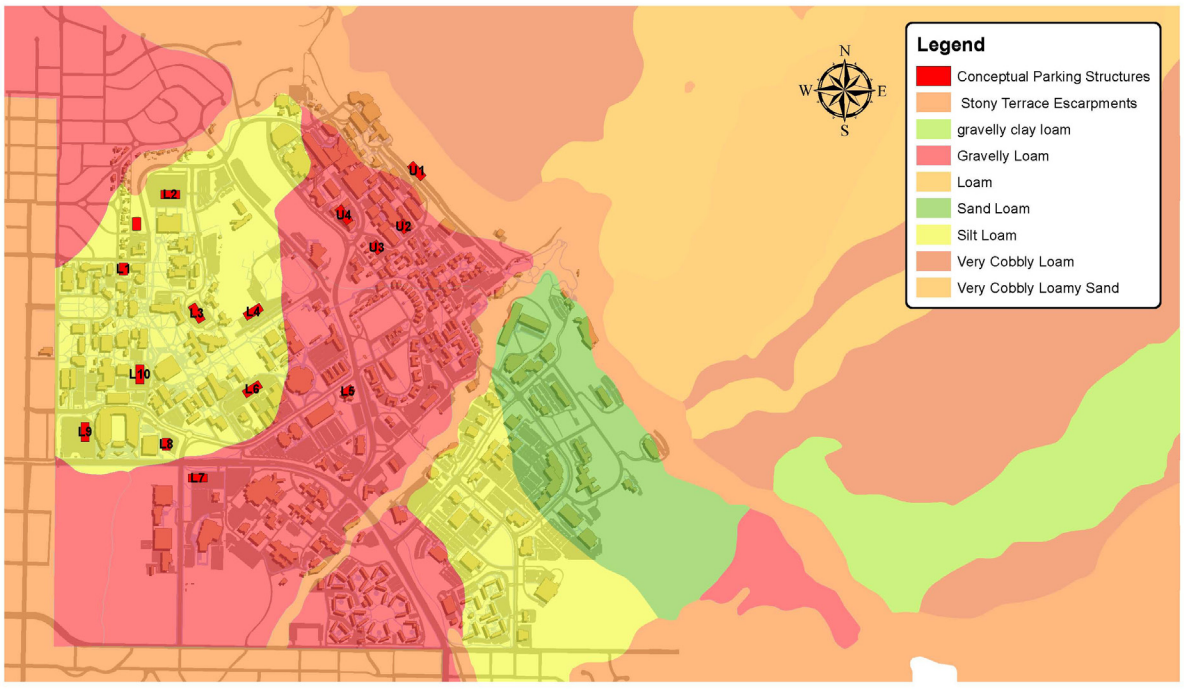
Catchment Area:
The Task Force agreed that an important factor for evaluating the efficiency and convenience of each site was the number of campus destinations contained within a five-minute walking distance from the proposed location. Conventional planning wisdom holds that the average pedestrian can walk approximately ¼ mile in five minutes. Therefore, a ¼ mile radius was indicated for each site.

The Study then summarized the total net building area, total net gain of parking spaces, and total number of remaining surface parking spaces included within this catchment radius. The total net area was then divided by the total parking spaces before and after the addition of the parking structure to understand the comparative improvement. This value was expressed in terms of the number of parking spaces per 1,000 square feet since this is a ratio that is typically used by most planning departments to establish parking requirements.

Soil Descriptions Map

Although existing available data does not include detailed soils information for each site, an overall soils conditions map is provided. This map reveals a predominance of gravely loam on the Health Sciences Center and silty loam on the Main Campus. Both of these soils types are suitable for construction but may require structural modifications on a case-by-case basis. Empirical experience at the Huntsman Center expansion indicates that below-grade conditions on the upper edges of the Wasatch Bench can contain large amounts of boulders which increase both excavation costs and construction time.

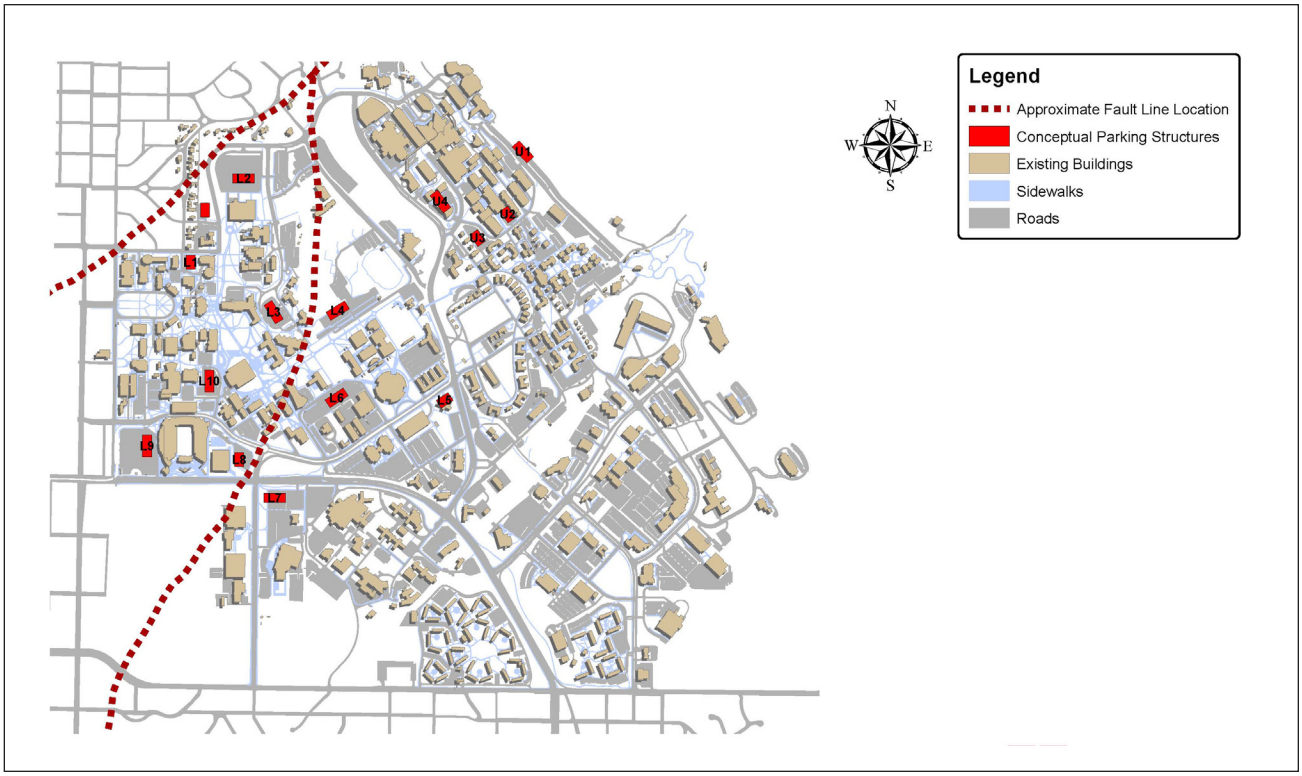
Before design begins, a soils investigation will need to be undertaken for the final selected sites in order to shed light on actual soils conditions.



Fault Line Location Map

The Fault Line Location Map illustrates two primary faults that affect the University of Utah campus. One travels under the neighborhood where the Fraternity and Sorority houses are located and proceeds north of North Campus Drive near the Merrill Engineering parking lot. The other bifurcates the Main Campus between the academic core and the HPER Mall.

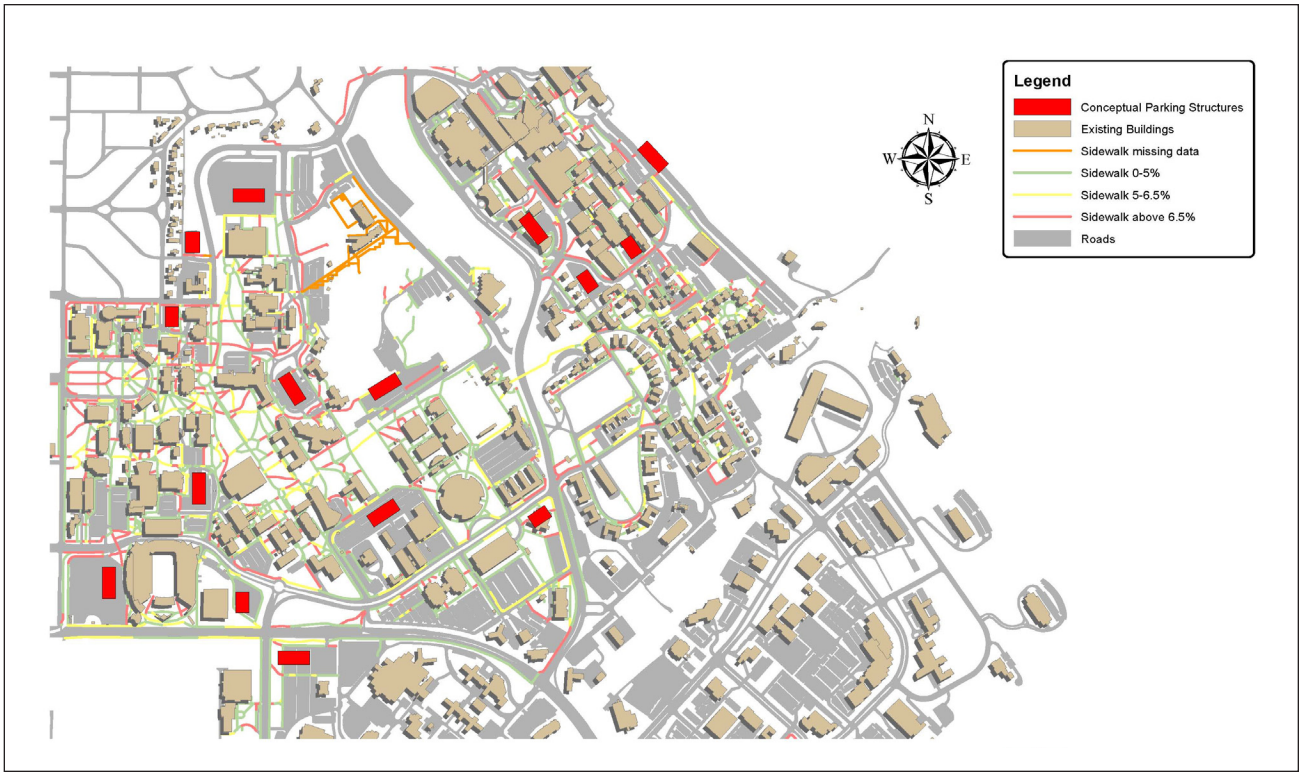
All of the proposed sites will be affected by seismic activity as a result of these faults and so, although a risk, are not differentiators in site selection. The International Building Code will exact the same stringent lateral loading criteria on the proposed parking structures, regardless of site.



Sidewalk ADA Compliance Map

Side walk slopes exceeding 5% are identified on the Sidewalk ADA Compliance Map. This is a concern on the Main Campus, where many areas exceed this gradient. All of the proposed sites will need to provide ADA accessibility and the specific solutions to this must be arrived at during the design process.

This concern is magnified on the Health Sciences Center due to its location at the toe of the Wasatch Foothills. Concerns over ADA accessibility are drivers in the final site recommendation for the HSC.



Initial Evaluation

The following criteria were used as a basis for the Initial Evaluation:

Size/Configuration

Building footprint and configuration
The proposed site must be large enough to accommodate a building footprint which provides at least 200 to 250 parking spaces for the Main Campus sites and 150 to 200 cars for the Health Sciences Center sites. This will allow the required parking quantities of 800 to 1,000 spaces for the Main Campus and 600 to 800 spaces for the Health Sciences Center to be satisfied within a four to five story structure.

No. stories required
The height of the parking structure should not exceed four to five stories plus the height of a roof. This height is considered appropriate in terms of maintaining a consistent scale with the campus in general. Parking structure mass and height should not compete visually with other campus buildings.

Access and Convenience

Vehicular
Vehicular access points to the parking structure must be clearly evident to the approaching driver. Excessively long and circuitous routes as well as routes crossing major pedestrian circulation paths should be avoided.

Pedestrian/Bicycle Access
The parking structure should be located to take advantage of pedestrian pathways leading to destination buildings. Parking structures should also be located to provide access to the campus' developing bicycle path network since many students, faculty and staff use bicycles to traverse the long distances between destinations created by the large campus size. Routes requiring pedestrian/vehicle cross-overs should be avoided to minimize the potential for accidents and to improve the walking experience.

Adjacency

Proximity to existing buildings
In order to minimize user frustration, pedestrian travel distance to key destination buildings should not exceed five minutes. Travel distance to secondary destinations should not exceed 10 minutes.

Proximity to future growth and demand
Parking structures should be located with consideration given to future campus development. Present as well as future vehicular, pedestrian and bicycle networks must be considered to avoid locations which hinder future development.

Traffic Impact

Intersection level of service
Many nearby intersections on the campus primary arterial feeder system operate at or near acceptable levels of delay, but will continue to be impacted with future campus development. Proposed parking structure locations should be considered to minimize impact on those intersections that are at capacity and take advantage of intersections which are currently within acceptable service parameters.

Peak demand conflict
The campus arterial feeder system provides access to other uses on the campus perimeter. Parking structures should be located to avoid peak demand time conflicts with these uses.

Infrastructure

Impact on utilities
Parking structure footprints are large and will have an impact on sub-surface utilities in most locations under consideration. Consideration must be given to minimizing the need for excessive utility relocation where possible since the costs for this work will have a negative impact on the cost/benefit performance of the structure. Utility rework will also impact service to other buildings on the network.

Impact on other infrastructure
Parking structure footprints will not only have an impact on sub-surface utilities, but will also affect surface improvements in most locations under consideration. Consideration must be given surface improvement reconstruction where possible since the costs for this work will have a negative impact on the cost/ benefit performance of the structure. Surface improvement rework will also cause disruption to adjacent buildings.

Of particular importance is the displacement of surface parking caused by new parking structure construction. In cased where parking structures are being considered in existing surface parking areas, the lost parking must be recaptured in the new structure at a greater per stall cost. The impact of this must be accounted for in the cost/benefit analysis.

Campus Considerations

Impact on views from adjacent facilities
With its dramatic setting on the east bench of the valley, the campus benefits from superb views in all directions. Many existing buildings take advantage of these views through siting and fenestration. Parking structures should not compromise these views and proposed locations should take this into consideration.

Site M1

Sutton Geology

Site Description

With direct vehicle access from 100 South Street, this “tucks into” an area whose edges are defined by the Sutton Geology Building to the east, INSCC to the south and Naval Science to the west. This precinct of the campus is currently one of the most under-represented areas of the University in terms of parking supply, while at the same time, generating one of the highest demand levels due to the confluence of academic, administrative and performance art venues that occur here.

The Campus Master Plan indicates this as a potential site for a parking structure, so consideration of this area for parking structure development would not conflict with current campus development goals.

By limiting a structure in this location to four stories, impact on views from the adjacent buildings can be reduced.

Initial Test Fit

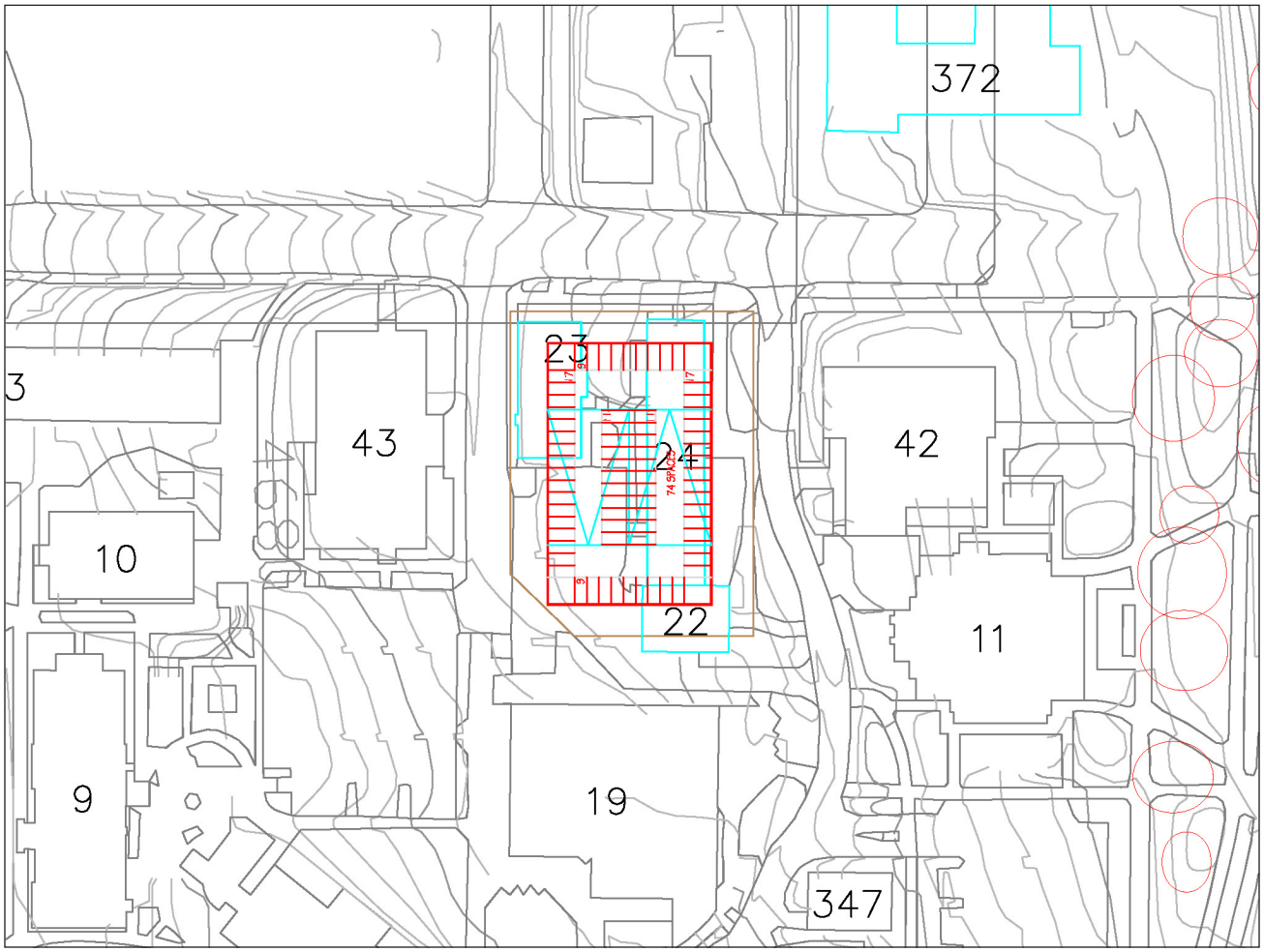
The Sutton Geology site is one of the smallest of the twelve sites being considered for a parking structure location on the Main Campus. The available footprint allows for approximately 75 cars per level and is close to the minimum size required for internal ramping within the 5% ramp slope recommendations. With some re-work of the service road alignment in this area, a somewhat larger, more efficient footprint would be possible.

Although this site can only accommodate 340 to 360 cars within a four-story structure, given the strategic importance of this location, a smaller “secondary” structure would still provide an important parking asset for the University.

Because 76 existing surface parking spaces would be displaced the net gain would be 264 to 284 spaces.

M1 — Sutton Geology

4 stories / 340 to 360 spaces

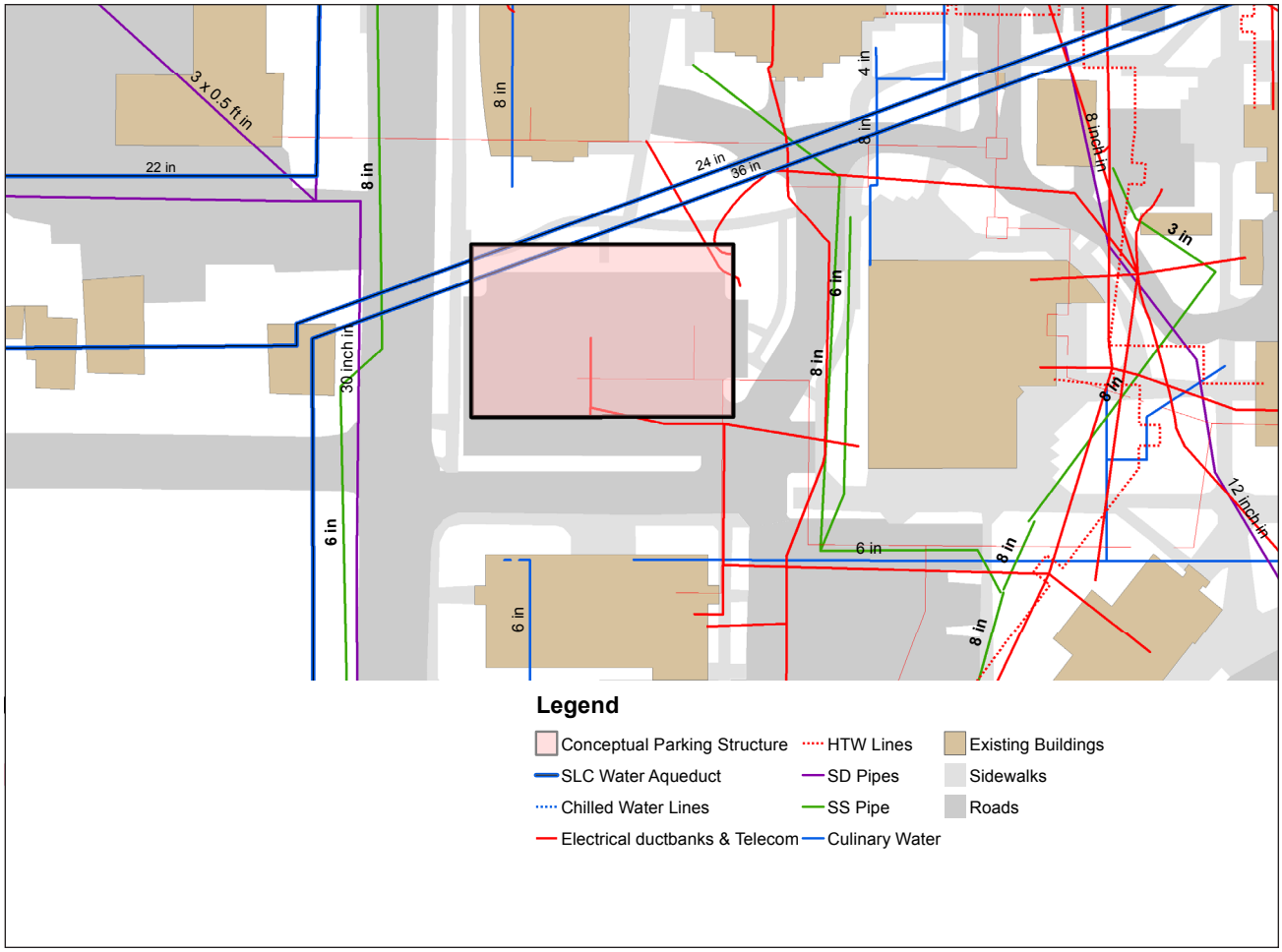


Impact on Infrastructure

There is an existing steam line and multiple HV electrical duct banks on this site which would need to be re-located.

M1 — Sutton Geology

Utility Plan



Campus Connections

In addition to immediate adjacency to the earth sciences core, a key advantage that would be provided by a parking structure on this site would be its close adjacency to Presidents Circle. This area generates not only large academic parking demand, but its administrative and public performance functions currently experience a shortage of valuable public parking. This is not only inconvenient for visitors and patrons, but creates parking conflicts when parking spills into the adjacent neighborhoods during events.

Additionally, this site enjoys excellent vehicular access from 100 South, enabling it to be a true “perimeterized” parking structure, aiding the University in its goal of minimizing the intrusion of vehicles into the campus. At the same time, this perimeter structure would be very convenient to the campus core.

Traffic Summary

Since the intersection which serves the existing surface parking area in this location is already signalized, this can provide a great benefit in terms of managing traffic impact. Because of its adjacency to 100 South, there would be no need to introduce vehicle traffic into the campus core.

There is the risk of possible cut-through traffic into the Federal Heights neighborhood from visitors accessing the site from the north.

Special Considerations

This site is of great strategic importance in addressing the long-standing need to provide parking for not only daily academic use, but also to provide event parking for Kingsbury Hall and Gardner Hall (music performance). Given its key strategic location, a parking structure on this site can support a number of reserved spaces, which will have a positive impact on its revenue stream.

There also exists the potential for a parking structure on this site to support the after-hours, off-campus demand created by events associated with the Greek system precinct on the north side of 100 South. This would help to reduce long-standing parking conflicts that have existed in this area.

Site M6

Business Loop

Site Description

This site is located at the existing surface parking are to the east of the new Business Building, Milton Bennion Hall and the new Beverly Taylor Sorenson Arts and Education Center. With road excellent connectivity with South Campus Drive, this location is similar to the East Union site in that it provides a 'core" campus location, yet with easy vehicular access. And like the East Union site, it also provides a campus "gateway", becoming an important front door for the Huntsman Center and the University Museum of Fine Arts.

The Campus Master Plan proposes future parking structure development at this site, so consideration of this area for parking structure development is consistent with current campus development goals.

A four story structure in this location will have some impact on the views toward the Wasatch Range; although it should have a low impact on views to Wasatch from adjacent buildings since it will be no higher than the Physical Plant and the Special Events Center. With considerable slope crossing the site from east to west, it may be possible to lower the structure into the grade, thus mitigating its height.

Initial Test Fit

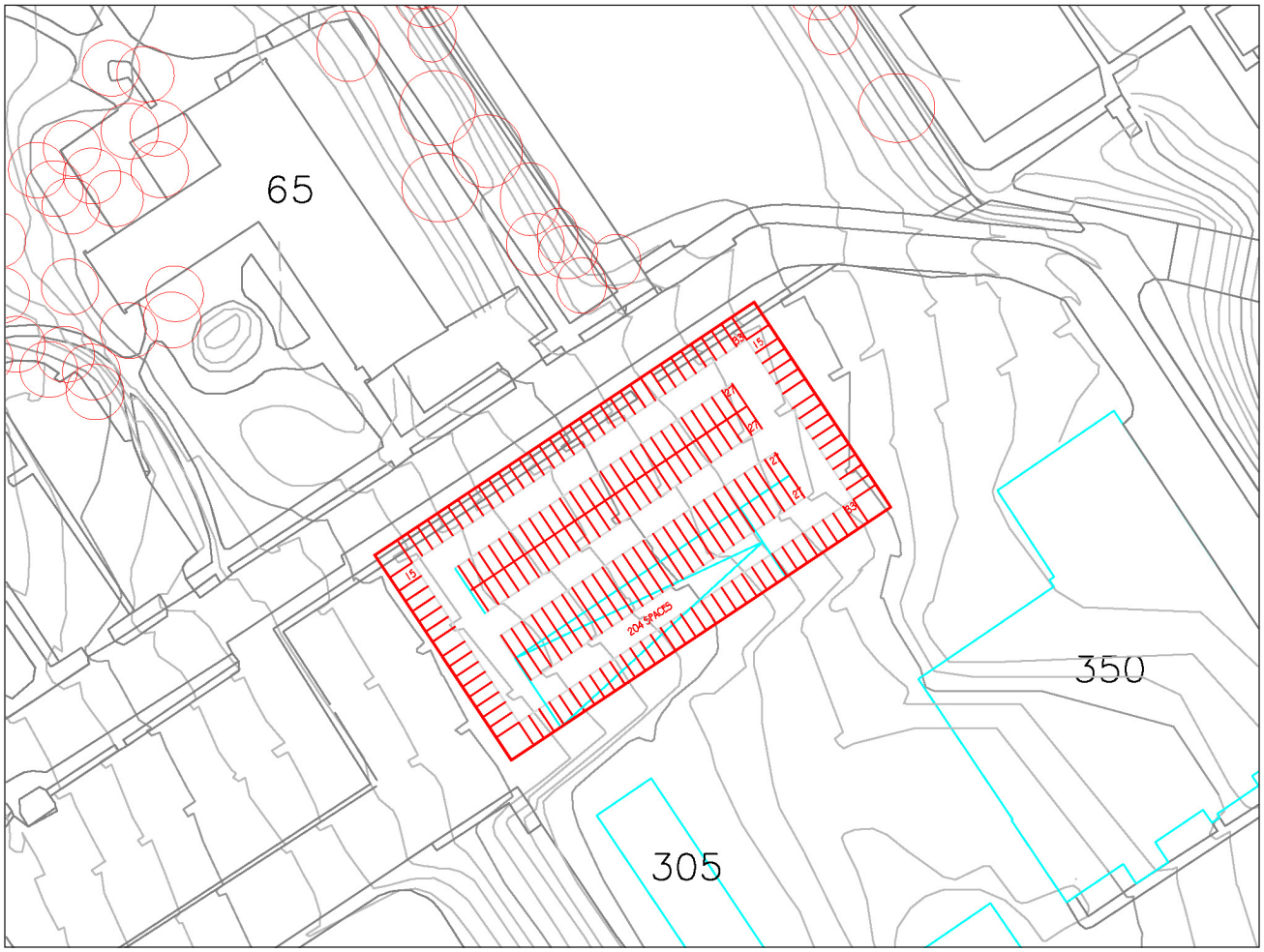
As one of the largest locations under consideration in this Study, the Business Loop site can provide the desired 800 to 1,000 parking spaces within a four story envelope, making it adequate to be a “primary” structure supporting the University’s target parking goal.

Because a structure in this location would overlay 255 existing surface parking spaces, this displacement must be considered when analyzing the net gain of parking spaces provided by a new structure on this site

A four story structure in this location will have some impact on the views toward the Wasatch Range; although it should have a low impact on views to Wasatch from adjacent buildings since it will be no higher than the Physical Plant and the Special Events Center. With considerable slope crossing the site from east to west, it may be possible to lower the structure into the grade, thus mitigating its height.

M6 — Business Loop

4 stories / 800 spaces

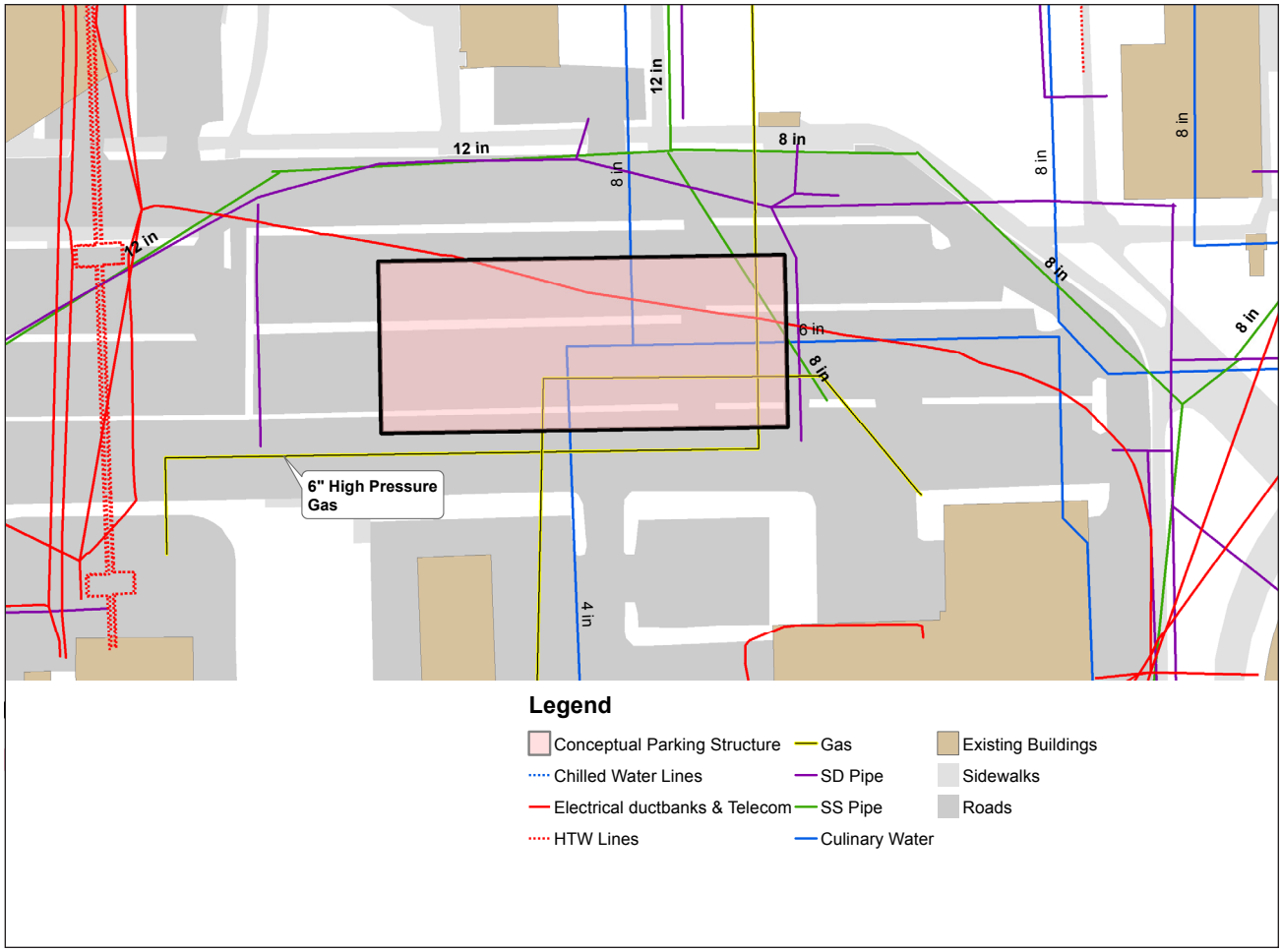


Impact on Infrastructure

Conflicts with the HV electrical duct bank, multiple water mains, an 8” sewer main, and an existing roof drain that serves another adjacent structure would need to be mitigated as part of the development of a new parking structure on this site.

M6 – Business Loop

Utility Plan



Campus Connections

This site provides convenient access to Eccles Business, Milton Bennion Hall, and the Beverly Taylor Sorenson Arts and Education Center. It also has good adjacency to Art and Architecture, UMFA, the Christensen Center, and the Huntsman Center. From this location, access to Central Campus is within easy walking distance.

A parking structure in this location would significantly augment event parking capacity for the Huntsman Center.

Traffic Summary

Locating a parking structure on this site will have an impact on nearby Campus intersections, although these intersections have good capacity. Depending on scheduling, there could be conflicts with Huntsman Center events, as well as Beverly Tanner Sorenson Arts & Education Center events.

This site would present no considerable neighborhood impact.

Special Considerations

Located within close proximity of the Huntsman Center, this site would be able to support events at the Center. It is large enough to accommodate a large footprint, which would enable it to meet the 1,000 car parking target in 4 stories. Care should be taken during the design process to acknowledge the impact of the mass of a structure in this location on views from the Eccles Business Building and the Beverly Taylor Sorensen Arts and Education Center.

Detailed Test Fits

After narrowing the sites selected for the Main Campus to seven, the Study focused on two key factors to further evaluate the remaining sites:

A more site-specific exploration of site opportunities to increase floor plate utilization efficiencies, understand building massing with respect to adjacent buildings, and address grading and excavation issues.

An analysis of each site's "catchment area" to assess the relationship between the number of parking spaces developed and the amount of building area served in terms of net assignable square footage.

Catchment Area

Each site was further subjected to the litmus test of its "catchment area" performance. Conventional planning wisdom holds that most people are comfortable with walking five minutes from a point of arrival to a point of destination. Beyond this distance, there is a tendency to become frustrated (or look for a closer place to park). This is commonly known as the "catchment area" or "pedestrian shed" and is normally considered to be roughly a distance of one quarter of a mile (or from 1,000 to 1,320 feet).

This naturally leads to the question of how many destination building uses are contained within a five-minute walking radius from each proposed parking structure site. Inscribing . mile radius around each parking structure site creates a graphic "net" indicating which buildings on campus are captured within this distance.

Adding the net assignable square footage of each building within the five-minute radius yields the total area served by each proposed parking structure location (non-occupied uses such as physical plants were not included).

By then counting the number of parking spaces that the proposed new parking structure provides and subtracting the number of existing surface parking spaces that are displaced by the new structure, a net yield can be determined. This net yield is added to the remaining surface parking spaces within the catchment area to sum the total number of parking spaces. This total number of spaces, divided by the total net assignable building area within the catchment creates a parking space to area ratio that reflects the net benefit of the structure to its catchment area. This ratio is adjusted to express the ratio in terms of parking spaces per 1,000 net assignable square feet to provide a common baseline number that can be utilized to compare the performance of the sites to one another.

Floor Plate Analysis

While the initial test fits placed a prototype footprint on each site to "test the waters" with respect to the amount of parking that could be provided, the detailed test fits looked at opportunities to more closely tailor the footprints for each particular site.

The specific approach to each site is described in more detailed in the following section.

Combination Options

This Study began with the assumption that a single new parking structure for the Health Sciences Center and a single new structure for the Main Campus would be constructed. After seeing the impact of the catchment area concept on the parking structure service level, the Task Force recognized that a "wider net" could be cast over the Main Campus by splitting the single structure into two separate structures. This enabled the total amount of net assignable area within a fiveminute walking area served by the new parking structures to be increased by a factor of approximately two (depending on the combination) without increasing the parking count.

This allowed the new structures to be strategically placed to more closely respond to campus demand. Corollary benefits to this approach include smaller structures that "fit" better into campus context without overwhelming their neighbors as well as reduced traffic impact since vehicle access to each structure is roughly half of what would be required for a single structure.

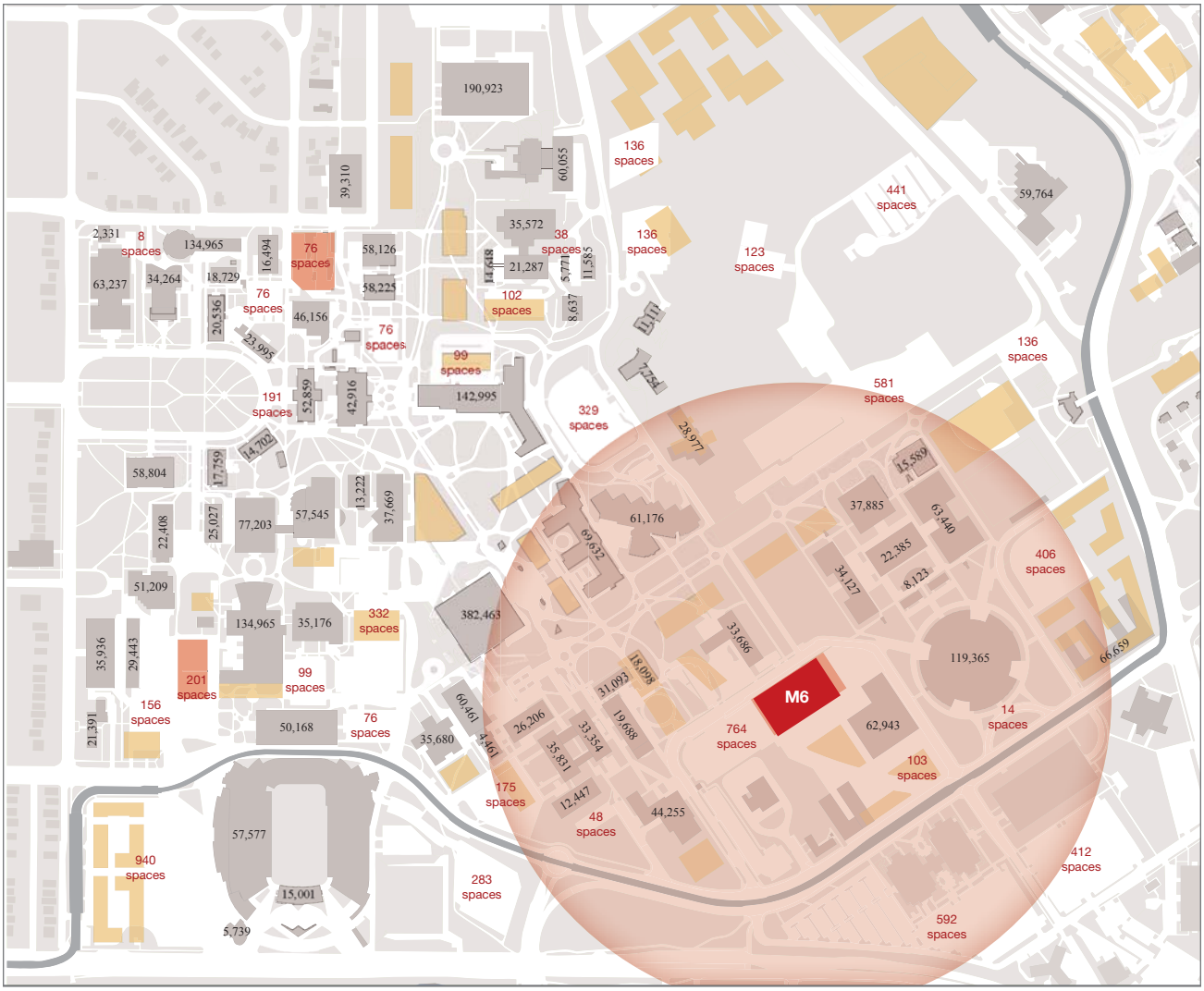
Primary and Secondary Locations

As noted earlier, of the seven sites at the Main Campus remaining on the table for continued evaluation, only four would be large enough to allow for parking structures accommodating 800 – 1,000 spaces within the four-story height limit. This implies that under a single structure scenario, there would actually only be four viable sites. However, with the introduction of the double structure approach, three additional sites become viable, since they are only expected to provide approximately half of the total parking requirement.

This led to a "Primary and secondary" strategy because the four larger sites are within the campus core and the three smaller sites are on the perimeter. This turns out to be fortuitous, because it allows the University to benefit from the advantages of each. Core locations place a large number of parking spaces in the interior of the campus, but also introduce additional vehicular traffic. Perimeter locations help to "pedestrianize" the campus by keeping vehicle traffic on the campus edges, but imply longer walking distances. The "two-pronged" approach of core and perimeter locations takes advantages of the benefits of both while minimizing the disadvantages.

Primary Parking Structure / M6 — Business Loop

Catchment Area

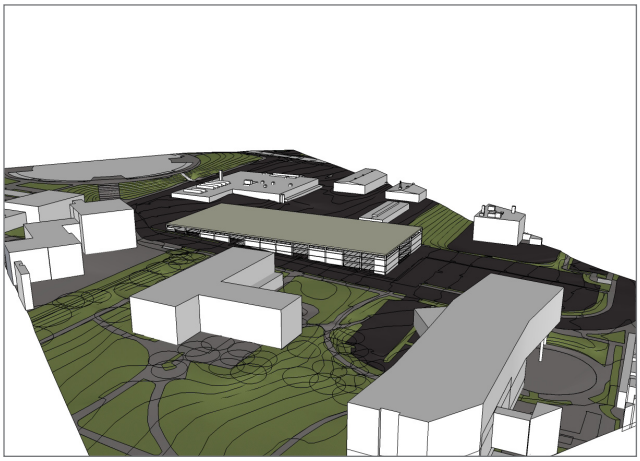


Total Net Assignable Area within catchment:	849,420 s.f.
Total Number of Proposed Parking Spaces:	792 spaces
Total Number Displaced Surface Parking Spaces: (⅓ of Business Lot)	255 spaces
Total Net Gain of Proposed Parking Spaces:	537 spaces
Total Number of Existing Surface Parking within catchment: (½ of South Wasatch Lot, ⅔ of Business Lot, ⅓ of South Huntsman Lot, & ½ of Fine Arts Lot)	1,085 spaces
Total Net Proposed Parking Spaces with Existing Surface Parking:	1,622 spaces
Existing Parking Ratio:	**1.58 spaces / 1,000 n.a.s.f.**
Parking Ratio:	**1.91 spaces / 1,000 n.a.s.f.**

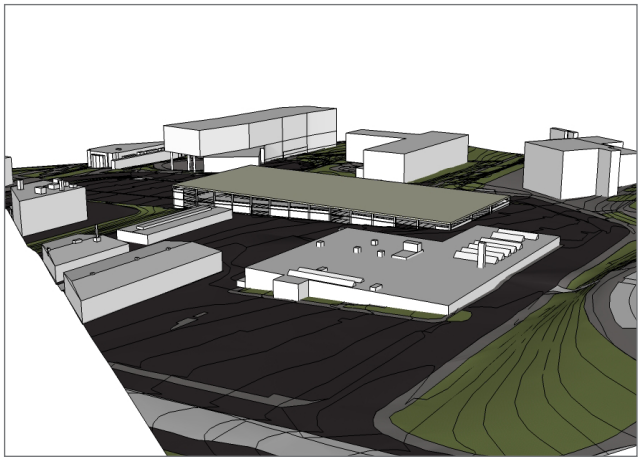
Primary Parking Structure / M6 — Business Loop

Floor Plate Analysis

Site Plan



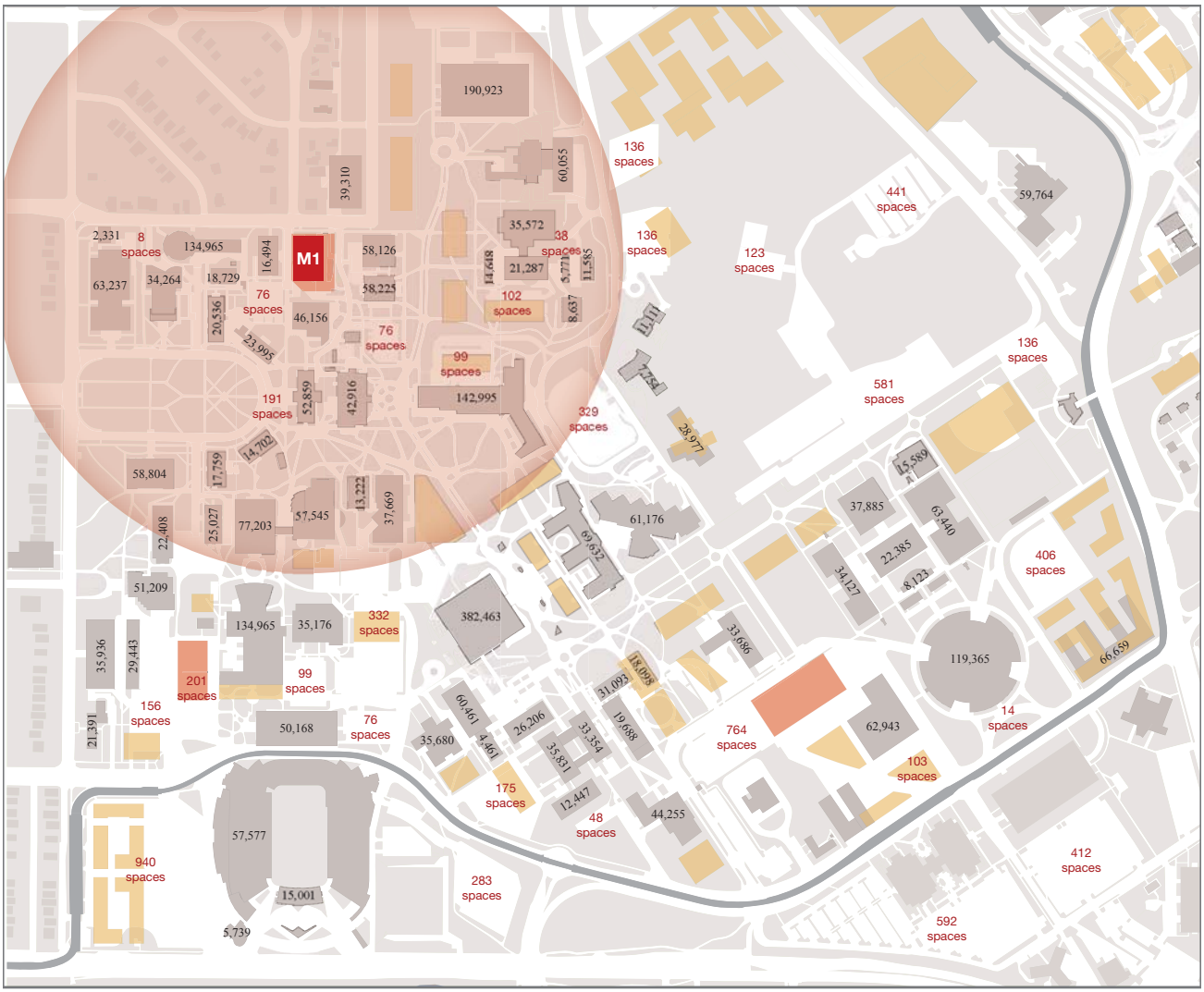
View Looking South East



View Looking North West

Secondary Parking Structure / M1 — Sutton Geology

Catchment Area

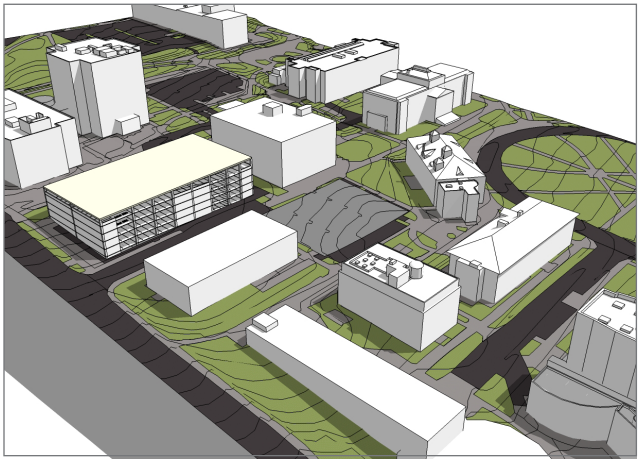


Total Net Assignable Area within catchment:	1,427,954 s.f.
Total Number of Proposed Parking Spaces:	340 spaces
Total Number Displaced Surface Parking Spaces: (½ of Naval Science Lot)	76 spaces
Total Net Gain of Proposed Parking Spaces:	264 spaces
Total Number of Existing Surface Parking within catchment: (½ of Naval Science Lot)	415 spaces
Total Net Proposed Parking Spaces with Existing Surface Parking:	679 spaces
Existing Parking Ratio:	**0.34 spaces / 1,000 n.a.s.f.**
Proposed Parking Ratio:	**0.48 spaces / 1,000 n.a.s.f.**

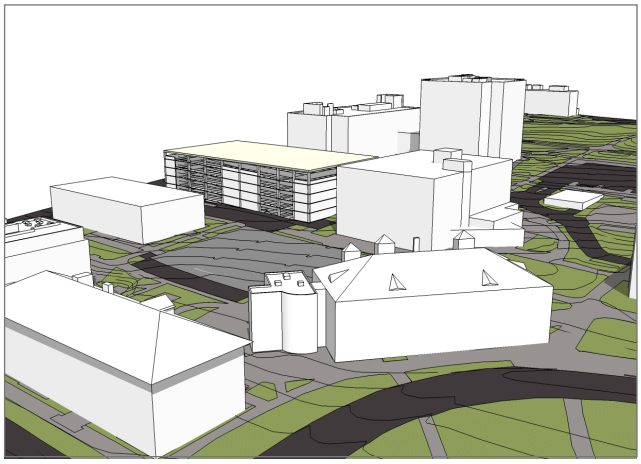
Secondary Parking Structure / M1 — Sutton Geology

Floor Plate Analysis

Site Plan

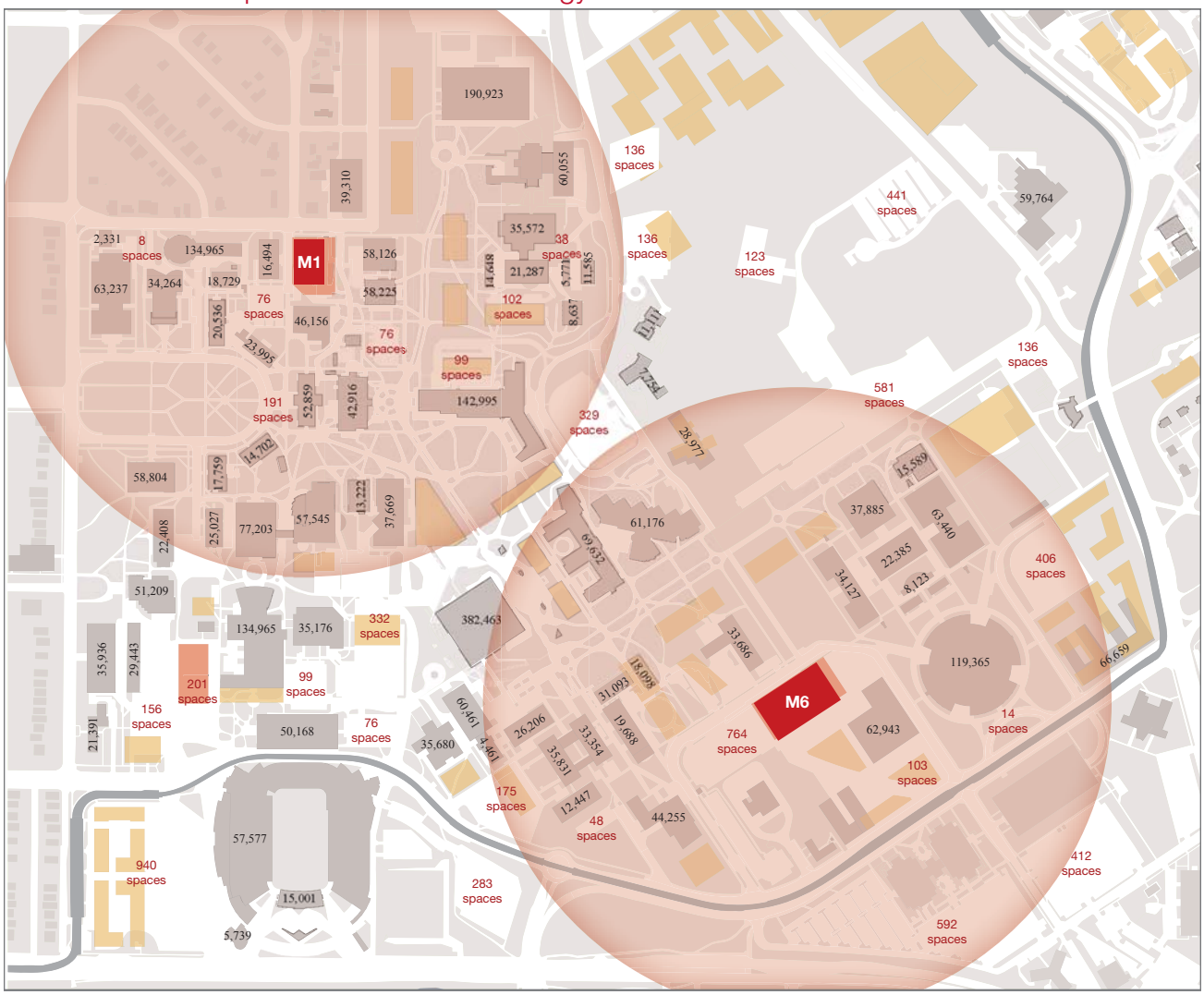


View Looking South East



View Looking North East

Combination Option 7
M6—Business Loop with M1—Sutton Geology



Total Net Assignable Area within catchment:	2,277,374 s.f.
Total Number of Proposed Parking Spaces: (M6 = 792 spaces + M1 = 340 spaces)	1,132 spaces
Total Number Displaced Surface Parking Spaces: (M6 = 255 spaces + M1 = 76 spaces)	331 spaces
Total Net Gain of Proposed Parking Spaces: (M6 = 537 spaces + M1 = 264 spaces)	801 spaces
Total Number of Existing Surface Parking within catchment:	1,500 spaces
Total Net Proposed Parking Spaces with Existing Surface Parking:	2,301 spaces
Existing Parking Ratio:	**0.80 spaces / 1,000 n.a.s.f.**
Parking Ratio:	**1.01 spaces / 1,000 n.a.s.f.**