# Appendix 2 - Urban Design

## c) West Lawn Report

# CAPITOL COMPLEX MASTER PLAN

FINDINGS & RECOMMENDATIONS
WEST LAWN CONCEPT DESIGN
April 9, 2014

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April 9th, 2014

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# 1.0 EXECUTIVE SUMMARY ASSESSMENT

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## 1.1 SUMMARY OF THE WEST LAWN PROJECT

The intent of the West Lawn project is to connect the western portion of the Capitol grounds to Lincoln Park directly west across Lincoln Street. The design expands the West Lawn over Lincoln Street and connects it to Lincoln Park by creating a cut and cover tunnel structure. The design proposes to depress Lincoln Street by approximately six feet at its lowest point and extend the West Lawn at its current elevation over Lincoln Street. The lawn would then step down in a series of historically reflective terraces to match existing grade at the base of the Colorado Veterans Memorial. The design would remove permanent parking from the Capitol Circle and resurface this area with granite and provide two symmetrical plazas for small functions, public art and seating opportunities on the western side of the Capitol building. The expanded West Lawn would accommodate terraced lawn gardens providing large level spaces for gatherings and functions.

In addition to the landscape improvements, the plan also presents the opportunity for a two level underground parking structure located beneath the West Lawn adjacent to the Capitol building. The parking structure would be accessed from the east lane of the proposed Lincoln Street tunnel and provide 195 parking spaces for occupants of the Statehouse. The garage would involve a connection into the basement level of the Capitol building which would require re-configuration of the Capitol basement to allow access to the vertical circulation at the buildings core. For more detailed drawings and descriptions of the West Lawn design, see sections 2.2 and 2.3.

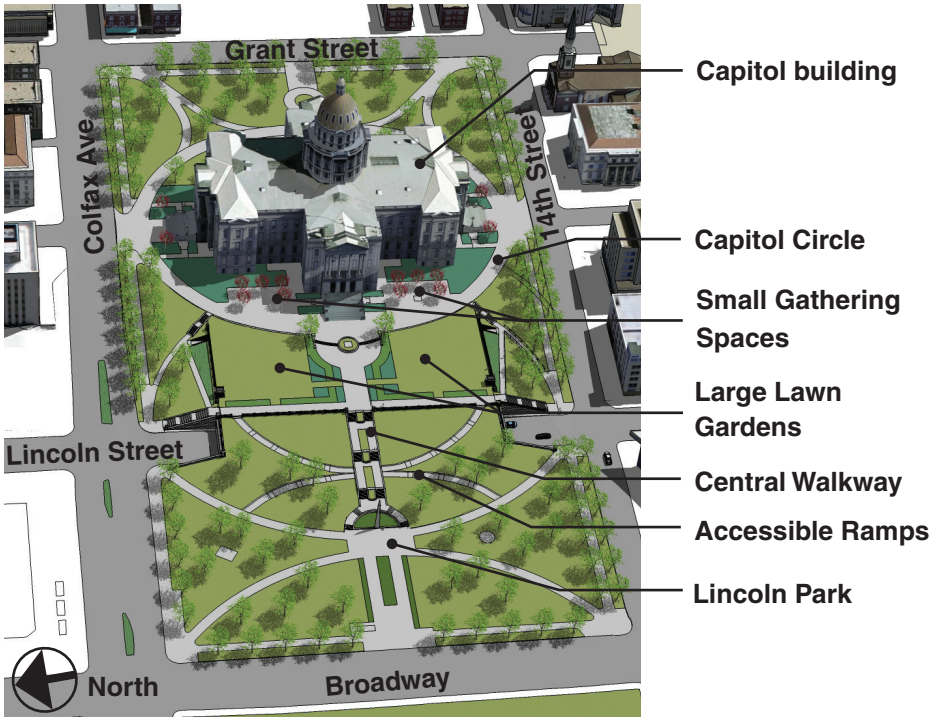


**Illustration A: Showing the Proposed West Lawn Expansion**

## 1.2 HISTORY AND DESIGN OF THE WEST LAWN AND CAPITOL GROUNDS

### A. HISTORY

Colorado State Capitol grounds, designed by landscape architect Reinhard Schuetze at the end of the 19th century, occupy two city blocks bordered by East Colfax Avenue on the north, East 14th Avenue on the south, Lincoln Avenue on the west and Grant Street on the east. The Colorado State Capitol building sits at the center of an elliptical loop drive connecting with Sherman Street where it enters the site on the north and south surrounding the Capitol building. In the present, the Capitol grounds include a series of formal lawns, memorials, and a variety of deciduous and evergreen tree species.

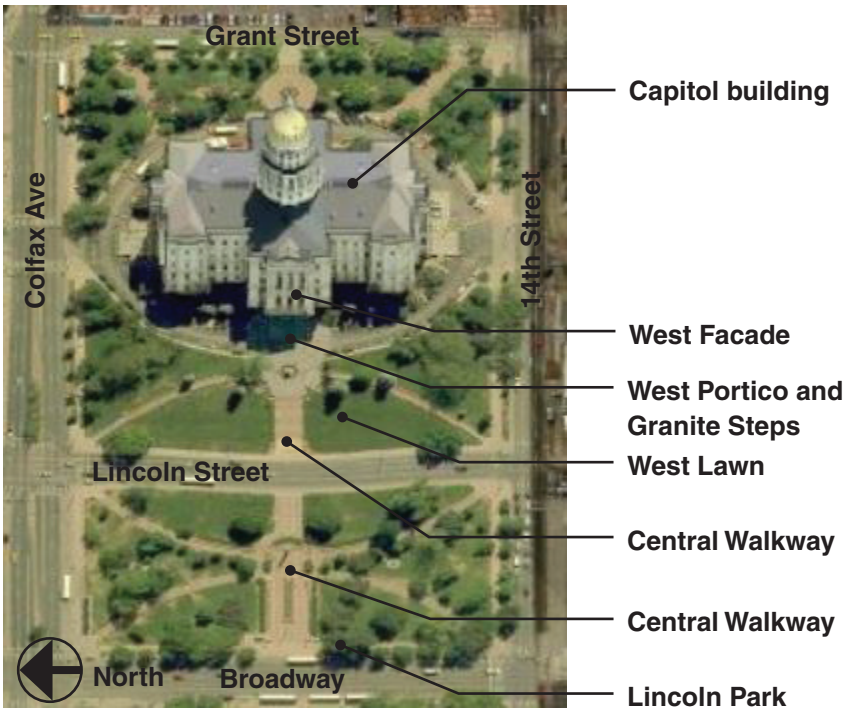


**Illustration B: Showing the West Lawn**

Designed by architect Elijah Myers in 1885 – 1886 and constructed at the turn of the 19th century, the Colorado State Capitol building is a Renaissance Revival building set upon a hilltop with prominent views to the west. The Capitol building is the central component of the Capitol grounds and its principal façade faces west towards the Rocky Mountains overlooking the west lawn and Lincoln Park. The west lawn was designed as a series of stepping terraces and sloping lawns that allow for views of the Capitol building from multiple venues and serve as a foreground for views of the City of Denver and the mountains beyond.

Aligned with the east-west axis of the Capitol building, the spatial organization of the west lawn is a dominant feature of the Capitol grounds. The west facade of the Capitol building features a portico with a monumental flight of granite stairs. The portico is a central organizing element of the design of the west grounds, creating a formal axial configuration. At the base of the stairs, the loop drive creates a semi-elliptical form surrounding the Capitol building. A central walkway, extending west from the axis of the west portico and stairs, divides the west lawn symmetrically into two expanses of lawn. These elements - the portico, the granite stairs and the outer edge of the loop drive and points along the central walkway - provide a sequence of vista points from which the city and Front Range can be viewed. Trees lining East 14th and East Colfax Avenues are intended to frame these views. The central walkway extending from the portico to Lincoln Street was laid out in a series of sandstone stairways which served as viewing terraces.

Lincoln Park, designed by Schuetze concurrently with the Capitol grounds, serves to extend the grounds one block further to the west. The park is bordered by East Colfax Avenue to the north, East 14th Avenue to the south, Lincoln Street to the east, and Broadway to the west. The park acts as a link between the Capitol grounds and Civic Center Park to the west. Lincoln Park features a central walkway that aligns with the axis of the Capitol building and the walkway of the west lawn. Two semi-eliptical lateral walkways connect the corners of the block to a central area where they meet with the central walkway. For a more detailed history of the west lawn, see section 2.1(A).

**B. ALTERATIONS**

In 1991, Phillip E. Flores Associates, a Denver-based landscape architectural firm, published the Capitol Complex Landscape Master Plan which detailed a series of proposed landscape improvements to the Capitol grounds, Lincoln Park, and portions of the two blocks directly north and south of the Capitol buildings and grounds. Several of the elements outlined in the document were executed while others remain unrealized.

Relating to the west lawn and immediate Capitol grounds, several elements of the Flores plan were implemented throughout the decade of its completion. In 1990, two semi-circular plazas outlined in phase 3 of the document were constructed at the base of the west portico and stairs. These plazas were comprised of decorative pavers and small retaining walls. The plazas served as a connection between the west stairs of the Capitol building and the central walkway to the west. For a more detailed description of the West Lawn alterations, see section 2.1(B)

## C. BRIDGE CONCEPT

While assembling the Landscape Master Plan, Flores, along with C.W Fentress Architects, proposed a pedestrian bridge across Lincoln Street. Much like the expanded current West Lawn concept, the bridge was designed to extend the central walkway beginning at the plaza surrounding the Civil War Monument and terminate in the central plaza of Lincoln Park, the current location of the Veterans Monument which was completed after the bridge proposal. The concept aimed at facilitating an easier, more convenient, pedestrian connection between the Capitol building and grounds and Lincoln Park.

The bridge, as proposed, would take dimensional cues from the existing central walkway by continuing its approximately 32' width across Lincoln Street with the intention of staying in step with the intent of Schuetze's original design. The existing central walkway west of the Civil War monument on the west lawn and east of the Veterans Monument in Lincoln Park would have to be removed to accommodate the bridge structure. The bridge would step down slightly from the Civil War monument, cross Lincoln Street at a consistent grade and land in Lincoln Park with three sets of terraced stairs. Two sets of stairs would connect the Capitol building and grounds with the sidewalk on the east side of Lincoln Street, flanking the bridge structure to the north and south. Similarly, two sets of walkways would connect the west sidewalk of Lincoln Street with the remainder of Lincoln Park.

To allow the bridge structure to stay at the desired elevation and avoid additional incline, Lincoln Street would have to be excavated and lowered approximately six feet. The sidewalks on either side of the street would remain at the existing grade providing separation from vehicles. The bridge, at its highest point, would span approximately 16' above the roadway.

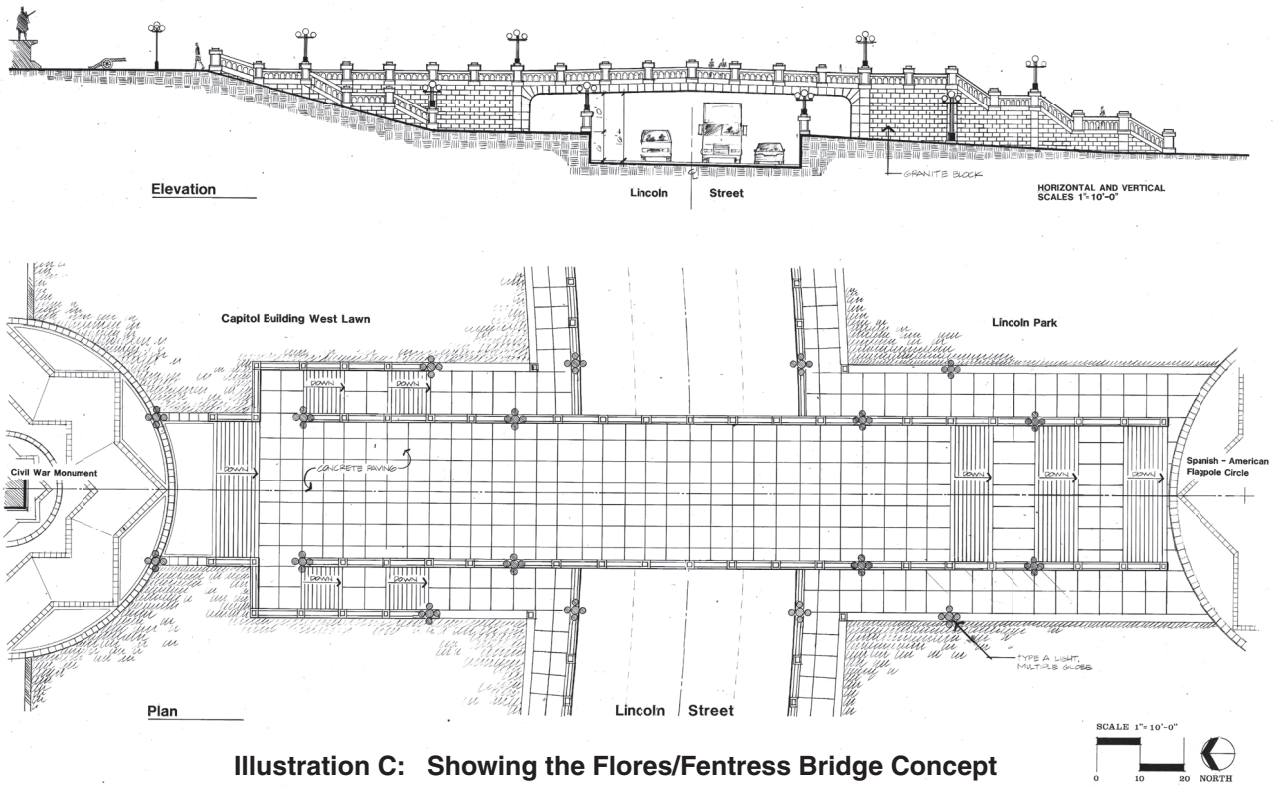


**Illustration C: Showing the Flores/Fentress Bridge Concept**

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## 1.3 WEST LAWN DESIGN PHASE ISSUES

### A. CONNECTION TO CAPITOL BASEMENT

The proposed parking garage under the expanded West Lawn is designed to connect to the Capitol building at its basement level. The connection would occur under the west portico and stairs of the Capitol building. Fire walls and doors would have to be installed at the point of connection between the proposed garage and the Capitol building basement. The Capitol building would be accessible from the garage through existing library, mechanical, and office spaces in the basement which would have to be renovated to accommodate the connection. A grand staircase from the upper level of the garage would connect to the basement in the central portion of an existing office, space which would be repurposed for circulation. An elevator, connecting both levels of the parking structure, would connect to a room currently used for mechanical purposes directly to the west of the office space. This space would have to be entirely repurposed for the proposed elevator, stairs, and emergency exit to the Capitol grounds. East of the converted office space, approximately five feet of the southern portion of the library space would have to be acquired for conversion to a hallway corridor. The newly constructed corridor would connect to Capitol rotunda and reception areas. From there, a visitor or employee would be able to access the remainder of the Capitol building via the rotunda staircase or elevators located east of the rotunda area. During construction, the west portico and stairs would have to be removed. For more detailed drawings of the basement connection, see section 2.4.

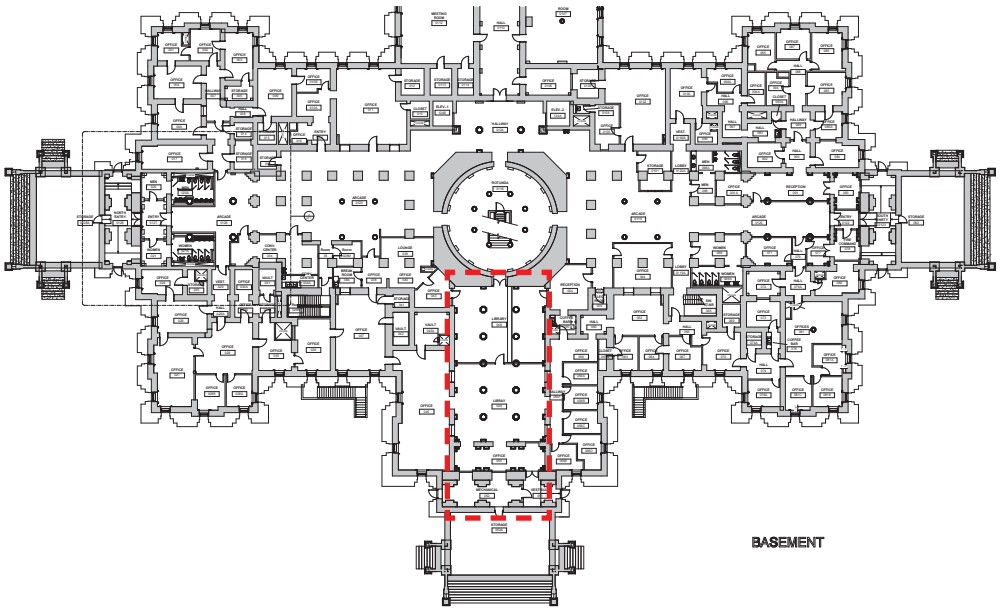


**Diagram 1: Existing Capitol Basement Showing Area of Proposed Change**

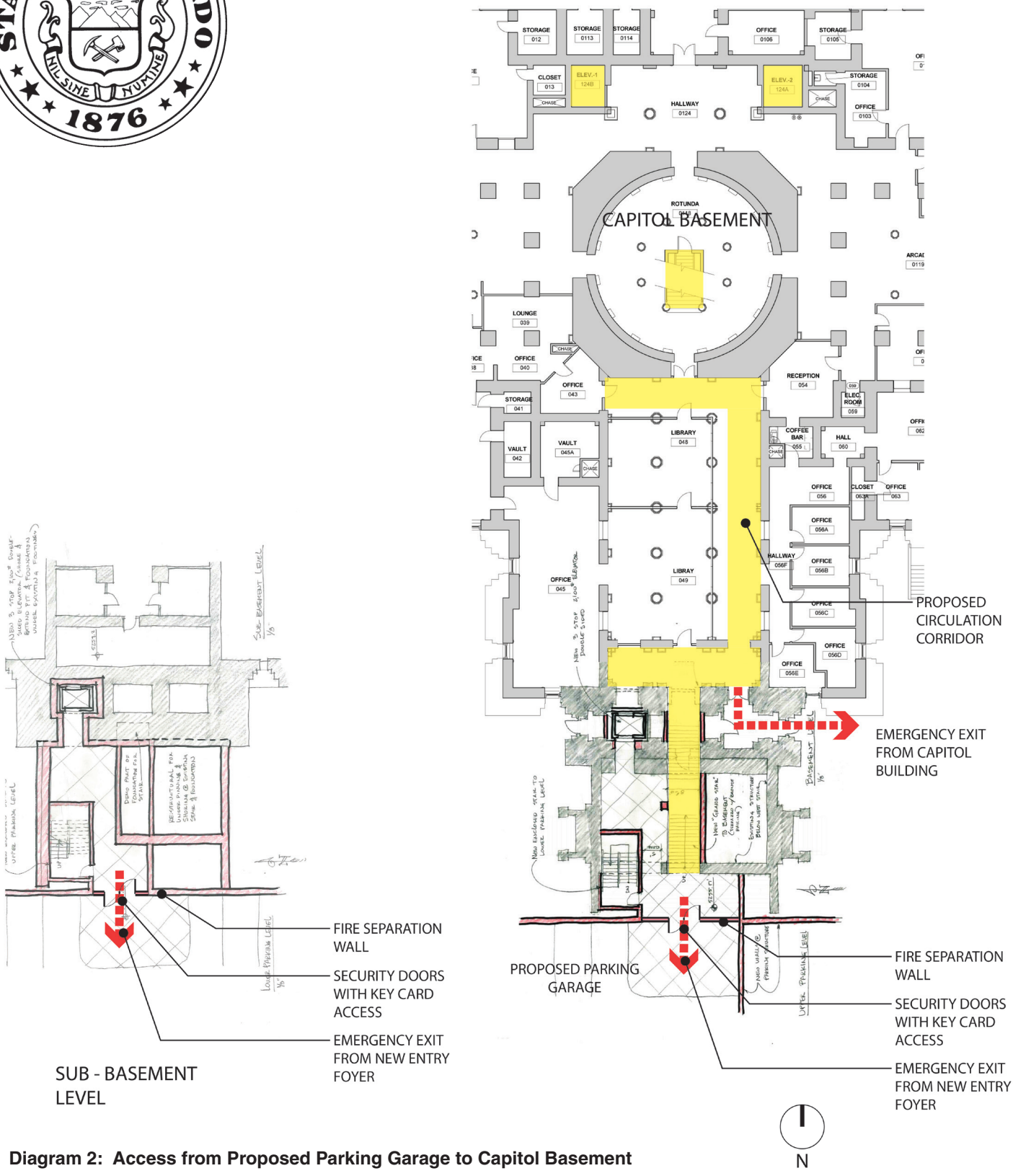


**Diagram 2: Access from Proposed Parking Garage to Capitol Basement**

## 1.4 POTENTIAL IMPACT OF THE WEST LAWN PROJECT ON THE NATIONAL HISTORIC LANDMARK DESIGNATION

### A. DESIGNATION

In 2012, the Civic Center area, including State of Colorado and City of Denver buildings and landscape elements were designated as a National Historic Landmark by the National Park Service. This designation took into account the integrity of the original designs - including Schuetze's landscape concepts - and the degree to which these designs were realized and preserved over time. This designation was the first National Historic Landmark in the City of Denver.

### B. IMPACT

The west lawn was designed as the primary elevation of the Capitol grounds and building. It was created to capture the view and establish the prominence of the Capitol building as a major element in the Civic Center. Lincoln Park, similarly, was conceived as a link between the state and city portions of the Civic Center and as a forecourt to the Capitol building. Lincoln Street is considered an important part of the Civic Center and a primary view point for the Capitol. The West Lawn expansion project, though sensitive to the historic character of its surroundings, fundamentally impacts the existing west lawn, Lincoln Park, and Lincoln Street as conceived by Schuetze. This alteration affects the views and structure of the Capitol grounds and Civic Center area and, as a result, could have a potential effect on the designation as a Landmark. The impact to the Civic Center area and the designation itself should be considered and studied should the project move forward. Several preservation groups, including History Colorado, History Denver, and the National Park Service should be consulted to establish the extent of the impact.

For a more detailed description of the National Historic Landmark designation impacts, see section 2.5.

## 1.5 VISUAL AND CULTURAL IMPACTS

### A. LINCOLN STREET PRESENCE

Lincoln Street is currently an integral part of Denver's Cultural District. The street comprises an important part of the Civic Center, Lincoln Park and west lawn connection that is collectively a place of social interaction, major events, government rallies, and protest. While the extension of the West Lawn above Lincoln Street will assist connectivity and visual continuity along the east-west axis, linking the Capitol with Lincoln Park, the street experience along Lincoln will be diminished. The view of the Capitol from multiple angles and the open space that shapes those views is currently an important part of the way the city and the district is experienced, by visitors and residents alike.

**Illustration D: Showing the Capitol building and West Lawn From Lincoln Street with Schuetze's Central Walkway in the Foreground**

## B. ACCESSIBILITY

Despite the greater east-west connectivity, direct access into Civic Center park across Broadway remains a challenge. This improved east-west access comes at a cost to north-south access both along Lincoln Street and through the West Lawn. The raised elevation results in inhibited pedestrian access along Lincoln Street. Pedestrian access will be restricted to stairs, or an indirect ramp to accommodate ADA movement, through this zone on the east side of the street, while the west side will have no pedestrian access from the Colfax Avenue or 14th Street intersections. The elevated design of the West Lawn also brings to light issues with accessible access from the West Lawn into Lincoln Park; the design would need to incorporate ramps which would descend the 19 feet of elevation change from the West Lawn to Lincoln Park. Diagram 4 shows a proposed configuration for the ramps which would have an impact upon the aesthetic of the design. For more detailed drawings and descriptions of the West Lawn design and the accessible ramps, see sections 2.2 and 2.3.

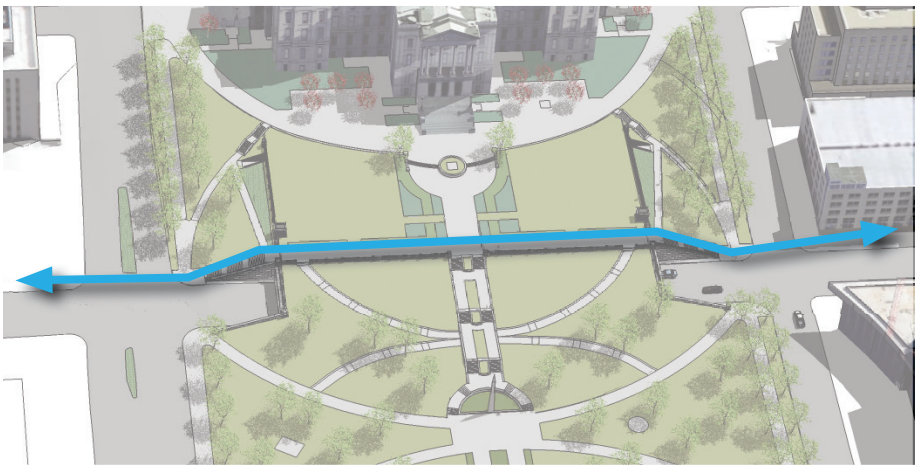

**Diagram 3: Proposed pedestrian route**

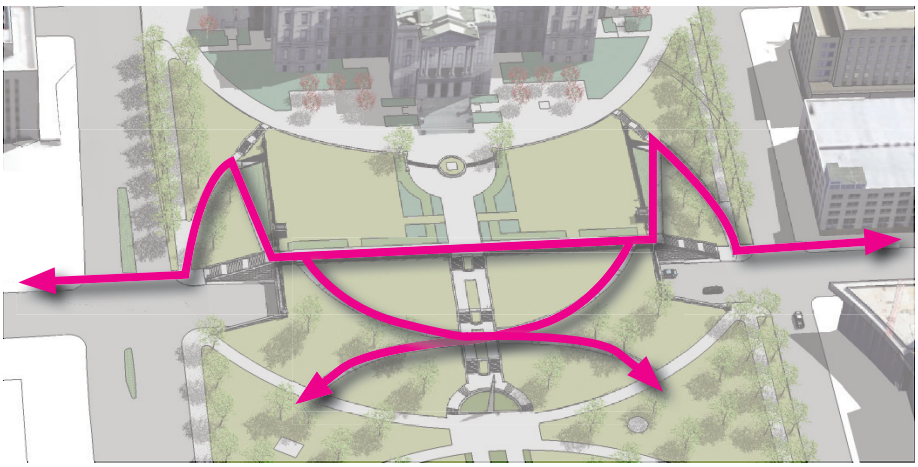

**Diagram 4: Proposed ADA accessible route**


**Illustration E: Pedestrian eye view of the West Lawn looking northeast from 14th and Lincoln (existing)**

**Illustration F: Pedestrian eye view of the West Lawn looking northeast from 14th and Lincoln (Proposed)**

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## 1.6 ENVIRONMENTAL IMPACTS

Intake and exhaust vent structures will be required to support the mechanical ventilation of the Lincoln Street tunnel as well as the potential parking garage. These will be designed and operated as independent systems.

This system will require two vertical structures (measuring approximately 10' x 8' at the base and standing 10' tall) within the west lawn area resulting in several potential issues:

- Visual impact (integrating the structures into this historically significant area in an aesthetically considerate manner).
- Noise created by the fan system, which may impact the quality of the visitor experience in close proximity to the structures. While in most situations this may be acceptable, it may be a greater concern within this significant, ceremonial park setting.
- Background air quality modeling will need to be undertaken to determine the baseline air quality environment of the site and adjacent areas. The exhaust vent will need to be modeled at a range of different winds.

For a more detailed description of the West Lawn structure and ventilation system, see sections 2.7 and 2.11.

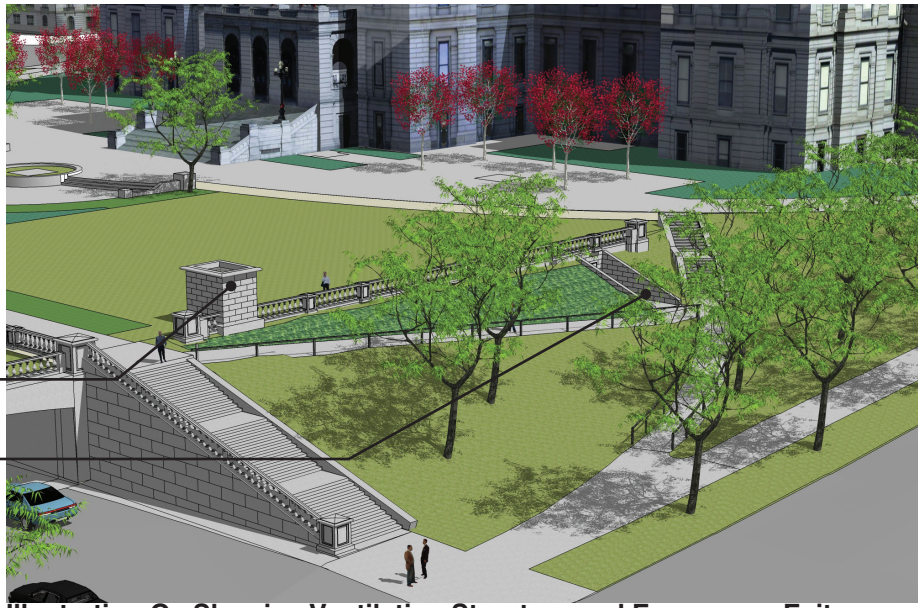



**Illustration G: Showing Ventilation Structure and Emergency Exit from 14th Avenue and Lincoln Street (mirrored on north side)**

## 1.7 PROCESS

The West Lawn is a high profile site due to its proximity to the Civic Center and location within the Cultural Core. A project of this magnitude would require an extensive stakeholder engagement process. While the state is not directly required to formally submit an application for development approval with the City and County of Denver, engagement with the various city and county agencies is recommended. Likewise, it would be appropriately considerate to reach out to major stakeholders to seek consensus to enable the project to move forward. This process has the potential to add a significant amount of time to the design process.

While the current west lawn and Lincoln Park are located on State-owned land, the Lincoln Street right-of-way is owned, maintained, and operated by the City of Denver. Reconstruction of the Lincoln Street and construction of the tunnel structure above it may require extensive cooperation between the state and city.

## 1.8 CONSTRUCTABILITY

Construction of the West Lawn project is anticipated to extend over 24-30 months. The most significant construction impact will be on roads and traffic, particularly Lincoln Street. Intersection modifications will be required at Colfax Avenue and 14th Avenue where they intersect with Lincoln Street. Excavation will also be required on 14th Avenue to enable connection to the existing storm water line. The reconstruction of Lincoln Street will require the existing storm water line to tie into to the main line on 14th Avenue at a point further west on 14th Avenue.

Due to the nature of the sandy soils, the construction of the potential parking structure may require substantial shoring. Detailed geotechnical analysis of the existing conditions within the area is lacking, which raises concerns relating to the stability of Capitol building should deep excavation occur in close proximity to the structure. A detailed geotechnical study should be commissioned to determine the necessary construction shoring required to ensure effective protection of the Capitol building during construction.

In addition connections from the parking garage to the Capitol basement will require the removal of the west portico and granite stairs to facilitate the underground connection. The stairs and portico would be preserved and replaced after the construction.

Several mature trees located in the West Lawn would either have to be removed or have their root structures affected by the construction. For a more detailed description of the West Lawn structure, see sections 2.6 and 2.7.

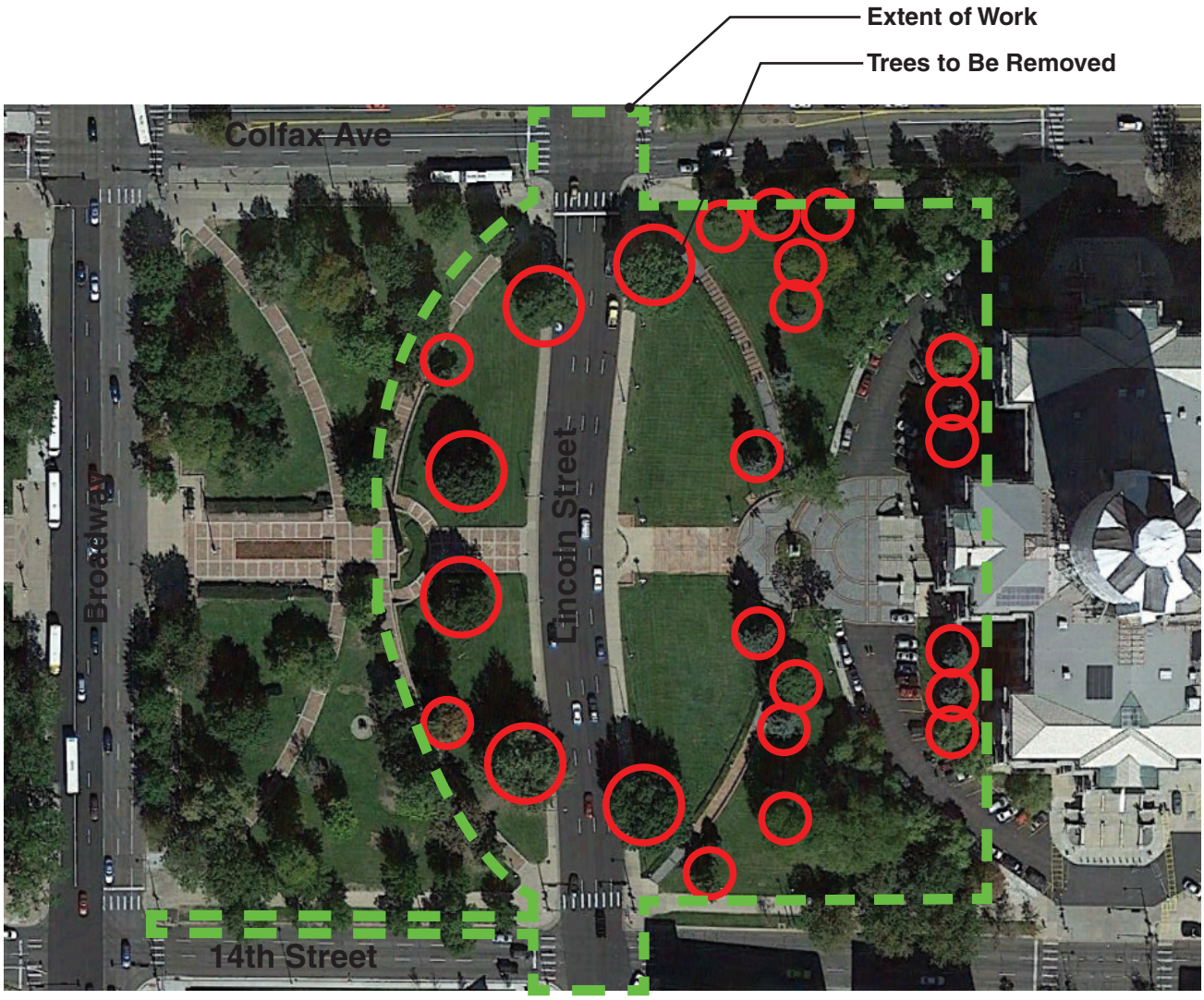



**Diagram 5: Showing the Trees to be Removed and Extent of Work**

## 1.9 TRAFFIC IMPACTS

The construction of the Lincoln Street tunnel will require the temporary re-routing of traffic for a period of 12 – 18 months. Construction will require the complete or partial closure of 14th Avenue during the duration of the work on the storm water system. Traffic diversions and lane closures will impact accessibility and add travel time to both the a.m. and p.m. peak.

The proposed tunnel may create congestion on Lincoln Street due to the restricted sight lines of traffic exiting the tunnel at the intersection of Lincoln Street and Colfax Avenue. Traffic entering and exiting the potential parking garage entrance will have effects upon the traffic flow on Lincoln Street. Vehicles leaving the parking garage will have limited merging distance and difficulty crossing multiple lanes on Lincoln to make left turns onto Colfax Avenue, especially during the a.m. and p.m. peaks. The preliminary traffic study conducted as part of this analysis shows that in the a.m. peak hour northbound traffic on Lincoln Street could queue from Colfax Avenue past 14th Avenue. This may limit the efficiency of vehicles entering and exiting the Capitol garage. During the p.m. peak hour, heavy northbound traffic on Lincoln may create difficulties for vehicles exiting the garage. In particular, vehicles heading for a left turn onto westbound Colfax Avenue may struggle to cross over three lanes of traffic. For a more detailed description of traffic impacts, see sections 2.8

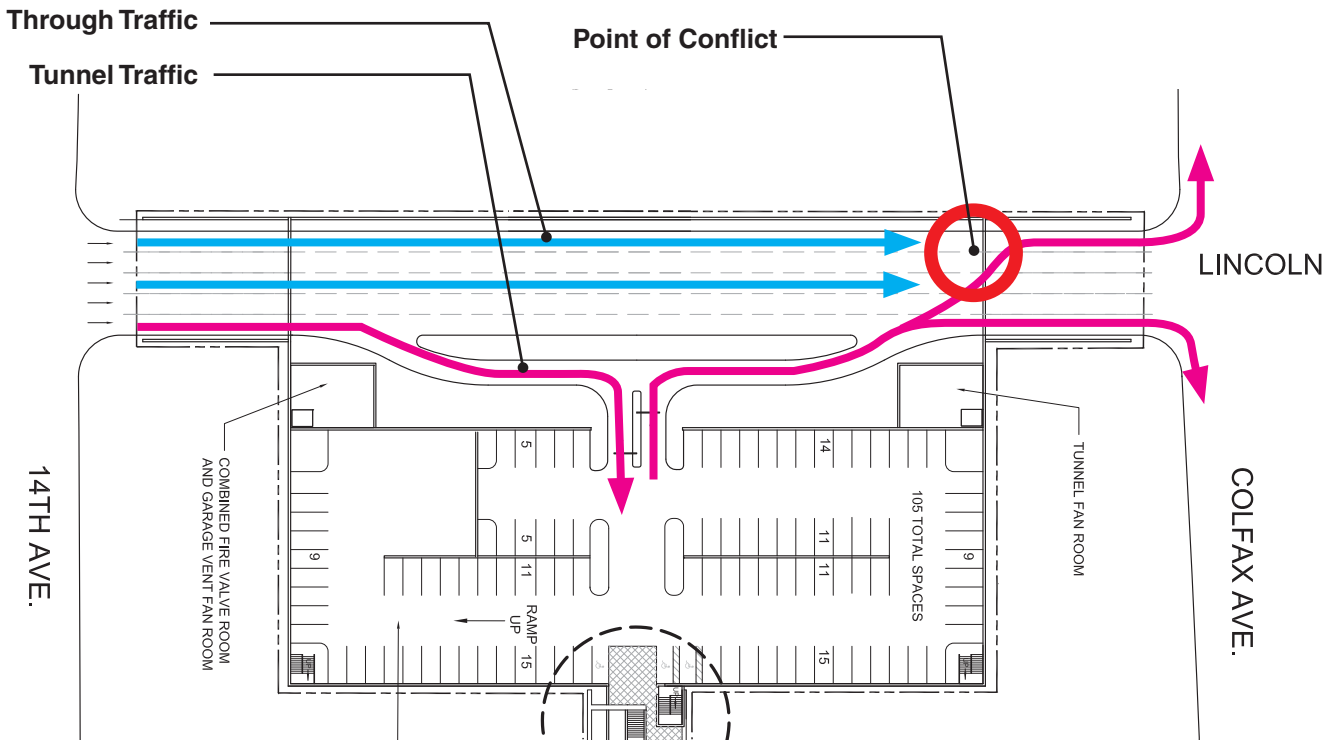
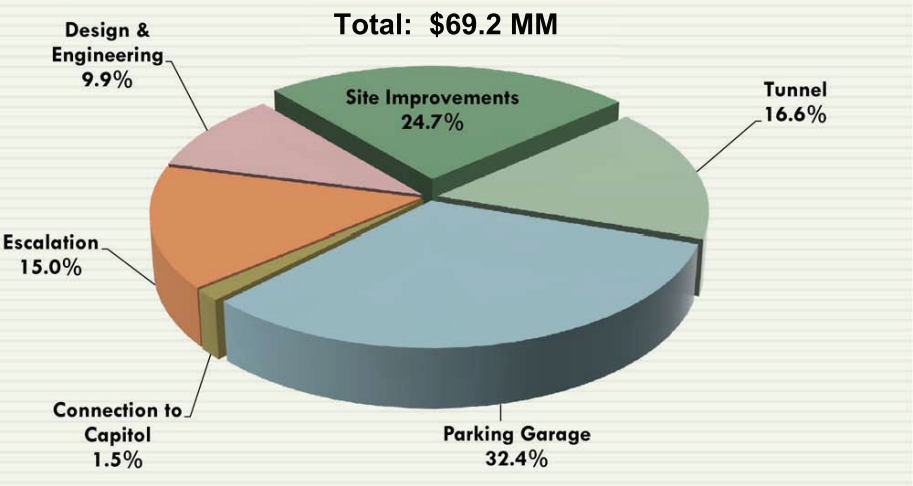



**Diagram 6: Showing traffic entering and exiting garage**

## 1.10 COST TO BUILD

The cost summary shown in the table below estimates a total construction cost of $68.8 million dollars for the complete project scope. This does not include ongoing maintenance costs for the tunnel and garage mechanical systems. For a more detailed cost analysis, see sections 3.0.




| Item No. | Description | SF | Total | $/SF |
|---|---|---|---|---|
| 1 | Site Improvements | 250,000 | 17,339,973 | 69.36 |
| 2 | Tunnel | 40,174 | 11,380,063 | 283.27 |
| 3 | Parking Garage | 83,250 | 22,254,033 | 267.32 |
| 4 | Connection to Capitol Building | 3,640 | 1,008,532 | 277.07 |
| 5 | Contingency on Above | | w/ Above | |
| | **Subtotals:** | **377,064** | **51,982,601** | **138** |
| 6 | Escalation - 6.75% per year | | 9,464,082 | 25.10 |
| 7 | Contingency on Above | | 946,408 | 2.51 |
| | **Escalation Subtotal:** | | **10,410,491** | **27.61** |
| | **Base Price \ FF&E \ EscalationSubtotal:** | | **62,393,092** | **165** |
| 8 | Design Fees at 10% | | 6,239,309 | 16.55 |
| 9 | Contingency on Above | | 623,931 | 1.65 |
| | **Design Fee Subtotal:** | | **6,863,240** | **18.20** |
| | **Base Price \ Escalation \ Design Fee Subtotal:** | | **69,256,332** | **184** |

| | | |
|---|---|---|
| **PROJECTED COST AT TIME OF CONSTRUCTION** | **69,256,332** | **184** |

## 1.11 SECURITY

The West Lawn project provides some potential security benefits but also creates a number of security challenges.

- The expanded West Lawn creates a secure structure and access from the garage to the Capitol building for the Governor and the Legislature allowing access away from protest activity.
- Vehicles and parking are removed from Capitol Circle to the secured underground structure.
- The garage allows for the parking of vehicles in close proximity to the building foundations.
- Parking structures are inherently difficult to monitor; entrance and egress to the structure is located adjacent to and beneath the Governor's offices.
- The Lincoln tunnel may provide opportunities for criminal activity and access to the garage circumventing the screening process.
- Lincoln Park is currently the largest security challenge within the Capitol Complex. Lincoln Street creates separation between the west lawn and Lincoln Park; bridging Lincoln Street would remove this separation.
- Elevating the West Lawn would create line of sight challenges for patrolling the west lawn from the perimeter and require patrols of the interior of the park.
- The Lincoln tunnel buries Lincoln Street below the West Lawn removing an existing venue for unpermitted protestors within the Lincoln right-of-way. The State Patrol will now have to direct these demonstrators to the Broadway right-of-way, which is a considerable distance from the Capitol building.
- The Lincoln tunnel and elevating of the West Lawn provides pedestrian access directly over Lincoln Street which may provide the opportunity for individuals to drop objects onto passing vehicles.

Given the challenges faced by the proposed plan and the need to secure the garage and adopt an increased patrolling strategy for the West Lawn and into Lincoln Park, this project would potentially require two additional trooper FTE's and two additional security FTE's and also require the addition of a minimum of 15 additional security cameras within the structure and the West Lawn. For a more detailed description of security issues, see sections 2.10.

## 1.12 OPERATIONAL ISSUES

The requirement for mechanical ventilation within the Lincoln Avenue tunnel and the parking garage will incur an on-going cost, both operational and maintenance-based, throughout the life of the tunnel and parking garage. For a more detailed description of the West Lawn structure and ventilation system, see sections 2.7 and 2.11.

## 1.12 SUMMARY

The purpose of this study was to determine in detail the technical requirements of the project. The technical evaluation and design form the basis of a detailed cost estimate for the implementation of the West Lawn project. The operational costs of the proposal have not been fully assessed at this stage. There are a number of significant non-financial impacts associated with the proposal and these will need to be further evaluated in order to determine the overall cost benefit of the project. It is recommended an Environmental Assessment or Environmental Impact Study be undertaken.

This report identifies the intent of the West Lawn project as connecting the western portion of the Capitol grounds to Lincoln Park by bridging Lincoln Street; the design also proposes to remove parking from the Capitol circle. The proposed parking structure is an offshoot of this design intent and may not be viewed as a critical component of the project. It however provides an option for the relocation of the parking spaces currently located within the Capitol circle. The report has initially identified a number of pros and cons related to the proposed design:

**Pros:**

**Visibility and Appearance**

- The project creates a continuous landscape bridging Lincoln Street and connecting Lincoln Park with the West Lawn.
- The proposed design introduces additional space for programmed and unprogrammed activities and provides a forum for large gatherings and events.
- There are aesthetic advantages to removing parking from the Capitol circle; this would remove a non-original design element and convert the circle back to its original use and structure.

**Security**

- There are security advantages to removing the parking from the Capitol circle and providing secure parking underground with access for the Governor and members of the General Assembly to the Capitol basement.
- There are safety advantages by providing a connection between the West Lawn and Lincoln Park and separating pedestrian traffic from vehicular traffic mid-block at Lincoln Street.

**Accessibility**

- The proposed design creates a designated accessible pathway for disabled users to cross over and through the West Lawn separated from vehicular traffic on Lincoln Street.

**Traffic Issues**

- Removal of traffic from the Capitol circle reduces conflicts between cars and pedestrians, providing a pedestrian refuge on the Capitol grounds.

**Cons:**

**Visibility and Appearance**

- The creation of the Lincoln Street tunnel and the resulting loss of public realm/ right-of-way adjacent to Lincoln Street removes this area as a venue for non-scheduled public demonstrations with the State Capitol as a backdrop.
- There will be a loss of a number of mature trees within the West Lawn. While the design replaces these trees, it will be a number of years before they will retain the prominence of the existing landscape.

**Security**

- Elevating the West Lawn above the adjacent streets removes its relationship to Lincoln Street, 14th Avenue and Colfax Avenue creating the perception of an unmonitored and potentially unsafe environment and requiring additional security patrols in the parking garage, Lincoln Street tunnel, and the West Lawn.
- Elevating the West Lawn provides pedestrian access directly over Lincoln Street which may provide opportunity for individuals to drop objects onto passing vehicles.

**Accessibility**

- Elevating the West Lawn over Lincoln Street necessitates the introduction of multiple accessible ramps required to traverse the elevation gain.

**Traffic Issues**

- Traffic entering and exiting the parking garage will have effects upon the traffic flow on Lincoln Street - Queuing past 14th Avenue in the a.m. peak and potentially crossing three lanes of traffic to turn left on Colfax Avenue during the p.m. peak.

**Historic Designation**

- The proposed design may impact the historical fabric of what was there and what was foundational to the National Historic Landmark designation of the site, including the view of the Capitol from Lincoln Street and the layout of the west lawn.

The opportunity costs and benefits of the proposal should be assessed in the context of the overall Capitol Complex Master Plan.

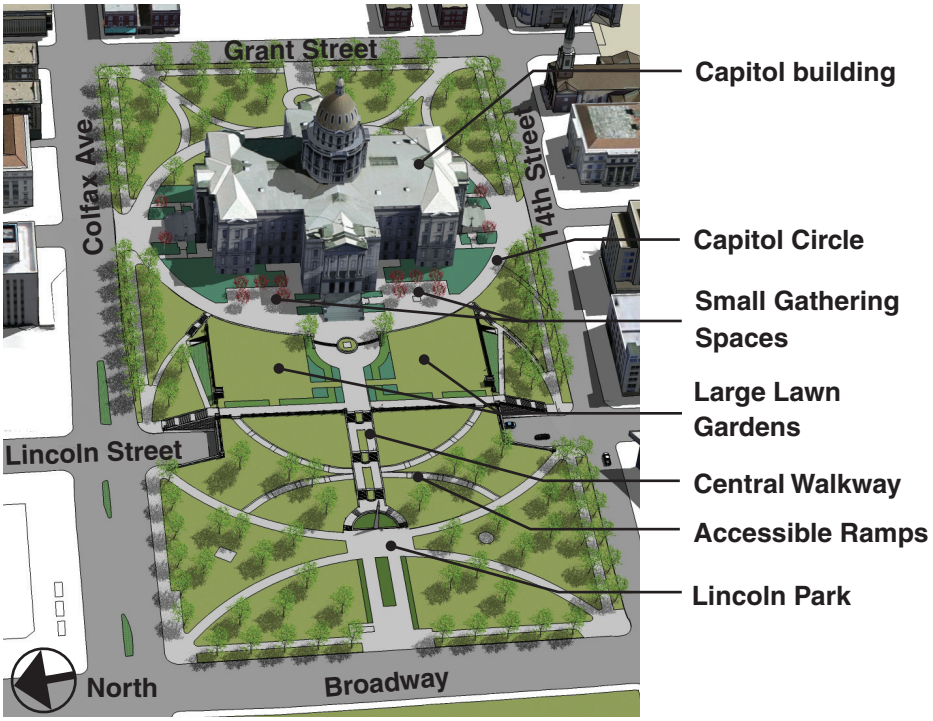



**Illustration H: Showing the Proposed West Lawn Expansion**

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# 2.0 PROPOSED WEST LAWN IMPROVEMENTS

## 2.1 WEST LAWN HISTORY

### A. HISTORY

The design of the Colorado State Capitol and its grounds became the starting point for all subsequent civic center plans. Designed by landscape architect Reinhard Schuetze between 1895 and 1896, the grounds lie at the east end of the civic center and occupy two city blocks bounded by East Colfax on the north, East 14th Avenue on the south, Grant Street on the east, and Lincoln Avenue on the west. Sherman Street enters the grounds from the north and south connecting the interior loop drive that is roughly elliptical in form and encircles the statehouse. Today the Capitol grounds contain formal lawns, public sculpture, several memorials, and a variety of evergreen and deciduous trees, including blue spruce, black walnut, oak, honey locust, catalpa, American linden and European beech.

The centerpiece of the grounds is the monumental Colorado State Capitol designed by national renowned architect Elijah E. Myers in 1885-1886 and constructed between 1890 and 1908 under the supervision of Frank E. Edbrooke. Like many state capitols of the period, the Renaissance Revival building echoes the stately elegance, hilltop setting, and neoclassical form of the United States Capitol at Washington D.C. The statehouse has a rock-faced stone foundation, a raised basement with banded rustication, and walls constructed entirely of gray cut Aberdeen granite. Monumental porticos on projecting pavilions dominate each elevation and center dome of 272 feet high rises from a four-story colonnaded drum.

Set high on the hill facing the Front Range of the Rocky Mountains, the west front of the statehouse was developed as the primary elevation and today provides spectacular views over the city to the mountain peaks beyond. Schuetze designed the grounds on the west side as open terraces and sloping lawns that would, “draw attention to the refined proportions and restrained elegance of the statehouse and portray it as a noble citadel when viewed from afar.” The level loop drive encircling the statehouse served the important aesthetic purpose of visually providing a base from which the building emerged thereby eliminating the uncomfortable visual effect of the hilltop building sliding forward down the slope. Today the terraced effect is magnified by recent landscape improvements which have introduced a pair of paved plazas and broadened the central walkway descending from the west portico to the western boundary. Schuetze was able to extend the public landscape westward by coordinating the design of the Capitol grounds with that of Lincoln Park, a one-block area at the base of the hill. As the larger civic center took form in subsequent decades, the axial views expanded to take in the richly textured landscape of additional parkland and the architectural grandeur of nearby buildings and monuments.

Historically pedestrian stairways and paths provided entry to the grounds from the northeastern and southeastern corners of the grounds, while the extension of Sherman Street (closed to through traffic) on the north and south provided vehicular access from East Colfax and East 14th Avenue and connected with the interior loop road. The road was laid out on a level grade and forms the outer edge of the elliptical terrace on which the statehouse was built. Today the road provides circulation in a clockwise direction and is lined with a narrow concrete sidewalk and parking on each side. The west side of the terrace, like the west porticos above it, provides a magnificent view of the distant mountain range. Plantings filled the areas within the loop that flank the corners of the building and framed the wide central stairways that descended from the raised porticos and served as entrances to the statehouse. Outside the loop drive, the ground to the east, north, and south were developed in quadrants as a tree park with informal groupings of deciduous and evergreen trees, while the hillside on the west was left as an open sloping lawn. From the east grounds, where much of the historic tree canopy remains today, the tree park wrapped around the corners of the statehouse to frame the north and south porticos.

One of the most striking features of Schuetze's design was the planting of a continuous double-row of deciduous trees along the edges of the grounds that bordered city streets on the east, north and south. A concrete sidewalk was placed between the two rows of evenly spaced trees, with the overall effect being that of a formal allee and pleasing promenade. The orderly rows of elm trees were punctuated by symmetrically balanced walkways and stairways on the east and the openings for Sherman Street on the north and south. In keeping with nineteenth-century park design, the trees effectively screened the grounds from the traffic and the noise of neighboring city streets. The border plantings, which Schuetze extended into Lincoln Park, also had the double-row planting pattern. As they matured, they accentuated the geometrical structure of the underlying plan and gave bold relief to the spatial organization of the public landscape.

Schuetze's spatial organization of the sloping west lawn remains the dominant feature of his work on the Capitol grounds. The grounds framing the principal elevation of the Colorado statehouse were developed to draw attention to the refined proportions and restrained elegance of the statehouse and portray it as a noble citadel when viewed from afar. The west front was further developed to reveal a series of sweeping, westward vistas. Dominant in the overall design of building and grounds was the grand central portico with its colossal Corinthian order, bold triangular pediment, and monumental flight of granite stairs. The portico's six multi-story columns supported an entablature with a banded architrave and plain

frieze and were linked together at porch level by a balustrade. Surmounting the whole, a triangular pediment feature a highly moulded raking cornice and a sculptured tympanum depicting in high relief “a pioneer family and gold seekers struggling through the dangerous frontier to the welcoming lands of Colorado”.

Aligned with the east-west axis of the statehouse, the portico’s monumental flight of stairs projected outward into the surrounding landscape and became the central organizing element in Schuetze’s design of the west grounds. Complementing the exterior materials of the statehouse, the stairway and its sidewalls were constructed of granite and equipped with brass handrails. Globed lampposts today are mounted on the flanking side walls. At the base of the stairs, the loop drive was extended outward to form a semi-elliptical viewing bay below which the front lawn sloped downward. Schuetze designed a central walkway along the east-west axis of the hill. The central walkway divided the west side grounds into a pair of symmetrically balanced quadrants that extended around the corners of the statehouse to the north and south elevations. The porch of the portico, the descending granite staircase, the other edge of the loop drive, and points along the central walkway together provided a sequence of points from which the city and Front Range could be viewed. As the double rows of trees along East 14th and East Colfax Avenues matured, they effectively framed the views. During the first decades of the twentieth century the west slope took the form of an open lawn with grassy terraces extending outward from a central stairway. Still visible today, the terraces were symmetrically modeled to gradually diminish and blend into the contours of the natural slope. The central walkway was laid out with a series of sandstone stairways with intermittent landings which served as viewing terraces. From the base of the hill, the walkway proceeded into Lincoln Park. Although recently repaved, the central walkway continues to dominate the west side of the Capitol grounds and descends through a series of terraces and stairways as originally designed.

In 1909, the Colorado Soldiers Monument was installed in the center of the sloping central walkway to honor Coloradans who fought in the Civil War. Designed by Captain John D. Howland, a frontier artist and veteran of the Union Army, the monument consists of an eight-foot bronze stature of a Colorado soldier facing west toward Lincoln Park and standing atop a high, neoclassically ornamented, granite pedestal. About the same time two Civil War-era cannons were placed nearby on the lawn to either side of the central walkway. The monument remains in its original, centrally prominent location just below the loop drive. The area immediately surrounding it which originally followed the contours of the downhill slope has been redesigned in the form of a level, paved plaza. Still on its original pedestal, the statue

now rises above a circular planting bed bounded by a raised sandstone wall with round-edged coping. The Civil War-era cannons, originally placed on pedestals and set on the nearby lawn, are now placed directly on the plaza pavement in a diagonal orientation several feet north- and southwest of the statue.

The plaza displaying the monument consists of two semi-circular terraces constructed in 1990 between the west front and the central descending walkway. Decoratively paved, the plaza extends toward from the base of the west portico in descending tiers along the east-west axis. The decorative patterned pavement of contrasting sandstone and granite blocks is the most salient feature of the two plazas. The larger, upper plaza extends across the loop drive and forms a wide viewing terrace. A granite wall with a brass railing separates the upper and lower levels, and short stairways of the red sandstone descend on each side of the wall to the lower plaza where the Colorado Soldiers Monument is displayed.

Reference:

National Historic Landmark Nomination Form – Denver Civic Center, February 7, 2012. <www.nps.gov/nhl/Spring2012Nominations/DenverCivicCenter.pdf>

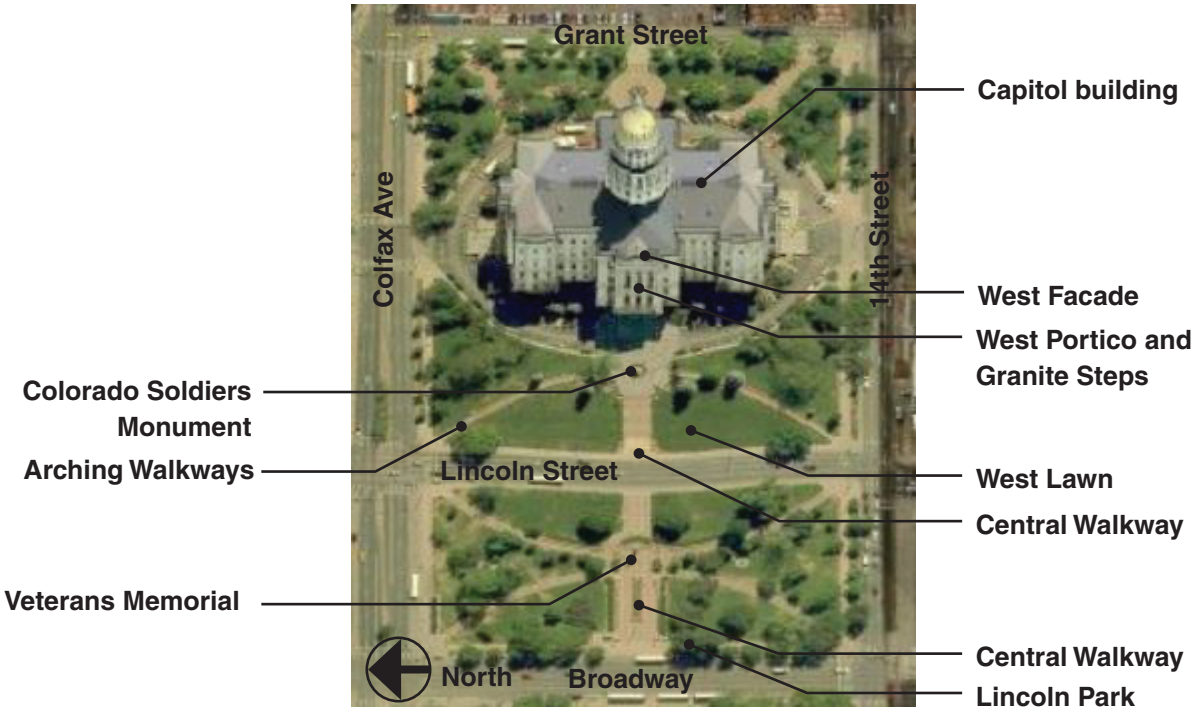


**Illustration Showing the West Lawn**

## B. PREVIOUS ALTERATIONS

Increasing visitation to the Capitol grounds in recent years has necessitated several other changes on the west grounds. In 1999 a pair of symmetrically balanced walkways was added to west lawn, dividing the area into roughly triangular areas. The walkways begin at the new central plaza and descend on opposite sides of the sloping west lawn to the northwest and southwest corners of the Capitol grounds. Today the street corners have grown up in the form of a tree park, while open grassy areas still flank the central west-facing stairway. The new walkways are paved with granite, lined by low red sandstone coping and walls, and incorporate stairways of red sandstone built midway to ease the descent along the steepest sections of the slope. The location of the paths was based on plans drawn by Reinhard Schuetze about 1900 but not executed during the historic period. Today each walkway forms a graceful elliptical curve, and mirrors the walkways installed under Schuetze's supervision in nearby Lincoln Park. In 1996, the Colorado Symbols Fence, a hand forged work of art four feet high and thirty feet long, was installed across the central walkway at the base of the west slope. Designed by Colorado artist Rafe Ropek to suggest a gate, it is composed of five panels depicting official state symbols, such as bighorn sheep for the state animal, a stegosaurus for the state fossil, and a lark bunting for the state bird. Small park furnishings include non-historic green metal benches and trash receptacles of design similar to those in Civic Center Park and metal lampposts topped by globe lights.

In 1895, at the same time he was designing the Capitol grounds, Reinhard Schuetze was making plans for a public park on the block directly west. This enabled him to envision a design that would spatially and visually extend the Capitol grounds beyond the base of the hill. Just as the introduction of the semi-elliptical loop drive gave grounding and stability to the statehouse, the development of Lincoln Park countered the downhill pull of the sloping west grounds by gradually easing the central east-west axis into the gentler grades that characterized the surrounding city. At the time the park was completed, ideas to extend the public landscape further west were just emerging. Today the park remains an important landscape link within the civic center, connecting the Capitol grounds on the east to Civic Center Park on the west. Bordered by Broadway, Lincoln Street, and East Colfax and East 14th Avenues, Lincoln Park is rectangular in shape, with the longer dimension running north to south. It slopes slightly downhill to the west and is bisected by a wide central walkway that extends along an east-west axis and is aligned with the central walkway descending the Capitol grounds. Borders of dense, evenly spaced rows of trees flanking the outer sidewalks, similar to

those introduced on the Capitol grounds, enclosed the north, south, and west edges of the park.

Schuetze seems to have applied a naturalistic convention of landscape design called the “hanging wood” to the design of plantings for Lincoln Park. The interior plantings of trees were informally arranged within the dense borders of evenly spaced trees. At ground level these plantings provided shade-covered walks and lawns. When viewed from the west front of the Capitol, the tree canopy became a verdant treed plateau that contrasted with the open slopes of the Capitol grounds and built-up city beyond. The hanging wood was intended to enclose the ground level vistas to the west, screen the park from the traffic on Broadway, and protect the sense of tranquility and contemplation that the grounds had been designed to create. It also shielded the park and Capitol grounds visually from the disconcerting collision of the street grids that lay outside the park’s borders.

While Schuetze laid out a central walkway to align with the principal east -west axis established on the Capitol grounds, he introduced a plan dependent on a combination of bilateral and radial symmetry. The layout of the park was centered on a l20-foot tall flagpole dedicated to the Colorado volunteers who served in the Spanish American War; the flagpole was placed at the center of the park in 1898. The plan was dominated by a pair of lateral walkways that formed graceful elliptical curves extending from north to south to connect opposite comers of the park (Photograph 14). The walkways were symmetrically reversed on opposite sides of the north to south axis and arranged to come together as they passed through the center of the park where they intersected the central walkway. The overall design of the park was simple yet elegant, contributing to the dignified setting of the State Capitol and at the same time creating a self-contained park with gently curving paths conducive to strolling and reflection.

Today the eastern lawn is relatively open, while the remainder of the park is more heavily forested, featuring a variety of deciduous trees, including oaks, crabapples, and elms. The mature trees that mark the site today date from various plantings projects that have taken place in its more than one-hundred-year history. Schuetze’s original plan for the borders along East Colfax and East 14th A venues called for double rows of evenly spaced trees flanking a central walk. Today concrete sidewalks and narrow tree lawns border the south and west edges of the park, while only sidewalks remain on the north edge. A similar double row of trees was laid out along the east side of Broadway, which remained the western end of the civic center for several decades. In 1923, the Sadie Likens Drinking Fountain was installed near the northwest comer of the park.

Lincoln Park has experienced more change than any other part of the district, mostly due to expanding commemorative functions. The central walkway remains in place today but has been widened and paved with contrasting blocks of granite and sandstone to form a distinct geometrical pattern that echoes the recently installed plazas on the Capitol grounds. The greatest change occurred in 1990 with the development of the Colorado Veterans Monument at the center of the park (Resource 19, noncontributing). In the form of a paved plaza dominated by a centrally located sandstone obelisk forty-five feet in height, the new memorial replaces the original flagpole and transforms the simple space where the park's walkways once converged (Photograph 15). In addition to the obelisk, the new plaza also contains rectangular planting beds and a new forty-five-foot flagpole (Resource 27, noncontributing) dedicated to the state's volunteers who served in the Spanish-American War. The widened central walkway with its decorative pavement intersects the monument, and the original semi -elliptical walkways have been paved in red flagstone and now converge on the central plaza.

Reference:

National Historic Landmark Nomination Form – Denver Civic Center, February 7, 2012. <www.nps.gov/nhl/Spring2012Nominations/DenverCivicCenter.pdf>

The 1991 Flores Capitol Complex Landscape Master Plan was the impetus for the first major improvements to the Capitol grounds and west lawn since their design and construction in the early 20th century, though not all recommended improvements were implemented. The plan was divided into five phases, though the completed work does not follow the phasing sequentially. Phase 1 proposed the renovation of the Closing Era monument on the east lawn of the Capitol along with landscape improvements to highlight the monument and provide a pedestrian resting area. Additionally, there were landscape improvements to the sidewalks and tree lawns along 14th Avenue for the two block stretch that encompasses the Capitol grounds. First Phase improvements were completed in the early 1990s. The 14th Avenue improvements are adjacent to the west lawn on the western portion of the Capitol block.

Phase 2 recommendations related to the eastern portion of the Capitol block, including xeriscaped gardens on the east lawn, an entry plaza along the east portico of the Capitol building, and streetscape improvements to the Grant Street edge of the Capitol block. Phase 2 improvements were not realized.

Phase 3 directly relates to the west lawn. This phase included an entry plaza at the base of the west portico and stairs which included two

semi-circular plazas, the smaller of which encircles an existing Civil War monument. This plaza, displaying the Colorado Soldiers Monument, is the smaller of two semi-circular plazas constructed in 1990 between the west portico and a widening of the central walkway which descends down the sloping terraces of the west lawn to Lincoln Street. The larger, upper plaza extends across the loop drive and forms a wide viewing terrace with a granite wall separating the larger upper plaza and the smaller, lower plaza. These improvements were among the first completed elements of the Flores plan.

This phase of the plan also included two arching walkways that meet at the Colorado Soldiers Monument and plaza. These walkways were added in 1999 to the west lawn to accommodate the increased level of visitation. The stepped walkways extend from the central plaza at the west portico and extend downhill northwest and southwest to the corners of the lawn along Lincoln Street mirroring the walkways in Lincoln Park. The location of these pathways was based on Schuetze's original 1895 design but were not executed at the time of the Capitol grounds and Lincoln Park's construction. Phase 3 also included streetscape improvements to Colfax Avenue along the Capitol block and on the blocks north and south of the Capitol block, some of which were completed.


**Illustration Showing the West Lawn and Arching Walkways from 14th Avenue and Lincoln Street**

**Illustration Showing the Colorado Soldiers Monument and plaza (foreground) and the Veterans Memorial and Lincoln Park with the City and County building and mountains**

Phase 4 of the Flores plan recommended improvements to Lincoln Park which combined previous plans for the Veterans Memorial at the center of the block. The improvements included retaining walls, planting, paving, and a pair of reflecting pools. With the exception of the reflecting pools, the Lincoln Park improvements were completed in 1991. The Veterans Memorial work included a tall obelisk set within a semi-circular garden at the middle point of the historic central walkway. The central walkway divides into two symmetrical curving staircase that meet with an expanded central walkway on the western portion of the block.

Phase 5 recommended the replacement of the loop road around the Capitol building with a pedestrian promenade. This promenade would feature sandstone and concrete paving that would match the west entry plazas and historic central walkways as well as site furnishing and and landscaping improvements. Additionally, the phase proposed two entry plazas adjacent to the north and south entries to the Capitol building that would match in texture the completed west plazas and unrealized east plaza. The remainder of phase 5 included further improvements to the east lawn. Phase 5 improvements were never realized.

Reference:

Capitol Complex Landscape Masterplan an Update, Phillip E. Flores Associates, Inc. – March 1991

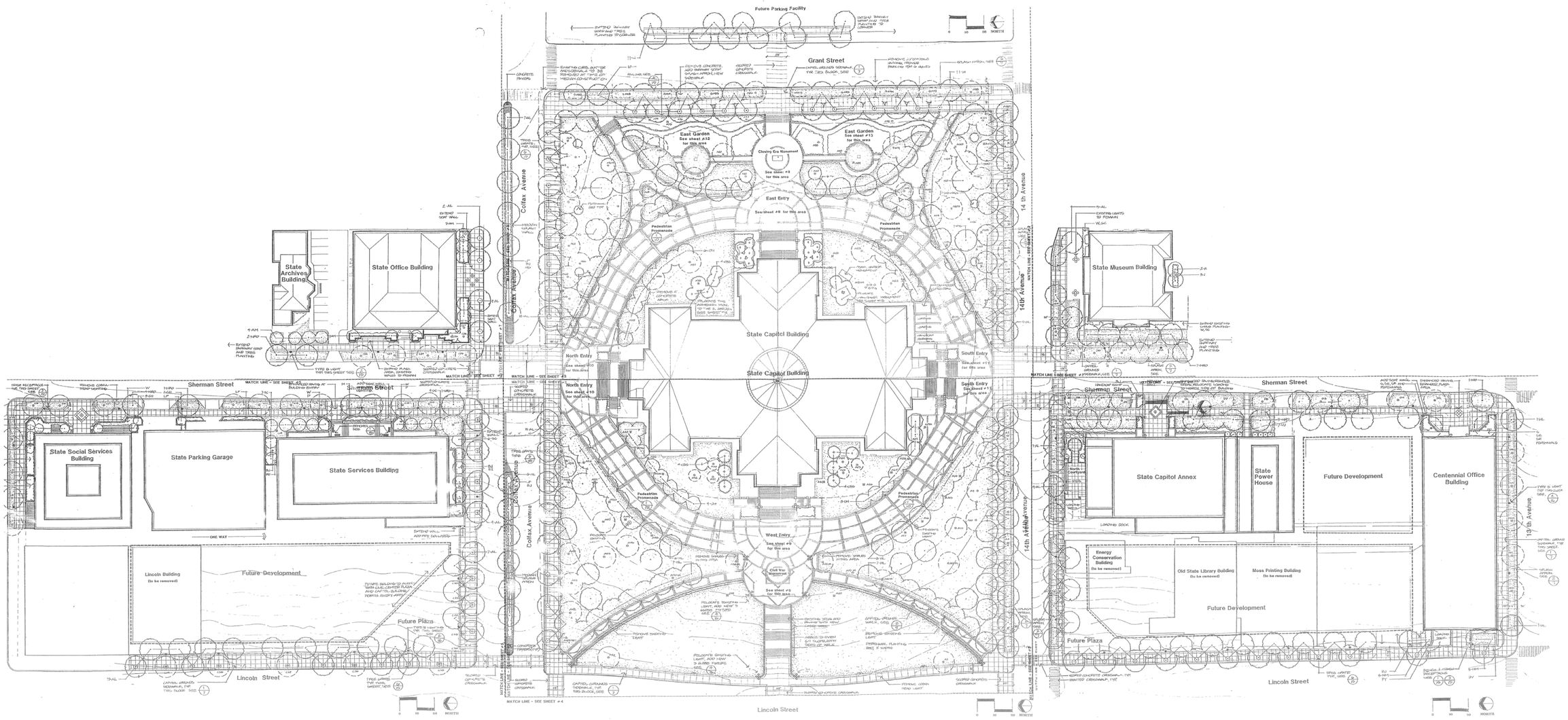


**Illustration Showing the Elements of the 1991 Flores Capitol Complex Landscape Master Plan**

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## 2.2 CONCEPT DESIGN FOR WEST LAWN PROJECT

### A. CONCEPT DESIGN FOR WEST LAWN PROJECT

The firm of Dunn + Kiley Landscape Architects in collaboration with Cales Givens is responsible for the conceptual design of the West Lawn Project.

The extension of a pedestrian and landscaped bridge over Lincoln Street serves to connect the West Lawn with Lincoln Park, in turn creating a series of outdoor spaces that provide a landscaped setting as a foreground to the Capitol. Elevating the West Lawn to the east of Lincoln Street also creates the opportunity for a useable volume below the new lawn that can accommodate a structured parking garage to serve the legislature and executive office.

Currently, the grounds of the Capitol, including the West Lawn, are not ADA compliant and, as a result, may cause certain mobility issues for handicapped users. The West Lawn expansion concept seeks to address this issue by providing handicapped accessible ramps beginning from the southeastern corner of Colfax Avenue and Lincoln Street and the northeastern corner of 14th Avenue and Lincoln Street that would connect to the elevate West Lawn.

The proposed creation of a new 195 space structure parking garage beneath an expanded West Lawn allows the current surface parking around the loop road around the Capitol building to be relocated. This new parking structure would be used primarily for legislators and other employees of the Capitol, providing a direct connection from the parking garage to the Capitol building. The elimination of the surface parking allows for a renovated landscape at the base of the Capitol. Two symmetrical plazas create areas for small functions, public art and seating.

The expanded West Lawn is proposed as two large lawn gardens, reflecting the dimensions and module of the State Capitol building. The two gardens provide large level areas for gatherings, functions and for visitors to tour. Defined by native shrub and flower gardens, they are designed to reflect the significant building and setting. Grand stairways and ADA compliant ramps connect the West Lawn and Capitol grounds at Colfax and 14th Street.

The expanded West Lawn reflects certain design elements from the original Schuetze concept, including a reinterpretation of the terraced lawns– level areas interspersed with sharp slopes that relate to the steps that climb or descend the grade. The West Lawn connects with the top of the existing

Lincoln Park retaining wall, thereby allowing the maintenance of a number of significant of the historic elements that exist in the western end of the park.

The current plan can be summarized as follows:

- Maintains several historic features and form of the current landscape and lawn
- Creates a Beaux Arts inspired landscape that is historically consistent with the Capitol, its grounds, and the larger Civic Center
- Creates programmable open lawn spaces, gardens and paved terraces
- Preserves the historic monuments and memorials in Lincoln Park and the Capitol
- Provides the opportunity for the construction of a new parking garage accessible from Lincoln Street under the elevated West Lawn
- A proposed 195 parking spaces within a secure parking structure
- Direct access into the Capitol building from the proposed parking structure.

## B. DESIGN AND MATERIALS

The landscape and site material choices were made using the following principles:

- Materials must be from Colorado, or at least a native material found in Colorado
- Materials must be sympathetic to the State Capitol's granite
- Materials should relate to Civic Center Park but be different

Granite has been selected as the dominant material for all of the landscape/ hardscape improvements within the West Lawn. The State Capitol is built from native granite, and is one of the most durable materials available and may provide reduced life time costs.

The existing asphalt paving and concrete curbs around the perimeter of the Capitol building will be replaced with granite pavers and curbs. The granite will complement the image and stature of the Capitol.

The extension of a level landscape plinth extending to the west provides a flexible space in the foreground of the building. The perimeter of the building plinth is defined with a limestone balustrade running north to south and signifies the start of the slope that drops to Lincoln Park. The horizontal run of the balustrade is punctuated every 14 feet with a limestone pillar that has a limestone cap to create a rhythm along the length of the balustrade. Similar designs are found at Civic Center Park, University of Virginia, and the Virginia State Capitol. Large monuments define the major circulation transition points.




Rather than use the traditional Beaux Arts ornamentation on top of these monuments, a Mountain Lion was suggested to reflect an iconic state animal that is strategic and powerful.

East of the balustrade, running north and south is a granite path connecting Colfax Avenue and 14th Avenue. The balustrade will create an overlook, providing views of Denver and the Rocky Mountains.

As a pedestrian walks to the west, the scale of the walk decreases, transitioning from a monumental scale to a more park-like, pedestrian scale with planters separating the two walks. Steps are granite risers and treads with granite coping walls defining the edge.

The abutment of the landscape bridge over Lincoln Street, visible by motorists and pedestrians as they pass below the new Capitol West Lawn, will be designed using a classical motif of base, column and pediment. The balustrade running across the top of the abutment will be consistent with the balustrade defining the Capitol's overlook. All of the materials will be limestone.

Handrails for the steps and accessible ramps will be a bronze railing to meet ADA standards.

Emergency access from the parking garage will be integrated into the ADA ramps located on the north and south sides of the West Lawn.

Plant materials will be hardy, Colorado plants selected to thrive in this location with minimal maintenance requirements. The plants will provide seasonal texture and color to enhance and define the landscape structure that has been proposed.



## 2.3 CONCEPT LANDSCAPE DRAWINGS FOR THE WEST LAWN AND PARKING STRUCTURE

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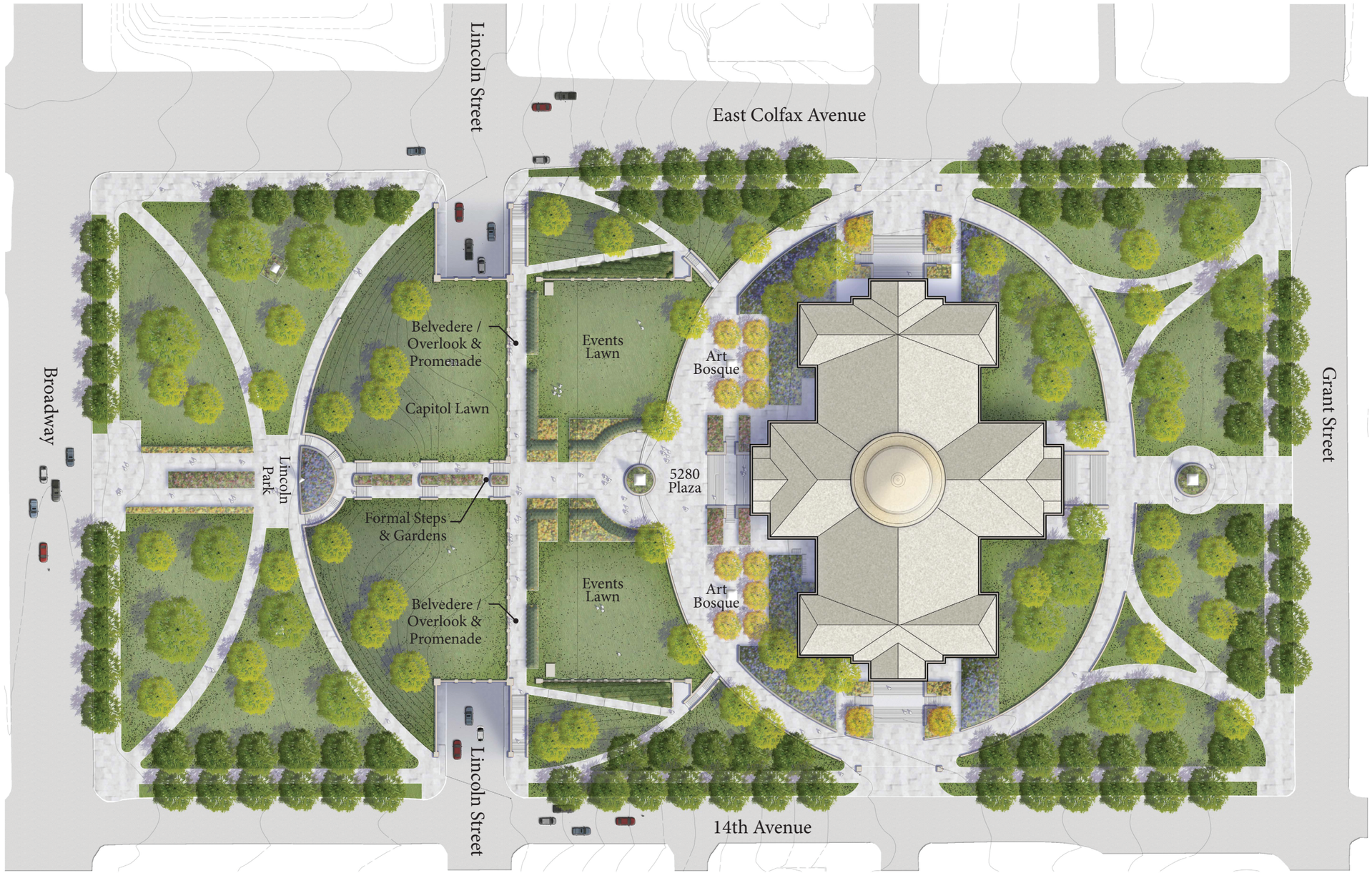


D+K

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303.355.1970

February, 2014

# State Capitol - West Lawn
## Conceptual Site Plan

N
W E
S

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Scale: 1:40

D+K Dunn + Kiley

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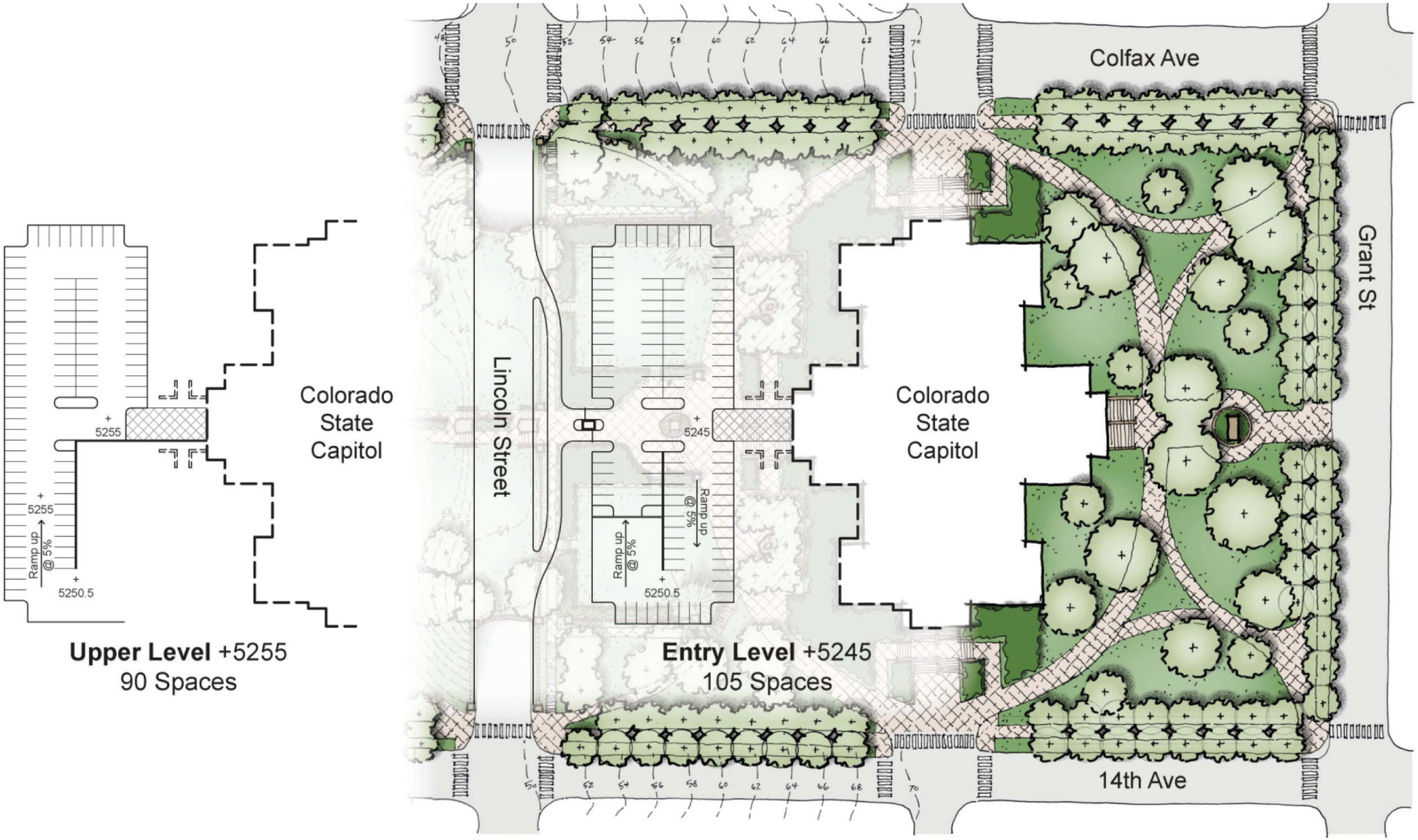


WEST LAWN GARAGE LEVEL PLAN

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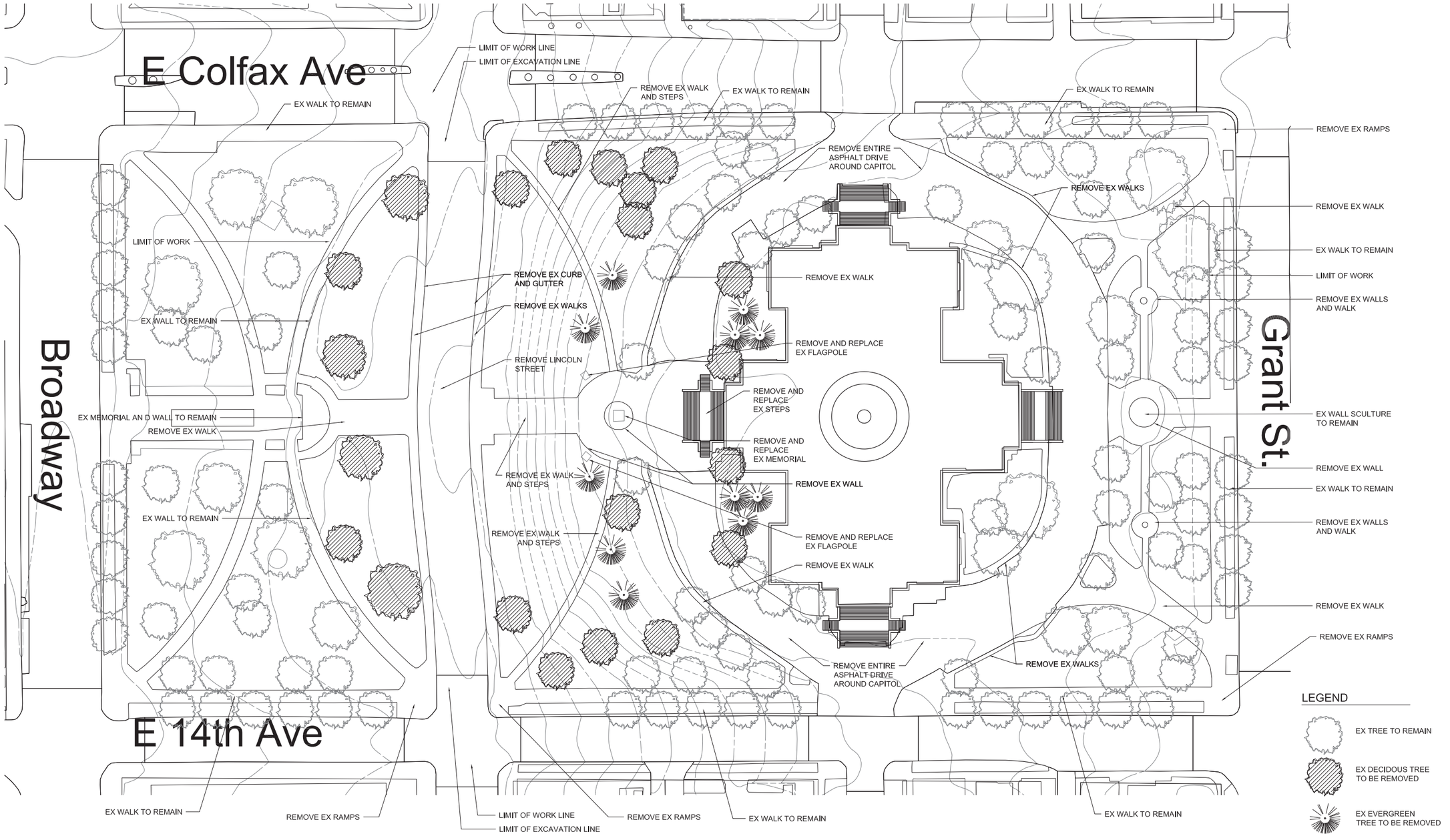


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September 5, 2013

# State Capitol - West Lawn
## Demolition Plan

N W E S

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Scale: 1:40

L1.0

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COLFAX AVENUE

LINCOLN ST.

GRANT STREET

BROADWAY

14TH AVENUE

LIMESTONE STEPS WITH CHEEK WALLS TYP. BOTH SIDES

RAMP WITH BRASS HANDRAILS TYP. BOTH SIDES

LIMESTONE STEPS WITH CHEEK WALLS TYP BOTH SIDES

LIMESTONE VENEER ABUTMENT WALLS AND HEAD WALL TYP. BOTH SIDES WITH BRONZE RAILINGS

LIMIT OF WORK

GRANITE PAVERS, TYP.

BALUSTRADE WALL RE: L5.03

TUNNEL BELOW

PUBLIC ART

GRANITE CHEEK WALL TYP. BOTH SIDES

GRANITE STEPS AND WALLS TYP. BOTH SIDES

GRANITE STEPS TYP. BOTH SIDES

GRANITE SEAT WALL

GRANITE STEPS AND CHEEK WALLS TYP. BOTH SIDES RE: L5.03

PARKING STRUCTURE BELOW

PUBLIC ART

BALUSTRADE WALL RE: L5.03

PARKING EMERGENCY EXIT TYP. BOTH SIDES

LIMIT OF WORK

GRANITE SEAT WALL

LEGEND

- PROPOSED GRANITE PAVERS
- PROPOSED TURF
- PROPOSED SHRUBS AND GROUNDCOVERS
- PROPOSED DECIDUOUS TREE
- EX TREE TO REMAIN

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# State Capitol - West Lawn

## Conceptual Site Plan

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Scale: 1:40

L2.0

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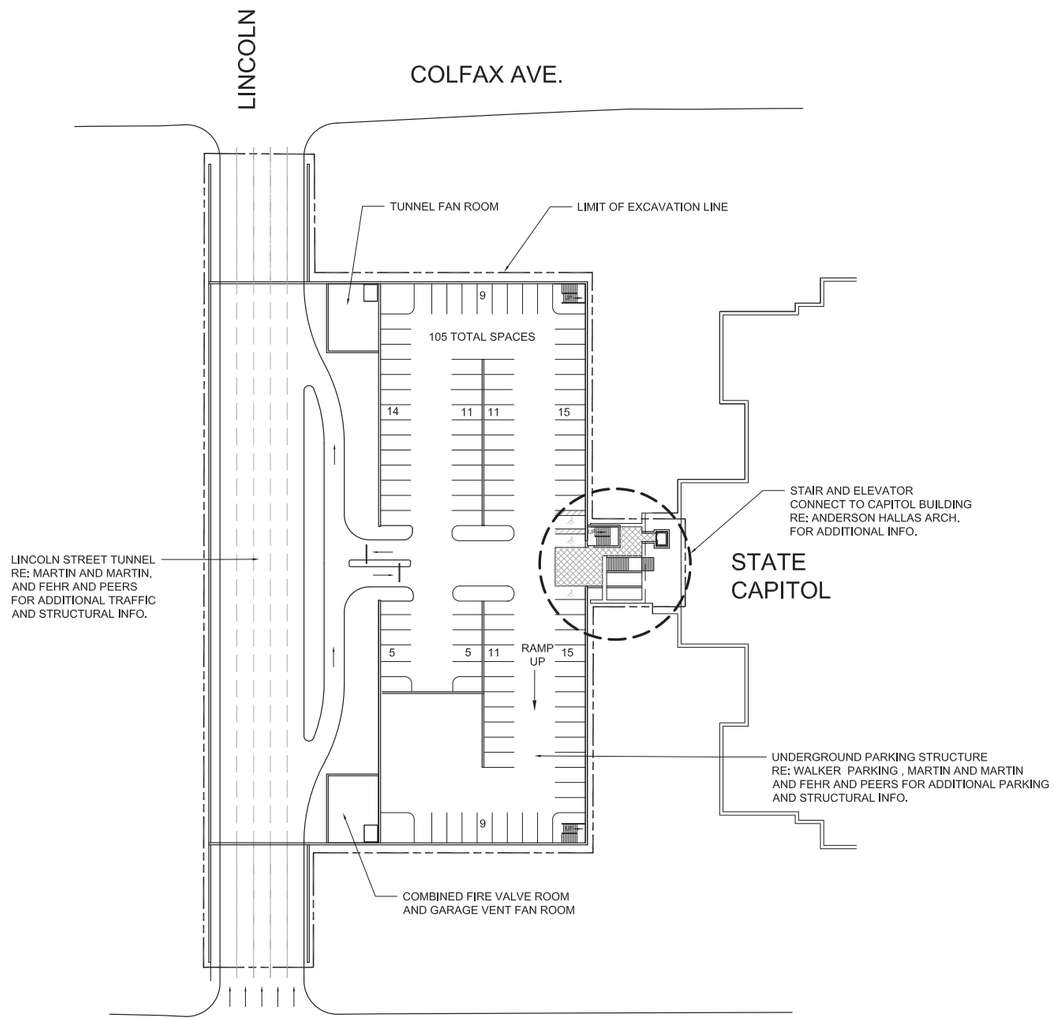
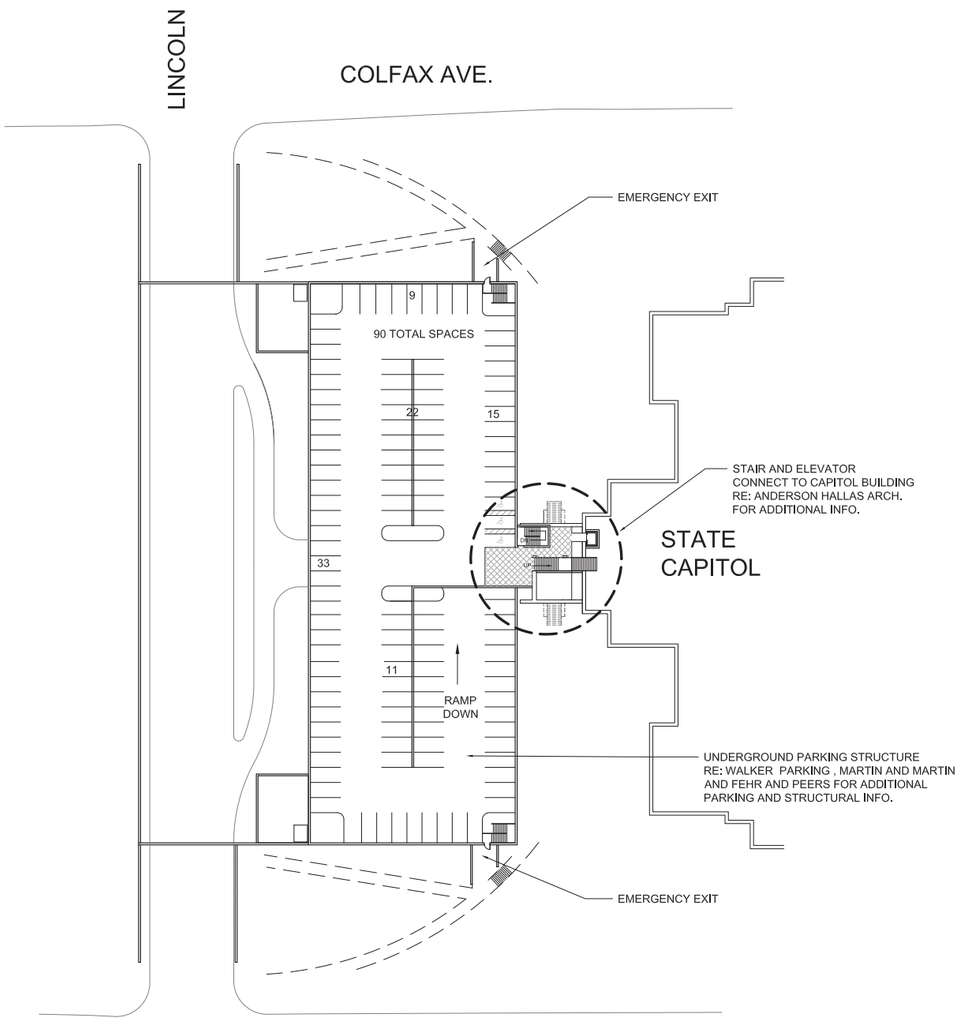



TUNNEL AND LOWER LEVEL PARKING PLAN




UPPER LEVEL PARKING PLAN

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February, 2014

# State Capitol - West Lawn

## Conceptual Tunnel and Parking Plans

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Scale: 1:40

L2.1

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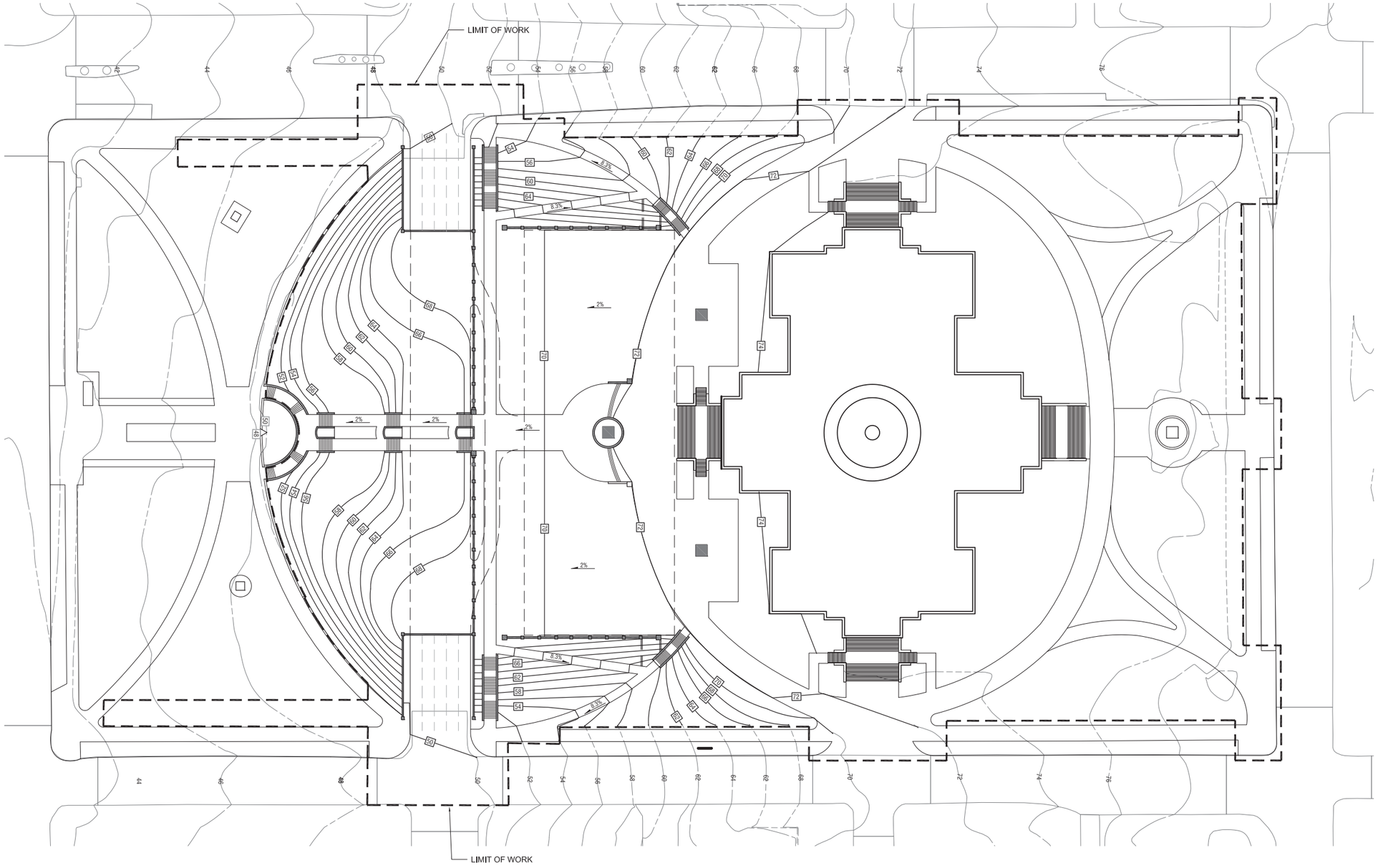


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September 5, 2013

# State Capitol - West Lawn
## Conceptual Grading Plan

N W E S

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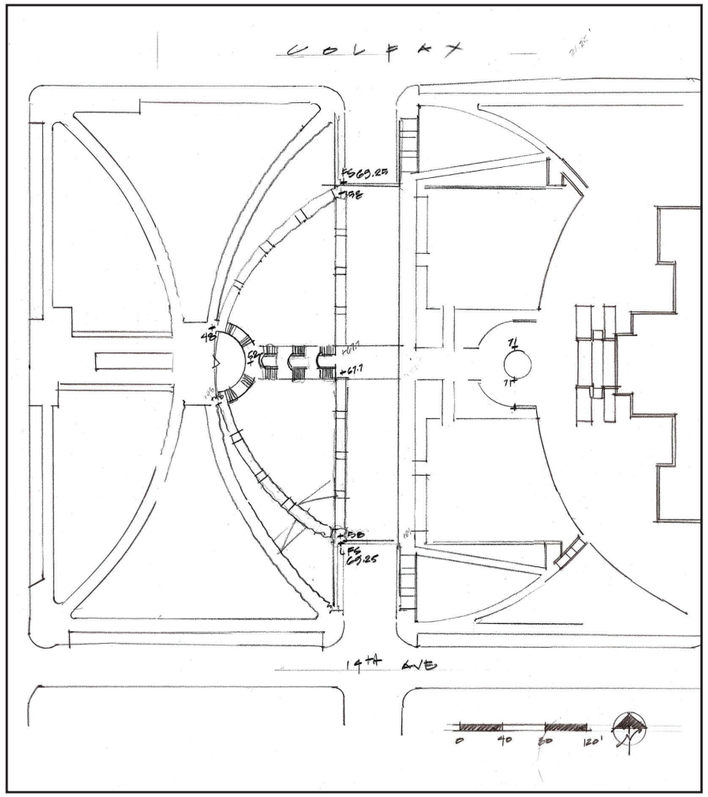
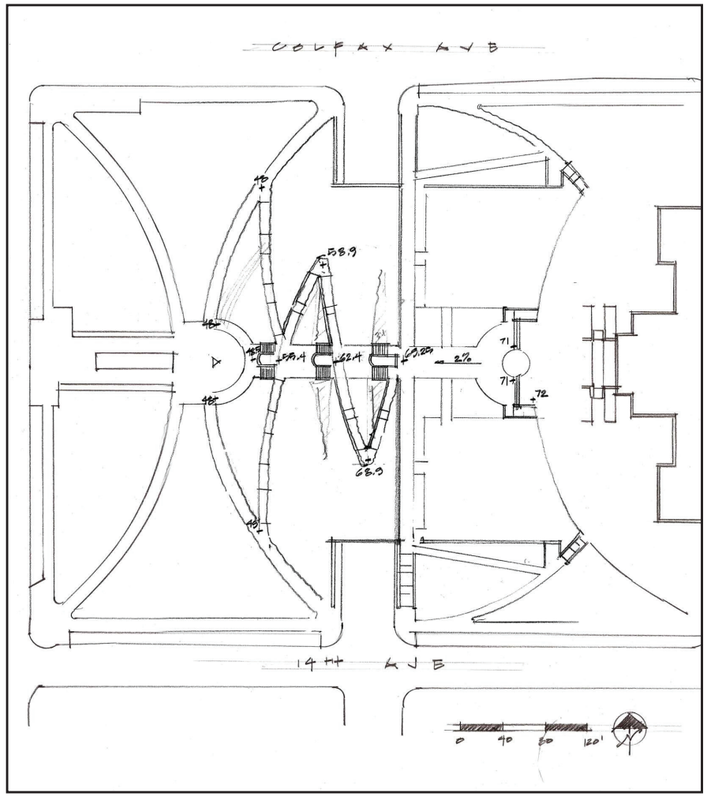
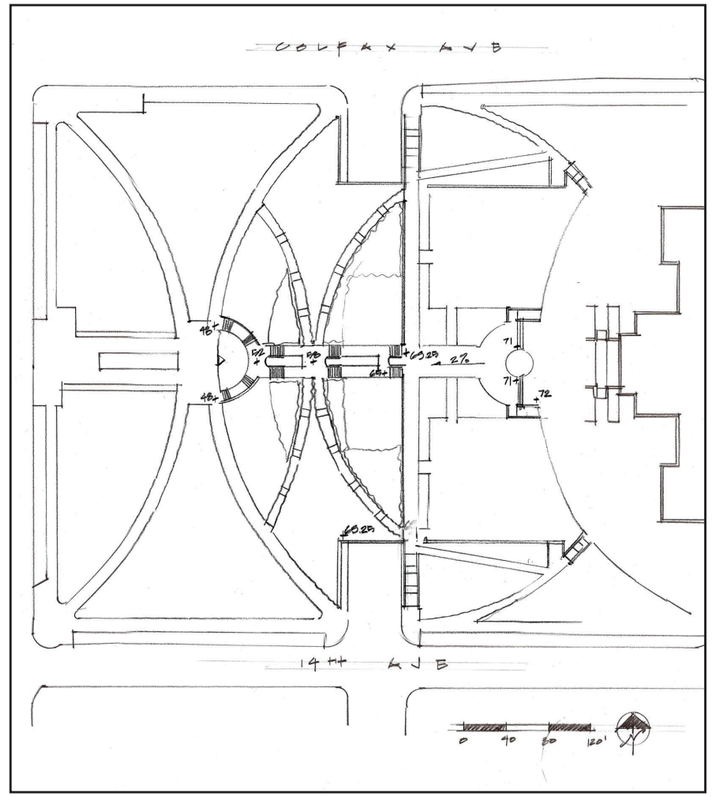



ACCESSIBLE RAMP OPTION 1




ACCESSIBLE RAMP OPTION 2




ACCESSIBLE RAMP OPTION 3

**WEST LAWN ACCESSIBLE RAMP OPTIONS**

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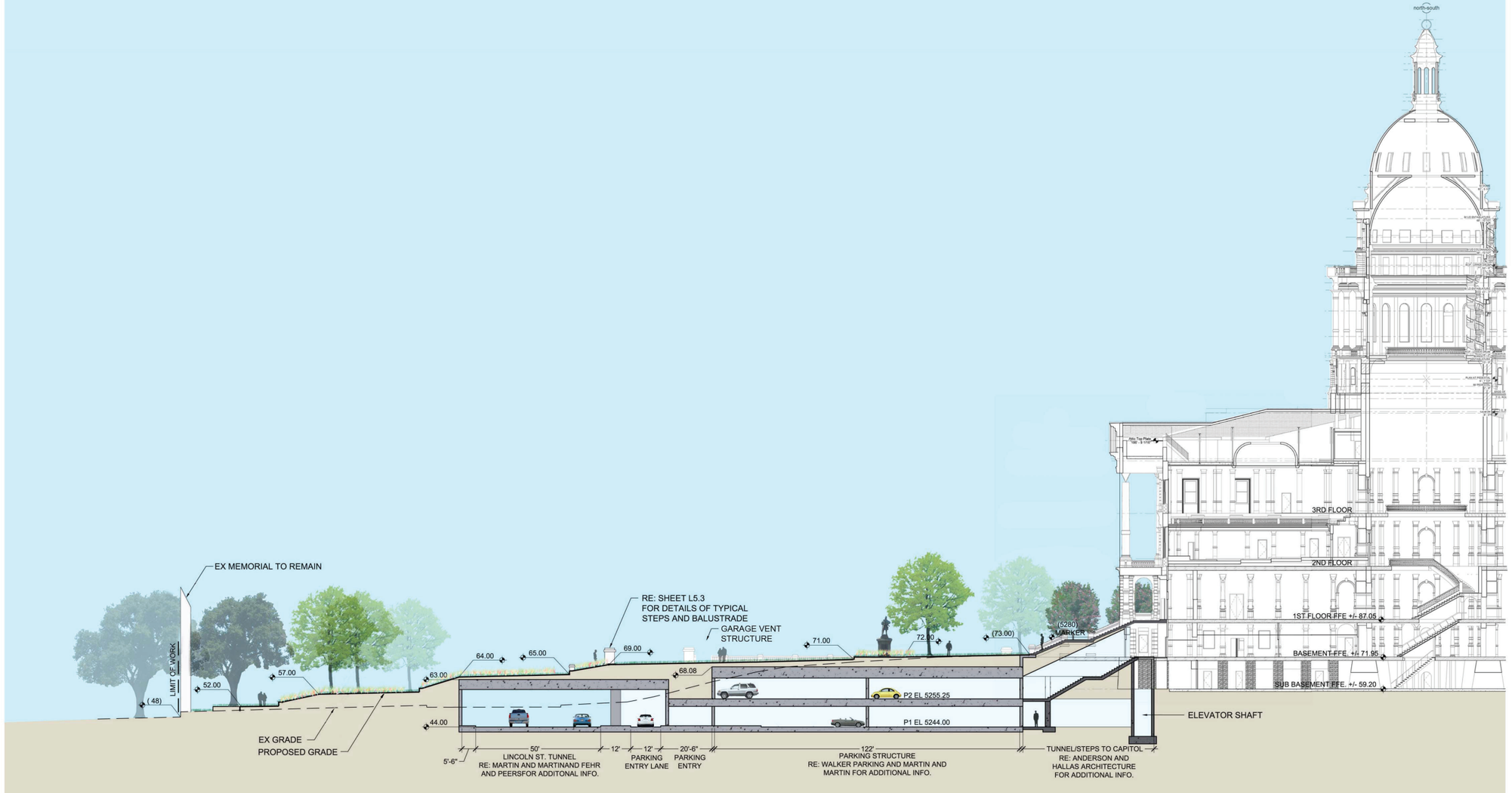


B EAST/WEST SECTION LOOKING NORTH
SCALE: 1"= 20'

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Denver, Colorado 80206
303.355.1970

February, 2014

# State Capitol - West Lawn
## Section B

N W E S

0 20 40 60 80
Scale: 1:20

L5.0

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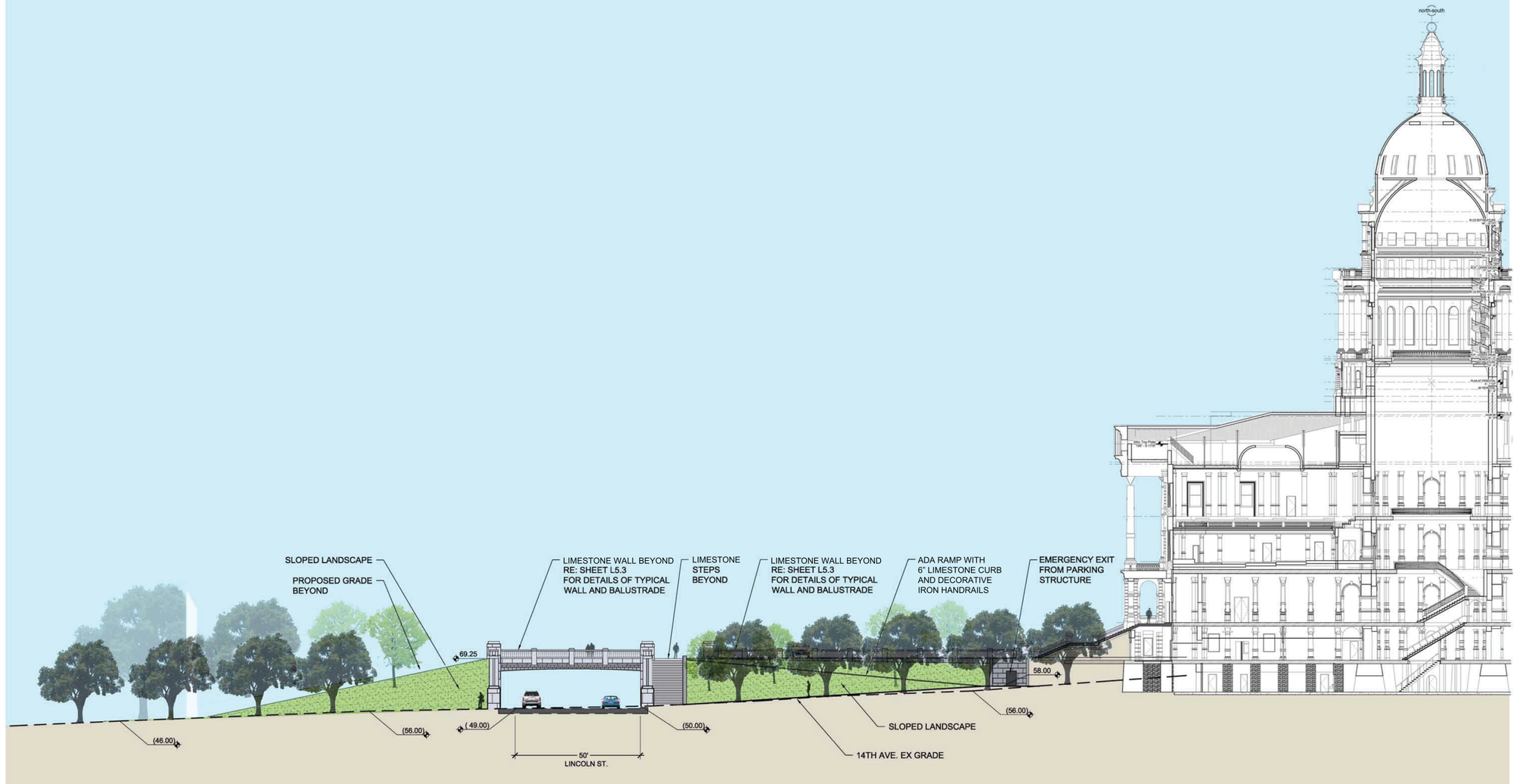


C EAST/WEST SECTION LOOKING NORTH
SCALE: 1"= 20'

D+K
Dunn + Kiley
Landscape Architects
222 Milwaukee Street, Suite 209
Denver, Colorado 80206
303.355.1970

February, 2014

# State Capitol - West Lawn
## Section C

N W E S
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L5.1

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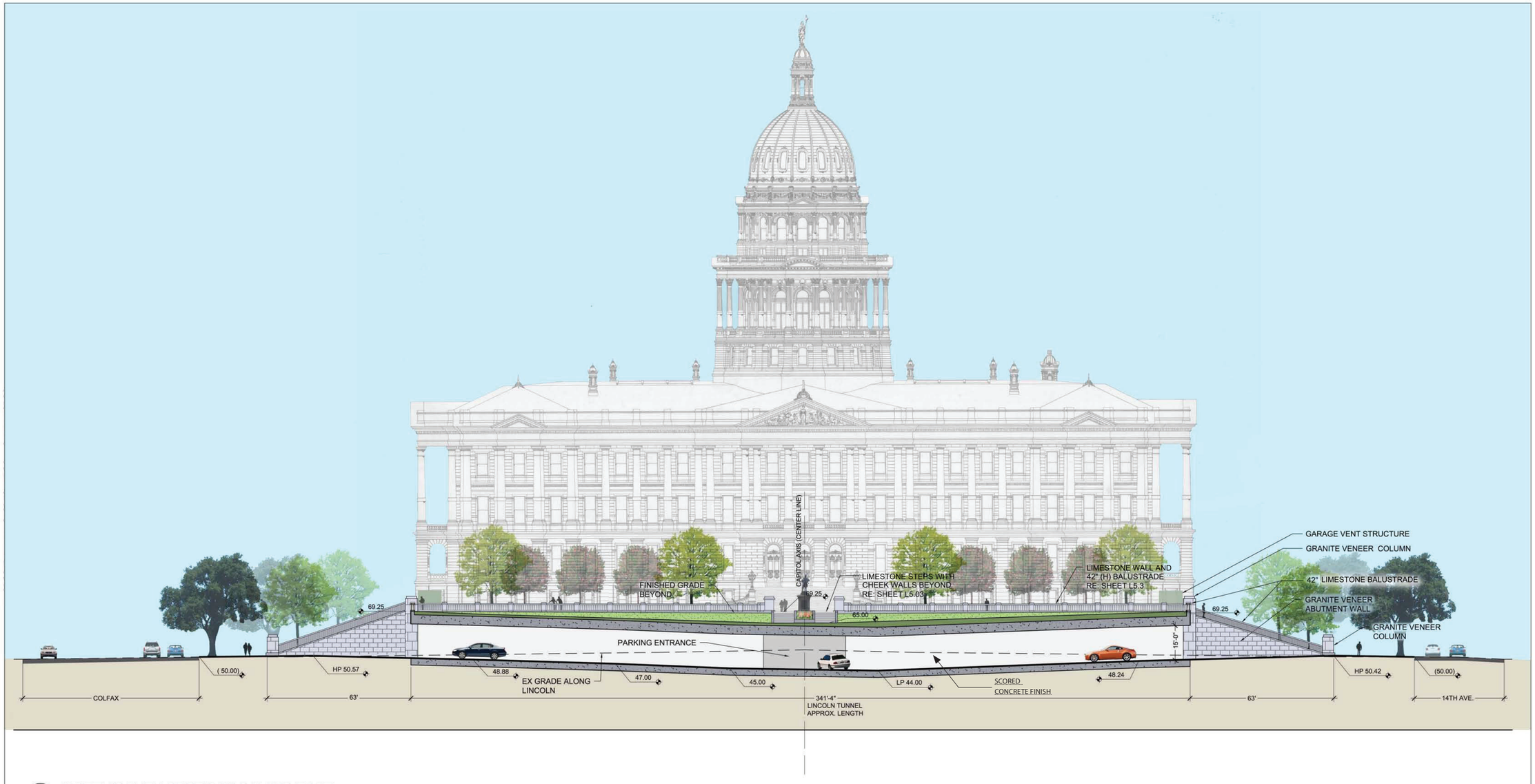


D NORTH/SOUTH SECTION LOOKING EAST
SCALE: 1"= 20'

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February, 2014

# State Capitol - West Lawn
## Section D

N W E S

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Scale: 1:20

L5.2

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## 2.4 ARCHITECTURAL DRAWINGS FOR THE CONNECTION FROM THE GARAGE TO THE CAPITOL BASEMENT

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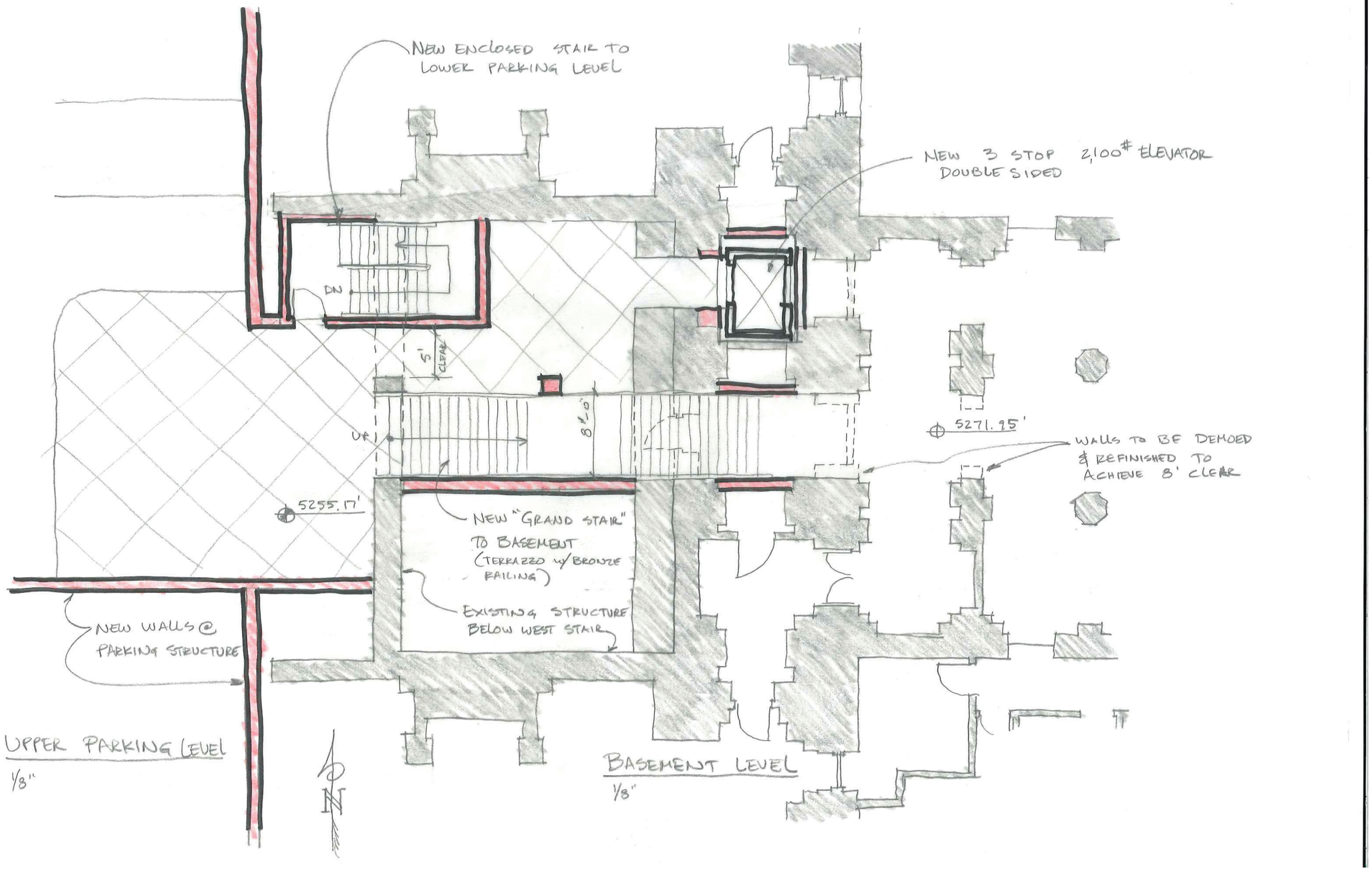


**PLAN VIEW OF UPPER PARKING LEVEL CONNECTION TO CAPITOL BASEMENT** **NOT TO SCALE**

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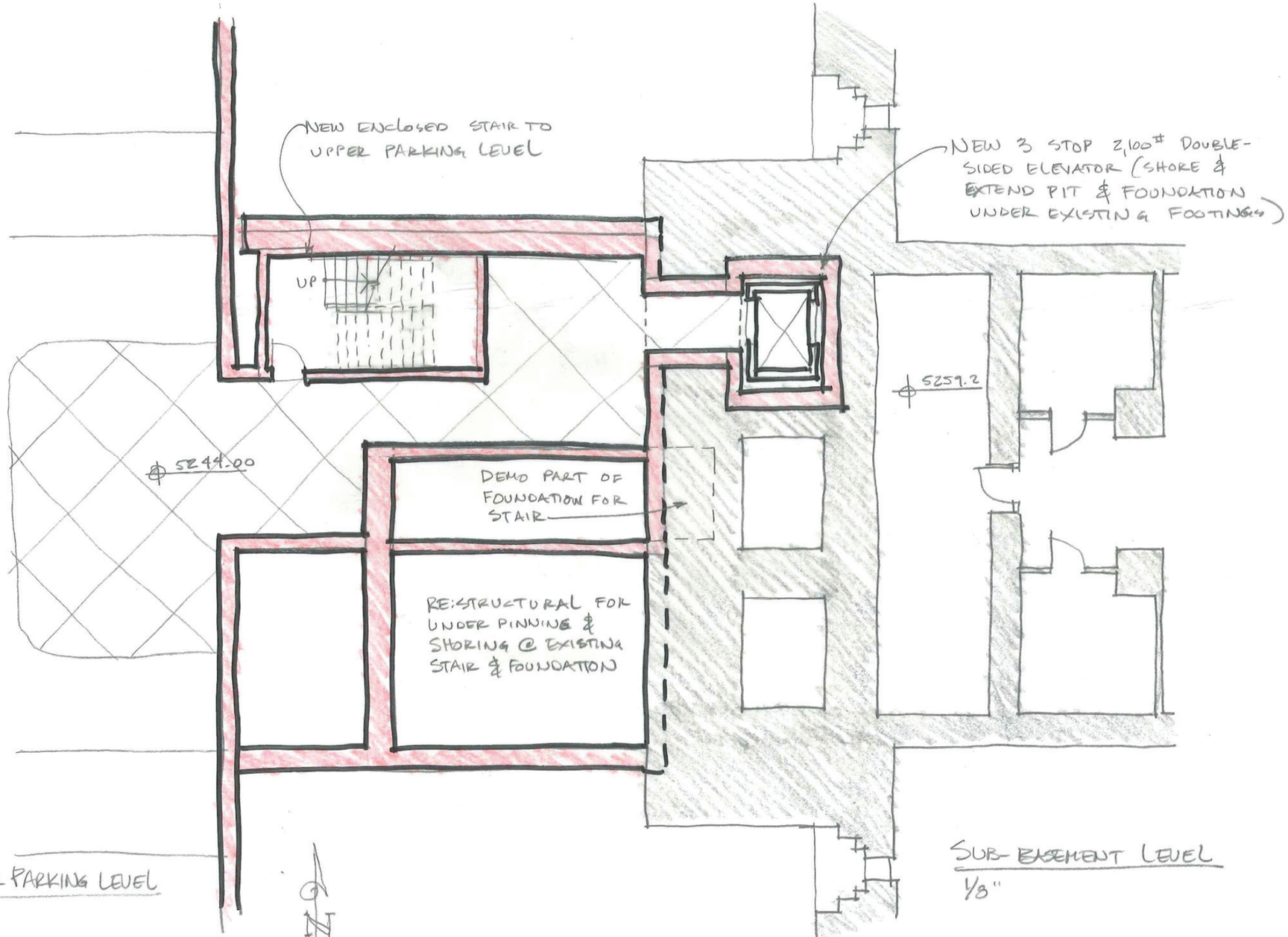


**PLAN VIEW OF LOWER PARKING LEVEL CONNECTION TO CAPITOL BASEMENT** **NOT TO SCALE**

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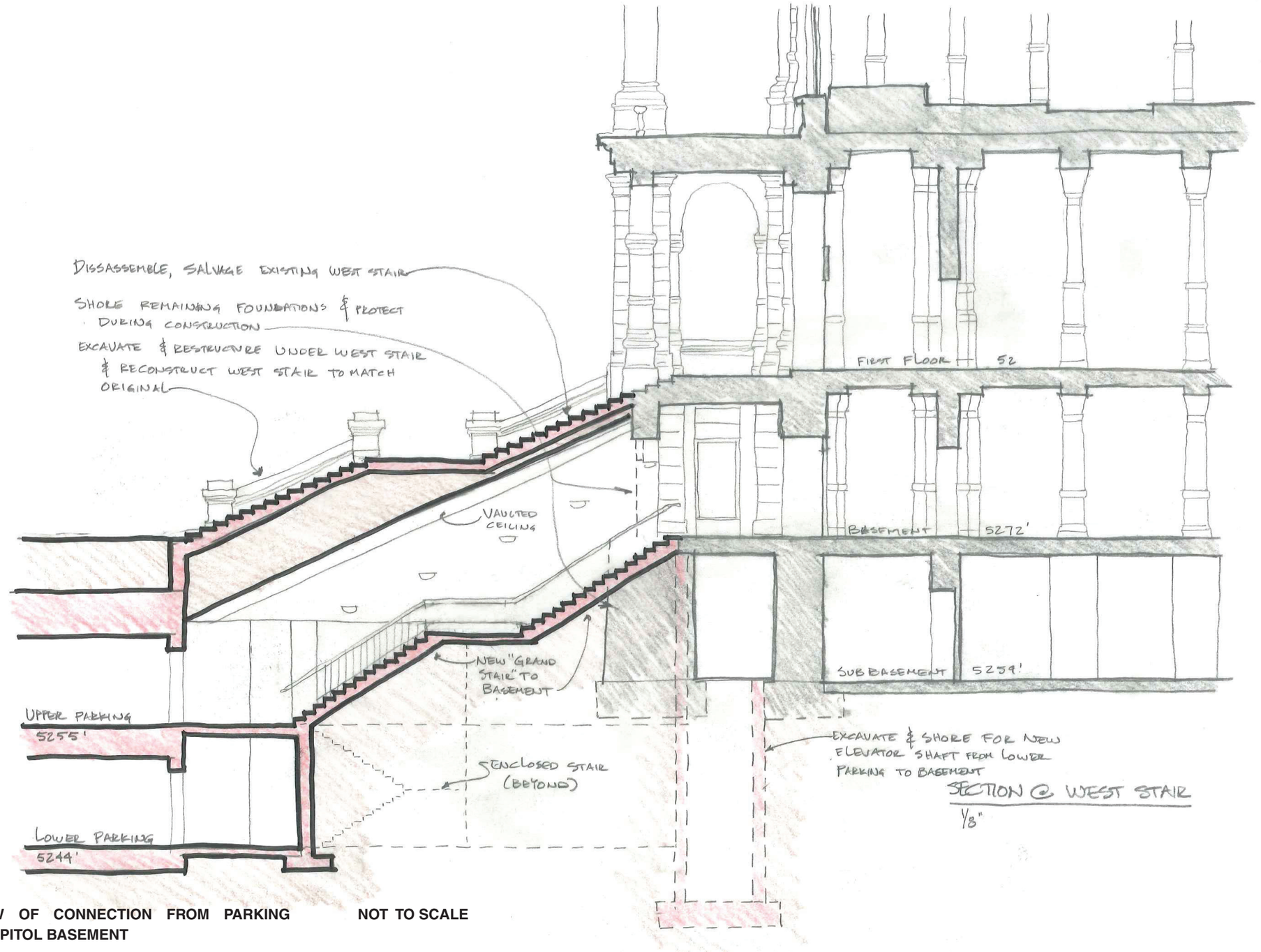


**SECTION VIEW OF CONNECTION FROM PARKING GARAGE TO CAPITOL BASEMENT** **NOT TO SCALE**

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## 2.5 DETAILED IMPACT ON NATIONAL HISTORIC LANDMARK DESIGNATION

### A. CONTEXT

The original layout of the grounds around the Colorado State Capitol is generally intact, along with the rest of the landscape in the Civic Center National Historic Landmark District. Currently parking for the building is located in angled parking spaces off of the circular drive that surrounds the Capitol building. This circular drive is part of the historic design of the Capitol grounds but the addition of the parking spaces is a modern addition. One proposed solution to this parking issue is to build a parking garage in conjunction with the proposed West Lawn expansion and remove all the parking around the Capitol. The West Lawn expansion would act as a landscape cap to the proposed parking garage. This would allow the landscape immediately adjacent to the Capitol to be restored to its original layout. However, the overall West Lawn proposal - including or excluding the potential parking structure - will alter the layout of the West Lawn and Lincoln Park.

### B. CHALLENGES

This proposal impacts the layout and views of the West Lawn, Lincoln Park, and views of the State Capitol building from the west. The affected landscapes and building are part of several historic districts. In October 2012 the Denver Civic Center was designated as a National Historic Landmark. The Civic Center Historic District was listed on the National Register of Historic Places in 1974 and became a Denver Landmark in 1976. Due to this, the proposal will need to be aware of what impact it will have on the historic fabric in the area and it may need to consult with multiple organizations:

- Historic Denver
- History Colorado
- Denver Landmark Preservation Commission
- National Park Service

Colorado Statute 8 CCR 1504-5 8.2 requires that *"When a state agency may adversely affect a property fifty or more years old, the agency should seek the (Colorado Historical) Society's determination as to whether such property is of historic significance. If the property is determined to be of historical significance as defined in CRS 42-80.1-102 (6), the agency shall request the Society's determination of effect on such property."* The preservation community as a whole will also likely be a voice in the discussion.

## C. IMPACTS

The National Historic Landmark Nomination Form classifies the 33 acre landscape, which includes the west lawn and Lincoln Park, as essential contributing elements to the historic designation falling within the period of significance between 1895 and 1935. This nomination states *"…the west front of the statehouse was developed as the primary elevation…Schuetze designed the grounds on the west side as open terraces and sloping lawns that would allow stately views of the State Capitol from various points in the city…"* (NHL Nomination Form, p. 8). This project would change these views and the extent of that impact is something to consider. How much of the view toward the Capitol from the west is blocked due to the change in grade should be carefully studied and this impact limited as much as possible. The nomination also states, *"Schuetze's spatial organization of the sloping west lawn remains the dominant feature of his work on the Capitol grounds"* (NHL Nomination Form, p. 8). The impact of this project on the original layout is something to consider. In 1999 the layout was altered by the addition of paths across the west lawn; however these paths were installed in locations originally shown in the design that were never constructed.

This project will noticeably change two aspects of the park:

- Views of the Capitol building from the west will be altered
- The proposal removes the separation between the West Lawn (part of the "Capitol grounds" – NHL Nomination form p. 7) and Lincoln Park.

Currently the landscaped areas are separated by Lincoln Street and are two separate parks. These parks are treated as two separate elements in the National Historic Landmark Nomination Form: "Colorado State Capitol grounds (Resource 1: Landscape Component #1) and "Lincoln Park (Landscape Component #2)." This proposal relocates Lincoln Street to run below the landscape and merges the landscaping of the West Lawn into Lincoln Park. This could be perceived as a significant change to the overall layout of the Civic Center.

Changing the design of the West Lawn and Lincoln Park could have an effect on the status of the National Historic Landmark. One of the ways the Denver Civic Center qualified as a historic landmark is under "Significance Criterion 4, Landscape Architecture". Changing two of the contributing landscape elements could result in these two elements being changed from contributing to non-contributing. If this happened it is possible the entire district could be reevaluated since these two landscapes are key components of the nomination and the Denver Civic Center could potentially lose its status as a National Historic Landmark.

**Reference:**

National Historic Landmark Nomination Form – Denver Civic Center, February 7, 2012. <www.nps.gov/nhl/Spring2012Nominations/DenverCivicCenter.pdf>

Colorado Statute 8 CCR 1504-5 8.2 <http://www.sos.state.co.us/CCR/Rule.do?deptID=8&deptName=1504%20Higher%20Education&agencyID=50&agencyName=1504%A0Historical%20Society&ccrDocID=2767&ccrDocName=8%20CCR%201504-5%20STATE%20REGISTER%20OF%20HISTORIC%20PLACES&subDocID=25159&subDocName=STATEMENT%20OF%20BASIS%20AND%20PURPOSE:&version=1>

## 2.6 CIVIL ENGINEERING NARRATIVE AND SCHEMATIC DRAWINGS OF UTILITIES

Note: Description of existing infrastructure is based on public utility information provided by the City and County of Denver.

### A. GENERAL

The project analysis, referred to as the West Lawn Project includes the conceptual study of lowering and routing Lincoln Street through a tunnel between 14th Avenue and Colfax Avenue. Also included in this study is the feasibility of construction of a multi-level parking structure under the lawn west of the Capitol building, accessed from the proposed Lincoln tunnel. It is understood that the parking structure shall accommodate 195 parking spaces with a secure entrance and underground connection to the Capitol building.

The West Lawn Project will include the tunneling of Lincoln Street, construction of a parking structure and associated infrastructure including utilities, landscaping, walls, sidewalks and lighting across an estimated 3.5 acre site.

### B. EXISTING CONDITIONS AND EXISTING DRAINAGE

The existing site consists of the Capitol building, which was constructed in the 1890's and is the home of the Colorado General Assembly and the offices of the Governor of Colorado. The West Lawn of the Capitol is terraced and includes historic steps and arched sidewalks. The existing grade slopes approximately 18 feet from the Capitol building down to Lincoln Street. Existing Lincoln Street, within the area of study, is a four-lane, one-way northbound arterial street. Lincoln Street runs parallel to one-way southbound Broadway Street, located one block to the west. The site is located in the Capitol Hill district of Denver and the Capitol building sits at approximately 5,280 feet in elevation.

The existing site generally slopes from east to west at grades ranging from 1% - 25% away from the Capitol building. There is an existing high point in the center of Lincoln Street that splits the site runoff into two separate drainage basins. Existing runoff is conveyed overland and collected by street curb and gutter and storm sewer inlets located in the intersections of Lincoln and Colfax and Lincoln and 14th to the north and south respectively. Based on information provided through City of Denver records, it appears there are no major public utilities including storm sewer within Lincoln Street and likewise no storm drainage structures. However, per visits to the site, an existing manhole lid was apparent and assumed at this time to be associated with a regulated, but non-public utility and not associated with any unmarked

storm sewer. Storm sewer lines do exist both north and south of the proposed project within Colfax and 14th Avenue ranging in size from 18" to 24".

The site is located in the Denver Storm Drainage Master Plan Basin 4600-01 (Central Business District). This basin consists of 2.67 square miles and conveys the 2, 5, and 100-year storm event via both storm sewer and roadway conveyance. Runoff from the major basin is conveyed westerly to Cherry Creek, ultimately discharging into the South Platte. Within this basin, storm sewer facilities typically are designed to convey the 5-year rainfall event at a minimum, and we assume the same is true in this area of the City. It is proposed as part of the master plan to improve the storm sewer system within 14th Avenue between Grant Street and Delaware Street. The improvements include upsizing the line to increase the storm sewer capacity, but the timing of the improvements is subject to funding and may not occur for some time. The storm sewer line within 14th between Lincoln and Broadway is also listed within the Master Plan to be upsized from 18" to 24". The site lies within two secondary basins inside of the major basin, Secondary Basins 82 and 290. Secondary Basin 82 contains the northerly portion and majority of the site, collecting and conveying runoff northwesterly to storm sewer within Colfax Avenue and the West Colfax Avenue outfall. At the intersection of Lincoln Street and Colfax, it is estimated that there is a peak runoff of 45 cfs in the 100-year storm event from Secondary Basin 82. The southerly portion of the site is located in Secondary Basin 290, where the Master Plan storm sewer improvements are proposed. At the intersection of Lincoln Street and 14th Avenue, it is estimated that there is a peak runoff of 111 cfs in the 100-year storm event from Secondary Basin 290.

**C. PROPOSED GRADING**

The proposed Lincoln Street tunnel is anticipated at this time to have a width of approximately 57.5 feet. The ability to maintain 5 lanes through the tunnel to mimic Lincoln configuration south of 14th should be conserved. This width includes a 5' walk on the west side, 50' roadway width, and a 1.5' buffer on the east side. Since this section is not a typical City and County of Denver arterial roadway section and minimum lane widths are typically 11 feet, the proposed section will need to be confirmed and approved by the jurisdiction. In order to tunnel Lincoln Street, the center of the roadway between Colfax and 14th will be lowered as much as 8.5 feet to an elevation of 5,244.00. The tunnel will have a minimum clearance of 14 feet with a desired clearance of 16 feet. The intersections at Colfax and 14th will remain undisturbed and proposed grading will tie into existing grade before both intersections. The existing elevations at the center of both intersections are approximately 5,250 feet. The centerline profile from south to north is displayed in the plans included

with this preliminary design package. At this time, we anticipate the road will be crowned at 2%, draining to sump inlets approximately halfway between 14th and Colfax. The roadway profile will include a vertical curve high point at both the 14th Street and Colfax intersections approximately 6-12 inches in height to minimize the amount of stormwater runoff introduced to the tunnel in larger storm events. The road will ramp down at a steep slope between 5-6% to the low point in the tunnel, before ramping back up to the opposite intersection.

The parking structure is expected to be constructed at an elevation of 5,244; a range of 7.5-23 feet below existing grade. Based on a review of geotechnical reports for nearby facilities it is believed the existing groundwater is approximately 32 feet below ground, at an approximate elevation of 5,218. While temporary and/or permanent dewatering of the parking structure is not anticipated at this time, further geotechnical and groundwater investigations are recommended as a part of design to verify permanent dewatering will not be required.

The surface elevation of the tunnel is estimated at 5,264. Proposed landscaped areas will slope away from any structures at a minimum 10:1 slope for 10 feet and 2% in hardscape areas. Slopes on pedestrian paths will be limited to 5% maximum unless ramps and handrails are specified per ADA guidelines. As the roadway slope is anticipated to exceed this maximum slope, we anticipate that ADA access between 14th and Colfax will occur on grade rather than through the tunnel. Slopes in landscape areas are anticipated to be 4:1 or less to improve landscape installation and ease long term maintenance. Retaining walls will be required if landscape slopes exceed 3:1 or the elevation difference between adjacent flatwork exceeds 12 inches. Since the existing grade is steep and includes steps and a large range of slopes, steep slopes are anticipated, especially along the tunnel abutment walls.

**D. PROPOSED DRAINAGE AND STORM SEWER**

Although most of the runoff will be on the surface of the proposed tunnel and drained overland, the tunnel will include storm sewer conveyance to drain any storm runoff that enters the tunnel via large storm events, snowmelt from passing cars, or other potential points of stormwater entry. The tunnel will be drained by sump inlets located midway between 14th and Colfax. The proposed storm sewer will drain to the south to an existing manhole at the intersection of 14th and Lincoln. The existing storm sewer within 14th between Broadway and Lincoln will be lowered and sloped at approximately 1% to accommodate the necessary depth associated with the lowered roadway

elevation. Based on data collected it appears the depth of the existing storm sewer within 14th Street at the intersection of Broadway is low enough to accommodate the proposed depth of the tunnel. As design progresses, we recommend further evaluation of the inverts within 14th Street between Lincoln and Broadway and as it continues to the west across Broadway to verify depths can be accommodated. Additionally, further confirmation of potential crossings with existing utilities within 14th Street (telecommunications, water and electric) will need to be verified prior to construction. Proposed surface drainage improvements include the collection and routing of runoff via grass swales and other low impact style design features designed to promote infiltration and filtration of smaller storms. Drainage of the proposed surface features will mimic existing conditions and follow existing drainage patterns.

The effective Flood Insurance Rate Map (FIRM Map Number 0800460201G, effective date November 17, 2005) shows the property lies within Zone X, areas designated as outside of the 500-year floodplain. To our knowledge, there are no known existing flood control problems or drainage issues.

**E. EROSION CONTROL**

Site erosion controls will be designed to implement practices in accordance with EPA and City and County of Denver guidelines for construction activities stormwater discharge. Perimeter controls will prevent sediment from leaving the project site. Interior measures will help stabilize slopes, control runoff, and contain pollutants. Final site improvements including paving, landscaping, and restoration of native areas will provide erosion protection by stabilizing exposed surfaces. Anticipated erosion control measures include rock socks, a concrete washout area, temporary and permanent seeding, mulching, erosion control blankets, existing and proposed inlet protection, diversion ditch, soil stockpile areas, silt fence, and construction fence.

**F. SECURITY AND FORCE PROTECTION**

As the proposed improvements are designed to accommodate vehicle access to the Capital building, incorporation of security elements is anticipated to limit vehicle access threats. These elements may include limiting direct line access to any security structure or pedestrian tunnel. While we don't anticipate at this time the need to install active vehicle stopping barriers, the design shall remain flexible enough to allow for future installation of active and/or passive barriers in the future. This may include facilities limiting access to both the garage, and potentially limiting access into the tunnel in the future.

**G. UTILITY SERVICES**

Based on City records, it appears there are no wet utilities within Lincoln

Street between 14th and Colfax. Additional research on dry utility providers will need to be performed to determine if the need for lowering of dry utilities exist. Multiple existing water, sewer, gas, electric, communications, and other utilities are located in both Colfax and 14th. A detailed description of the new and existing utilities is provided below.

An existing 12" sanitary sewer main located south of the Capitol in 14th Street will serve the site with a connection point at the intersection of Lincoln and 14th. A proposed 8" sanitary sewer line for the parking structure is designed in Lincoln Street at a minimum slope of 0.5%. There are no known sewer capacity problems at this time, but further coordination with the City to verify and validate existing capacities can accommodate the minor flows associated with the new parking garage will be required. All proposed sanitary sewer lines will be designed in accordance with the City and County of Denver criteria.

It is anticipated that the parking structure will be protected with a dedicated fire protection standpipe system. At this time, it is assumed a dedicated fire service line will be installed either within the landscape or within Lincoln Street from an existing 12" water main to the north of the site within Colfax Avenue. There are existing fire hydrants located near the site at the intersections of Colfax and Lincoln and 14th and Lincoln and at this time are assumed to be adequate for the proposed development. All proposed water materials and installation practices will meet or exceed Denver Water regulations. Water materials include fully restrained PVC (C-900) or Ductile Iron Pipe for all installations.

Existing dry and regulated utilities (electric and telecommunications) are located south in 14th. Further survey and information is required to determine the location of additional dry utilities.

**H. SITE LAYOUT, PAVING, AND PARKING**

Lincoln Street is a heavily traveled roadway and a main artery of the Central Business District. The parking structure will be accessed by the proposed Lincoln tunnel.

The site paving design will be based upon geotechnical recommendations inclusive of pavement sections and subgrade recommendations. Site roadways and parking facilities are expected to be asphalt or concrete designed to accommodate heavy duty traffic anticipated on this section of roadway. All pavements are placed over prepared subgrade. All paving and roadway surfacing associated with the West Lawn project will be consistent with industry standards. All asphalt materials will conform to the specifications

of the Colorado Department of Transportation (CDOT) and will include an S and SX aggregate mix. Binders and mix designs will follow proven blends as specified by CDOT. Similar to asphalt mix design, all proposed concrete used in vehicle traffic areas will follow CDOT mix design parameters for air entrainment, water content ratios, cement and flyash content, etc. Minimum concrete strength will be based on geotechnical recommendations.

The garage layout shall be designed to accommodate semi-truck and delivery vehicle access. Denver Fire and the International Fire Code require a 26-foot fire lane for aerial access around the site in case of a fire. The minimum inside turning radius is 25 feet along this fire lane.

The site shall be designed to accommodate ADA parking and accessibility. Parking and traffic considerations as a result of the West Lawn project have not been analyzed as a part of this study.

Plans are included as a visual supplement to this report. Utility information is based on the best available information to date and provided by others but may be subject to change. All dimensions, points of connections, lengths, and sizes are approximate and may change upon further study.

## I. REFERENCES


1. City of Denver Sanitary Sewer Plat Map.
2. City of Denver Storm Sewer Plat Map.
3. Denver Water Map.
4. Flood Insurance Rate Map No. 0800460201G Panel 201 of 300.
5. City and County of Denver Drainage Criteria Manual, latest revision.
6. Urban Storm Drainage Criteria Manual (Volumes 1, 2, and 3), latest revision.
7. Soil and Foundation Investigation, Ralph L. Carr Judicial Complex 2 East 14th Avenue Denver, Colorado, prepared by CTC-Geotek, Inc, dated April 8, 2010.
8. Subsurface Exploration Program and Geotechnical Recommendations, Colorado History Museum, 12th Avenue and Broadway, Denver, Colorado, prepared by Ground Engineering Consultants, Inc, dated October 16, 2008.
9. City and County of Denver Storm Drainage Master Plan, prepared by Matrix Design Group, dated June 2009.



Prepared by Matt Schlageter, P.E., LEED AP, Principal, and Melyssa Lorenger, P.E.

Martin/Martin Consulting Engineers

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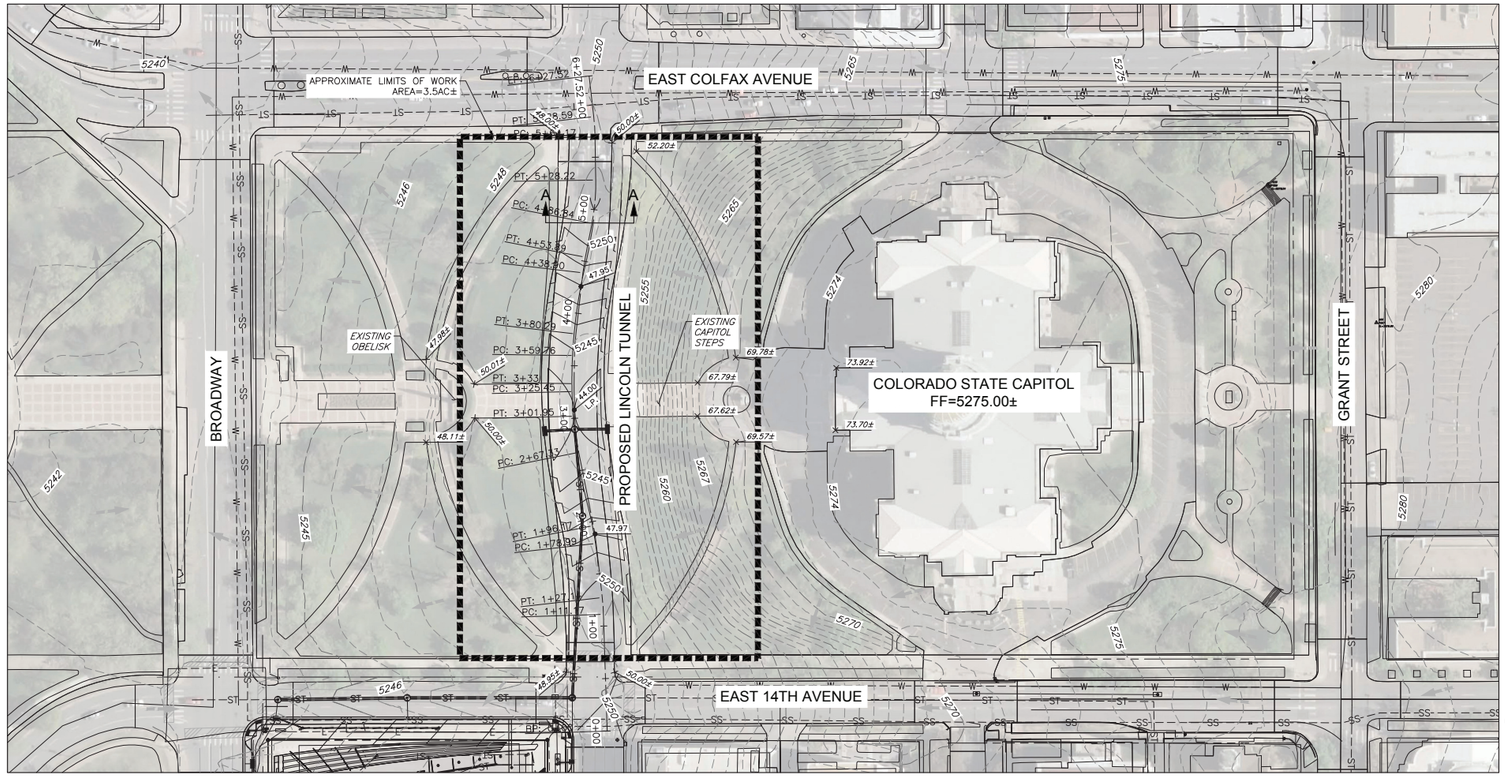
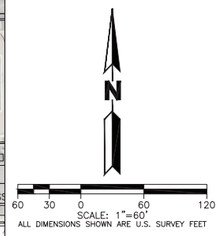
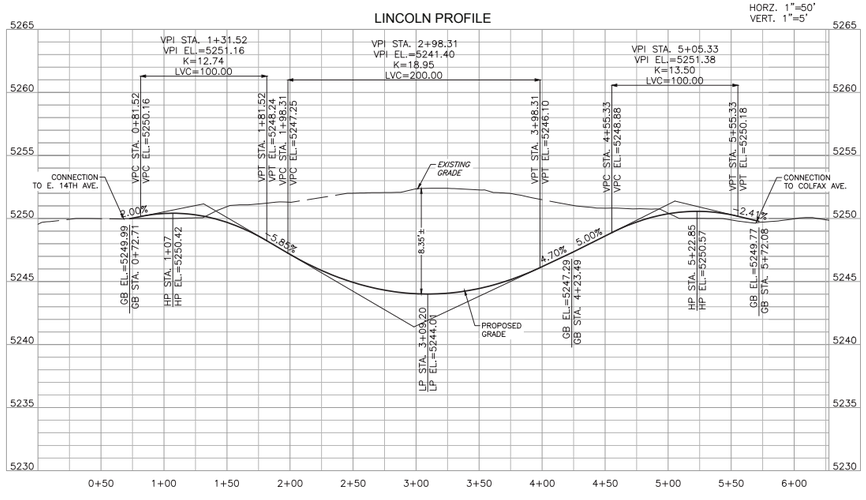


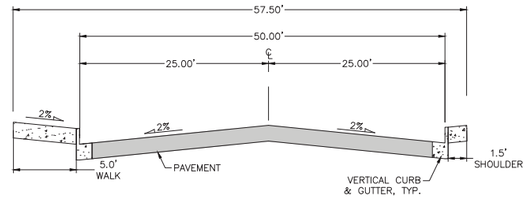




NOTES:

1. EXISTING INFORMATION SHOWN IS BASED ON BEST AVAILABLE INFORMATION TO DATE AND PROVIDED BY OTHERS. ALL GRADING AND UTILITY DIMENSIONS, POINTS OF CONNECTIONS, LENGTHS, AND SIZES ARE APPROXIMATE AND MAY CHANGE UPON FURTHER STUDY.
2. PROPOSED GRADING SHOWN IS FOR THE TUNNEL ROADWAY SURFACE ONLY. REFER TO CONCEPTUAL GRADING PLAN PREPARED BY DUNN + KILEY FOR DETAILED GRADING.
3. PROPOSED ROADWAY SECTION HAS NOT BEEN REVIEWED/APPROVED BY THE CITY AND COUNTY OF DENVER.

SCALES:
HORZ. 1"=50'
VERT. 1"=5'




PROPOSED LINCOLN TUNNEL
SECTION A–A RE: NOTE 3
5-LANE ARTERIAL
NTS

MARTIN/MARTIN ASSUMES NO RESPONSIBILITY FOR UTILITY LOCATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY THE SIZE, MATERIAL, HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION.

MARTIN / MARTIN
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12499 West Colfax Ave.
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303.431.6100
Fax 303.431.4028

COLORADO STATE CAPITOL
MASTER PLAN
WEST LAWN PROJECT
GRADING PLAN & PROFILE

| No. | Issue / Revision | Date | Name |
|---|---|---|---|

Job Number 13.0535
Project Manager M.LORENGER
Design By M.LORENGER
Drawn By M.LORENGER
Principal In Charge M.SCHLAGETER



Sheet Number:
C100

PLOT DATE: Thursday, September 05, 2013 7:30 AM LAST SAVED BY: LORENGER
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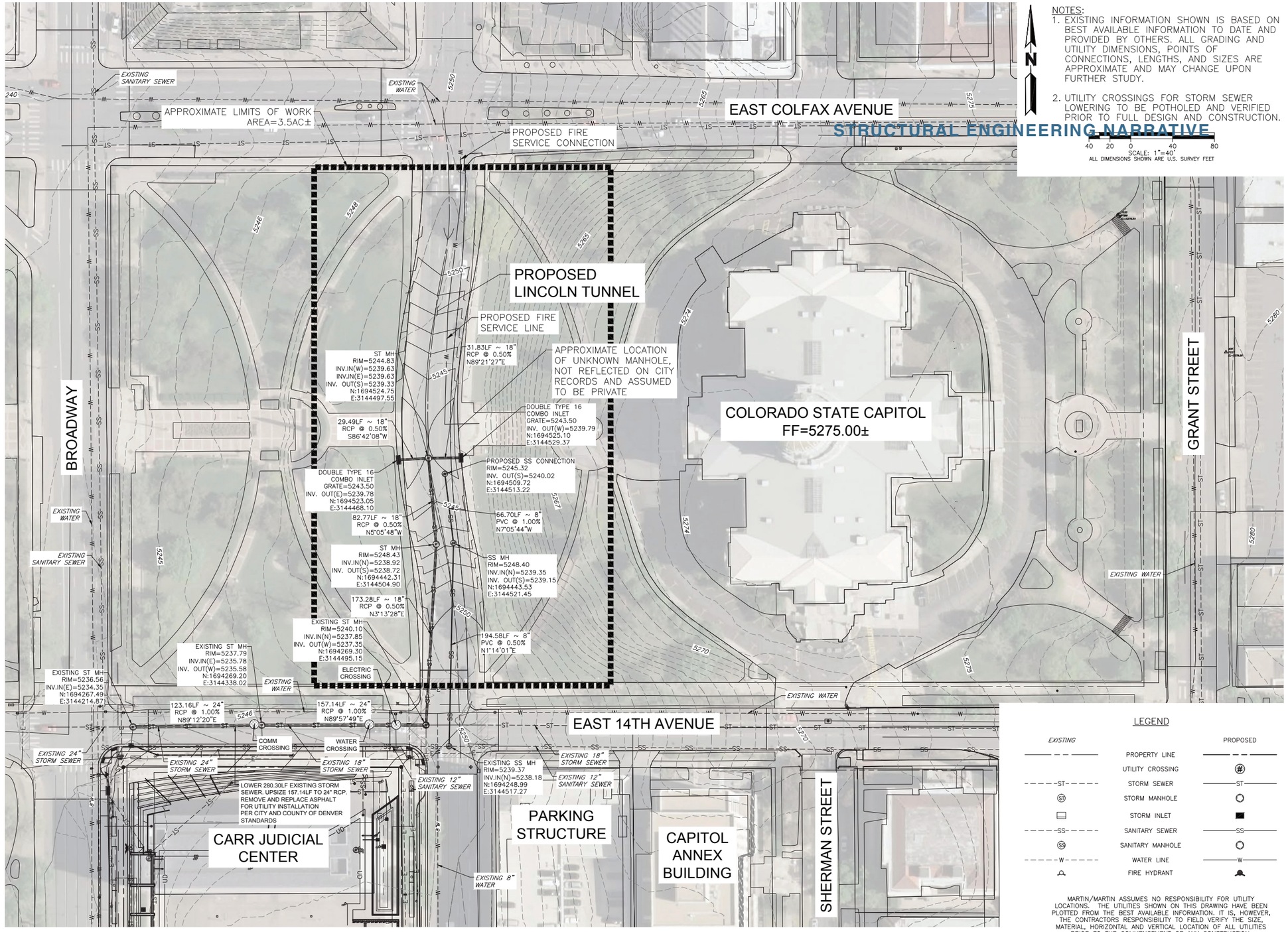


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1. EXISTING INFORMATION SHOWN IS BASED ON BEST AVAILABLE INFORMATION TO DATE AND PROVIDED BY OTHERS. ALL GRADING AND UTILITY DIMENSIONS, POINTS OF CONNECTIONS, LENGTHS, AND SIZES ARE APPROXIMATE AND MAY CHANGE UPON FURTHER STUDY.
2. UTILITY CROSSINGS FOR STORM SEWER LOWERING TO BE POTHOLED AND VERIFIED PRIOR TO FULL DESIGN AND CONSTRUCTION.

N

40 20 0 40 80
SCALE: 1"=40'
ALL DIMENSIONS SHOWN ARE U.S. SURVEY FEET

LEGEND

| EXISTING | | PROPOSED |
|---|---|---|
| | PROPERTY LINE | |
| | UTILITY CROSSING | # |
| -----ST----- | STORM SEWER | ST |
| ST | STORM MANHOLE | |
| | STORM INLET | |
| -----SS----- | SANITARY SEWER | SS |
| SS | SANITARY MANHOLE | |
| -----W----- | WATER LINE | W |
| | FIRE HYDRANT | |

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FAX 303.431.4028

COLORADO STATE CAPITOL MASTER PLAN
WEST LAWN PROJECT
OVERALL UTILITY PLAN

| No. | Issue / Revision | Date | Name |
|---|---|---|---|
| | | | |

Job Number 13.0535
Project Manager M.LORENGER
Design By M.LORENGER
Drawn By M.LORENGER
Principal In Charge M.SCHLAGETER



Sheet Number:
C200

PLOT DATE: Thursday, September 05, 2013 7:29 AM LAST SAVED BY: LORENGER
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## 2.7 STRUCTURAL ENGINEERING NARRATIVE AND ALTERNATIVES

Colorado Capitol building West Lawn Parking Structure
Martin/Martin Project # 13.0512.S.02
9/5/2013

### A. SUMMARY

The proposed parking structure is located between the Colorado State Capitol building and Lincoln Avenue in downtown Denver. The structure will be placed completely below grade and have vehicular access from Lincoln Street to the west and have pedestrian access through an underground tunnel into the Capitol itself.

The proposal includes relocating a portion of Lincoln Street below grade through a tunnel between Colfax Avenue and 14th Avenue. The access into the garage will be at approximately mid block in the tunnel. The new parking garage will accommodate 195 cars on two levels, both below grade. The garage is not intended to be open to the public.

To maintain the required fire department access to the Capitol building the new addition adjacent to and below the existing fire lanes will require design to support Denver fire department vehicle loads.

The existing Capitol building was designed and built in the late 1800's and was designed with spread footings in lieu of deep foundations currently recommended for new construction in this part of Denver. This will require additional coordination while constructing the new structure below and near the perimeter of the existing structure. Extensive construction shoring will be needed to construct the tunnel access between the parking garage and the Capitol including a new elevator pit located approximately 20 feet below the existing foundations.

In its current planned layout, three structural options are being considered as viable solutions:

- Precast concrete (PC) long span construction supported on cast in place (CIP) concrete walls at the perimeter and precast walls down the center of the structure.
- Post tensioned (PT) concrete long span construction also supported by CIP walls along the perimeter as well as down the center of the building.

- Mild reinforced CIP concrete two way flat plate construction supported by CIP walls along the perimeter and CIP columns on the interior in addition to the center CIP ramp wall

**B. CODES AND STANDARDS**

- Building Code: IBC 2012
- Concrete Design: ACI 318-08 “Building Code Requirements for Structural Concrete”
- ASCE 7-05 “Minimum Design Loads for Buildings and Other Structures”

**C. DESIGN LOADS**

Gravity Live Load

- Parking levels = 50 psf
- Roof load = 100 psf or fire truck loading per city and county of Denver amendment

Superimposed Gravity Dead Load

- Roof = 400 psf (3- 3 1/2 feet of soil above the Lincoln tunnel and parking structure for lawn and plants)

Occupancy Category

- Occupancy category = II

Wind Load (from Denver City and County building official)

- Basic wind speed: 90 MPH
- Exposure C
- Wind Importance factor I = 1.0

Seismic Load from Denver City and County building official and USGS seismic maps)

- Basic Seismic parameters, based on ASCE7-05 $S_{DS}$ = 21.3%g, $S_{D1}$ = 9.7%g, Assumed Soil site class D.

- Seismic lateral load resisting system; Ordinary reinforced concrete Bearing Wall System
- R = 4
- Seismic Importance factor I = 1.0

**D. FOUNDATION SYSTEM**

At the time of this narrative, no geotechnical information has been made available for the site. However, based on recent projects in the near vicinity (Ralph L. Carr Judicial Complex) it is very likely that the recommended foundation system will be a deep foundation system consisting of drilled piers/caissons seated in competent bedrock. Per the Geotechnical report from the Ralph Carr project, it should be anticipated that competent bedrock will be at an elevation between 65-100 feet below the anticipated base of the new construction. A minimum of 8 feet of bedrock penetration should also be expected. The water table was estimated to be located at a depth between 30-40 feet for the previous noted project.

Due to the extensive depth of the overburden we are anticipating the drilled pier diameters to be between 42-48 inches in diameter independent of the structural option is selected. This is a consequence of needing to meet slenderness ratio for the piers.

We anticipate the allowable end bearing to be +50,000 psf with an allowable side shear of at or above 5000 psf. These values should result in bedrock penetrations less than 15 feet for either of the design options

**E. BUILDING STRUCTURAL OPTIONS**

In all three of the design options the exterior wall system around the parking structure are full height 14-16" thick CIP foundation walls. There is also an additional wall down the center of the parking structure to support the upper parking deck and roof as well as the ramp between the lower and upper parking decks. This wall will stop short of the exterior walls at the north and south side of the garage to allow for vehicle drive lane circulation as well as leaving the center 25 feet out for entry and exit out of the garage. For option 1, the center wall can be constructed with precast wall panels while a CIP wall will be required for options 2 and 3. All design options have a 5" slab on grade as the base slab at the lower parking level

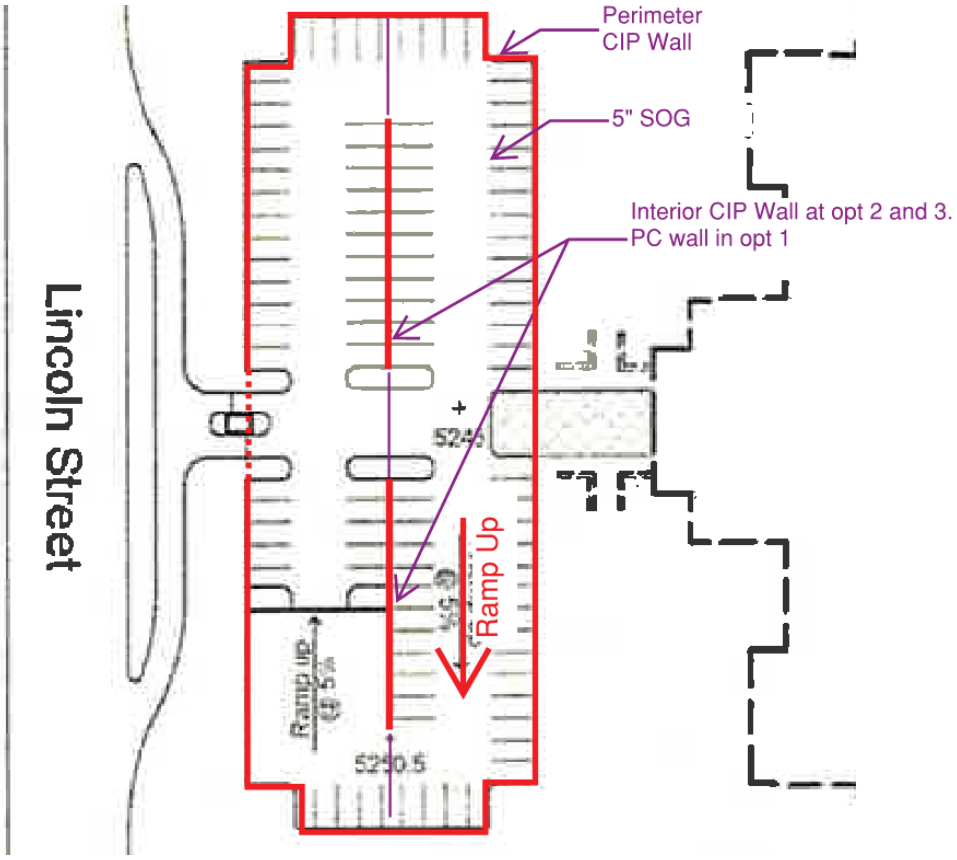


**Figure 1 General wall configuration all options**

Option 1. - Long span Precast Concrete (PC)

The primary load carrying system is precast double tee's spanning between CIP walls.

The Double Tee's (DT) and the upper parking deck are 24" deep with 3" topping and 3" wash for drainage adjacent to the walls. The roof will have 40" deep DT's also with a 3" topping slab. Above the drive aisle, the DT's will be supported by inverted T-beams. These beams will be approximately 36" deep below the upper parking deck and approximately 48" deep below the roof slab.

Total depth at upper parking deck is 36" and 48" at roof.

The drilled pier foundations will be spaced approximately 20 feet on center along the exterior perimeter wall. The pier spacing along the interior precast wall will be governed by the length of the wall segments, which will be limited to about 12 feet. We are estimating the piers along the interior and exterior walls to be 42" diameter piers with an overall length of approximately 100 feet.

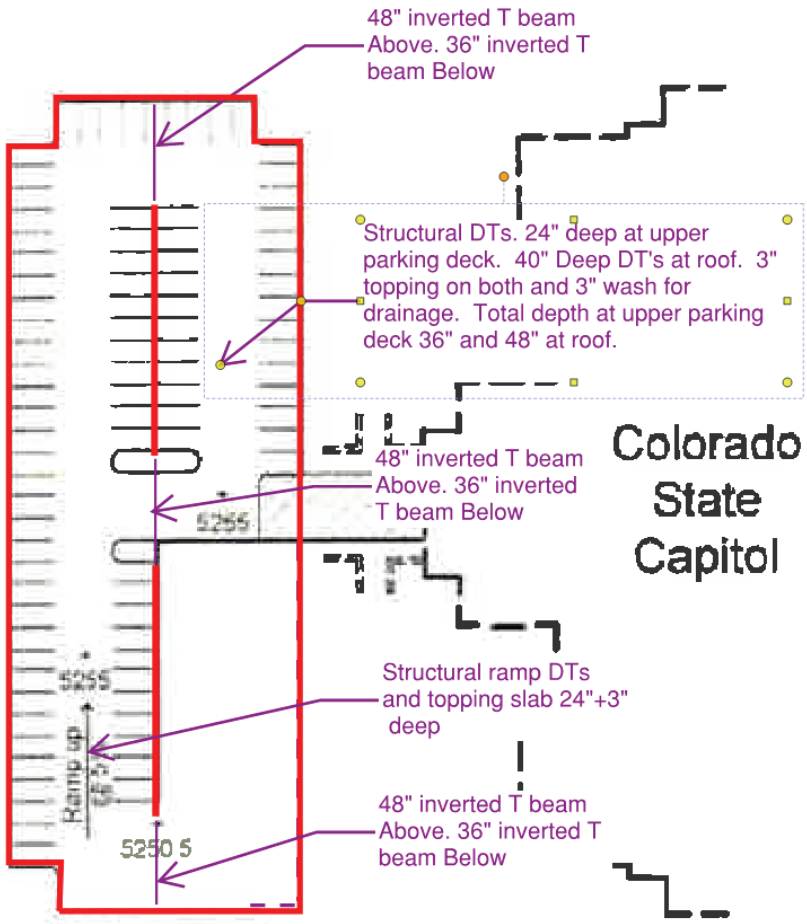


**Figure 2 Option 1 Long Span Precast structure**

Option 2. - Long span Post Tension (PT) cast in place Concrete beam and slab

The primary load carrying system is a PT slab spanning between PT beams spaced approximately 18 feet on center. The beams in are spanning between the interior and exterior CIP walls. The PT slab at the upper deck will be approximately 9" deep and the beams being 36" deep. At the roof, the slab will be an 18" deep slab with 48" deep beams.

Total depth at upper parking deck is 36" and 48" at roof.

Foundations will be spaced similar to the beam spacing along the exterior and interior. We are estimating the piers along the interior wall to be 48" diameter piers with an overall length of approximately 100 feet while perimeter piers will be 42" diameter and 100 feet in length.

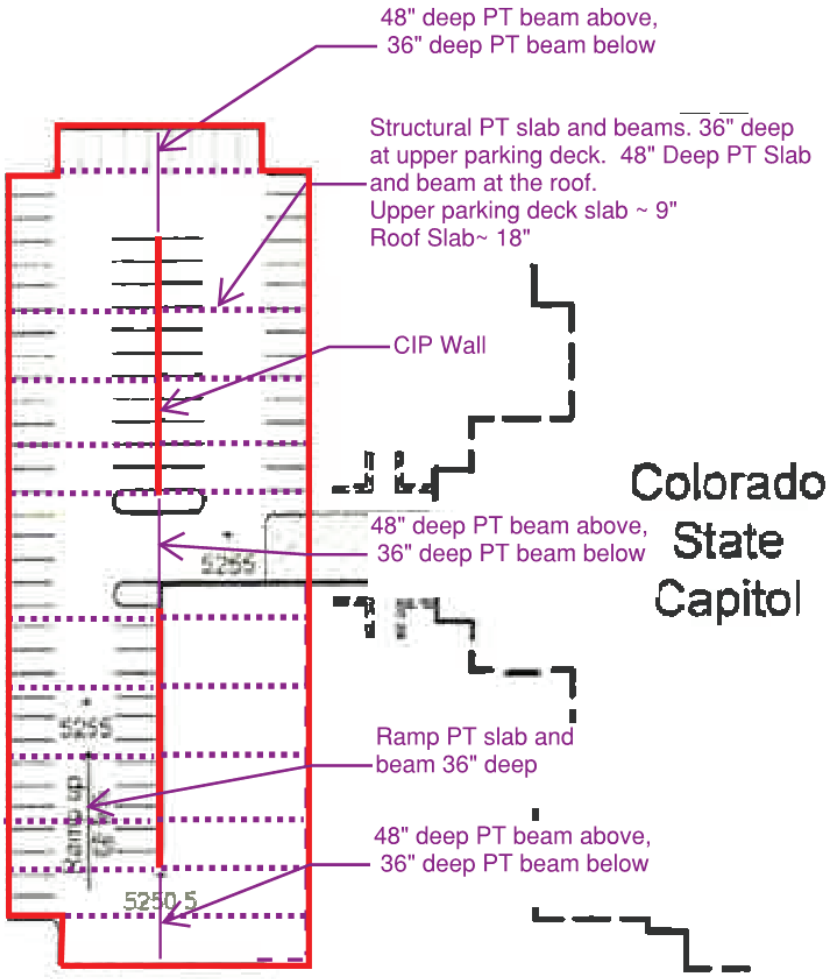


**Figure 3 Option 2 Long Span post tensioned structure**

Option 3. – Sea of Columns, Mild reinforced Cast In Place Concrete (CIP) flat plate with interior columns

This option has a mild reinforced flat plate as its primary load carrying system. The slab spans between the exterior and interior CIP walls with additional support from four lines of interior columns located at the back of the parking spots. The columns will be spaced at approximately 18-20 feet on center and be 20"x20" in size. The upper parking deck and ramp slab will be 10" deep with mild reinforcing. The roof will be closer to 24" deep also with mild reinforcing.
Total depth at upper parking deck is 10" and 24" at roof.
Foundations will be spaced below columns and at approximately 25-30 feet oc along the walls. We are estimating the piers 42" diameter piers with an approximate length of 100 feet, which is close to the minimum pier size allowed for the soil conditions.

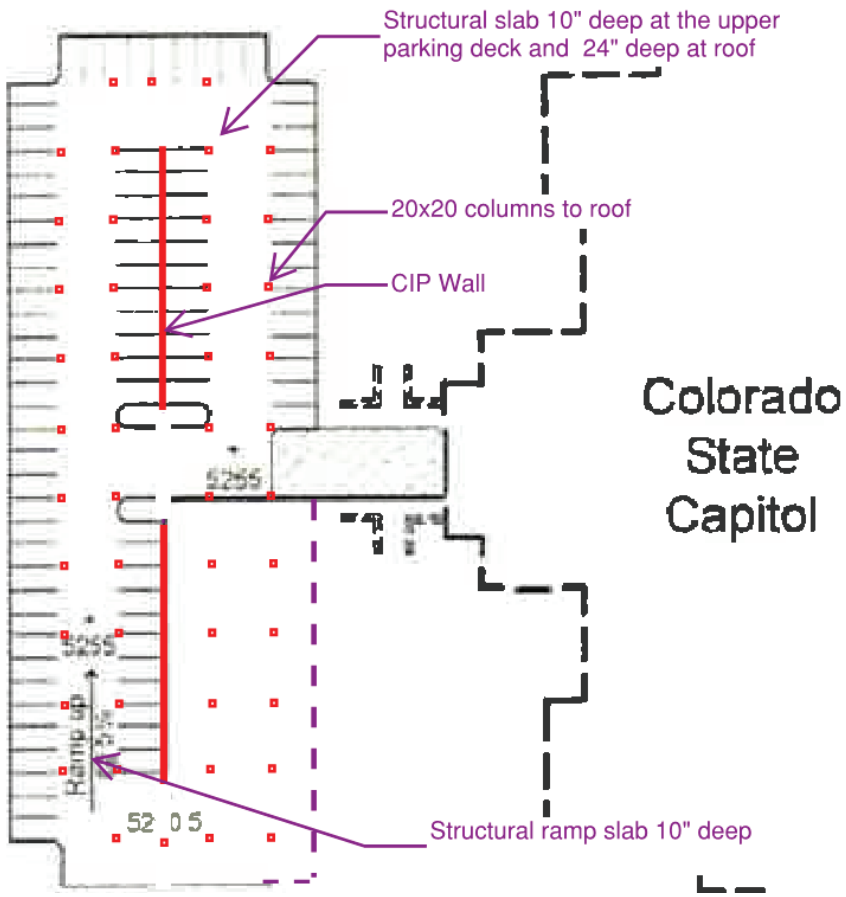


**Figure 4 Option 3 Sea of Columns CIP structure**

**Tunnel access to the State Capital Building:**

To access in and out of the state Capitol building a cast in place tunnel extending below the existing west stair will allow access to a new elevator below the existing sub-basement as well as include stair access to the existing basement level. This will require the temporary removal of the existing monumental stair on the west side of the building while the new tunnel and elevator is constructed. Because the new elevator serving the lower parking deck of the garage is more then 20 feet below the existing sub basement, extensive excavation shoring will be required to assure that the existing foundations remain sound and supported.

The new tunnel and elevator shaft will need to be constructed to support not only the vertical load on the tunnel roof but also the lateral loads on walls from the overburden soil as well as surcharge loads from the building itself. The final configuration of the tunnel and shoring will require input from a geotechnical engineer as well as specialty shoring contractors and engineers. The tunnel walls, roof and elevator shaft walls may exceed 18" in thickness depending on if temporary shoring is used in lieu of permanent shoring.

## F. LINCOLN AVENUE TUNNEL CONSTRUCTION

The structure for the tunnel allowing traffic on Lincoln Street to go below the new expanded west lawn will be constructed similar to the roof framing specified for options 1 or 2 noted above. Option 3 for the Lincoln Street tunnel is not a viable option as there is not sufficient space to allow columns at the required spacing to get the option 3 roof structure over Lincoln Street.

## 2.8 TRAFFIC NARRATIVE AND ANALYSIS

### A. INTRODUCTION

The West Lawn Project analyzes the feasibility of future improvements to the grounds surrounding the Colorado State Capitol and Lincoln Park directly west of there. As a result of the project's location on the cusp of the downtown central business district (CBD), the adjacent street network experiences high traffic volumes from a variety of modes. Colfax Avenue to the north and Lincoln Street, separating the West Lawn from Lincoln Park, experience especially high traffic volumes.

In the preliminary concepts for the West Lawn Project, a sub-grade tunnel would be built on the block of Lincoln Street between Colfax Avenue and 14th Avenue. In addition, an underground parking garage is proposed to serve the Capitol Complex.

In order to understand how these improvements would affect future traffic operations in the Capitol Complex area, this report will provide a baseline assessment of the existing transportation network.

### B. VEHICULAR NETWORK

The existing road network bordering the State Capitol consists of multiple one-way street couplets. Denver streets are based on an east-west/north-south grid, where roadways are parallel to the cardinal directions. Downtown Denver is based on a diagonal street grid, where the roadways were plotted to be parallel with Cherry Creek and the South Platte River. The intersection of Broadway and Colfax Avenue is where the two grid systems meet, just one block west of the Capitol building.

### C. ROADWAYS

Daily traffic counts were obtained from the City and County of Denver's traffic count database and the Denver Regional Council of Government (DRCOG) regional traffic count program. The annual counts were taken between 2002 and 2011. Based on the information collected, the traffic volumes have been consistent through the years. **Figure 1** shows the average daily traffic (ADT) counts for the surrounding roadway network.

**Lincoln Street** is a four-lane, northbound urban arterial that facilitates a substantial amount of traffic into the downtown CBD. This one-way northbound road couples with Broadway to serve traffic between downtown and I-25. Between Colfax Avenue and 14th Avenue, Lincoln Street carries about 32,000 vehicles per day (vpd). The posted speed limit is 30 miles per hour (mph) within the study area. During the peak period, the rightmost lane is reserved for buses or right-turning vehicles. On-street parking is permitted on either side of Lincoln Street, with an exception to the blocks between 14th Avenue and 16th Avenue. The City and County of Denver oversees maintenance of the roadway.

**Broadway** is a four-lane, southbound regional arterial that serves as a considerable volume of traffic out of the downtown CBD. Paired with Lincoln as a one-way couplet, Broadway serves southbound traffic through Denver. The roadway spans from Brighton Boulevard in north Denver through Highlands Ranch, including two segments designated as State Highway 75. Within the Capitol Complex study area, Broadway carries about 28,600 vpd. The posted speed limit is 30 mph. Similar to Lincoln Street, the rightmost lane is reserved for buses and right-turning vehicles in the peak period. Depending on bus stops and business access, on-street parking is allowed on certain sections of Broadway. The City and County of Denver oversees maintenance of the roadway.

**Colfax Avenue** is a four-lane, east-west regional arterial that runs from Lakewood to Aurora, also serving as US Highway 40. It connects several communities and neighborhoods with downtown Denver, as well as facilitating access throughout the Denver metro region. In the study area, the annual daily traffic (ADT) along Colfax between Lincoln and Grant is approximately 31,000 vpd. Moving west, traffic between Broadway and Lincoln increases to 50,000 vpd. West of Broadway, the volumes decrease to about 23,000 vpd. Based on these volumes, it is evident that Colfax facilitates high turning volumes into and out of the CBD. The posted speed on Colfax is 30 mph. Currently, Colfax Avenue is being analyzed in two major transit studies, Colfax Corridor Connections and 15/15L Transit Priority study; more details can be found in the Transit Improvements section. Within the Capitol Complex study area, Colfax Avenue is the only roadway in which CDOT provides jurisdiction and maintenance.

**Sherman Street** is a two-lane, north-south local road that provides direct access into the Colorado State Capitol. Segmented by the State Capitol building, Sherman Street accommodates movements into the Capitol's current surface parking lot and drop-off zones from both the north and south ends. Sherman spans from 20th Avenue through south Denver, connecting residential neighborhoods and communities. On-street parking is permitted on either end of the street. Maintenance is handled by the City and County of Denver.

**Grant Street** is a three-lane, southbound urban arterial road that borders the east side of the Colorado State Capitol. This one-way road couples with Logan Street to serve the neighborhoods and communities of Denver. Based on traffic counts, the ADT for Grant is approximately 10,500 vpd near the Capitol. On-street parking is permitted on either side of the road and the posted speed is 30 mph. The City and County of Denver oversee maintenance of the street.

**Logan Street** is a two-lane, northbound urban arterial that serves residential neighborhoods and communities in Denver. It pairs with Grant Street as a one-way couplet. Vehicular traffic on Logan is approximately 6,800 vpd. On-street parking is permitted on the east side and the posted speed is 30 mph. The City and County of Denver oversee maintenance of the street.

**14th Avenue** is a three-lane, eastbound urban arterial that borders the south end of the Capitol. It pairs with 13th Avenue as a one-way couplet. In the Capitol study area, volumes on 14th Avenue are approximately 14,800 vpd. The posted speed on the road is 30 mph. On-street parking is not allowed. The City and County of Denver oversee maintenance of the street.

**13th Avenue** is a three-lane, eastbound urban arterial that borders the south end of the Capitol. It pairs with 13th Avenue as a one-way couplet. East of Broadway, volumes on 13th Avenue is approximately 12,000 vpd. Moving west of Broadway, vehicular traffic is about 10,500 vpd. The posted speed on the road is 30 mph and on-street parking is allowed on the north side. The City and County of Denver oversee maintenance of the street.

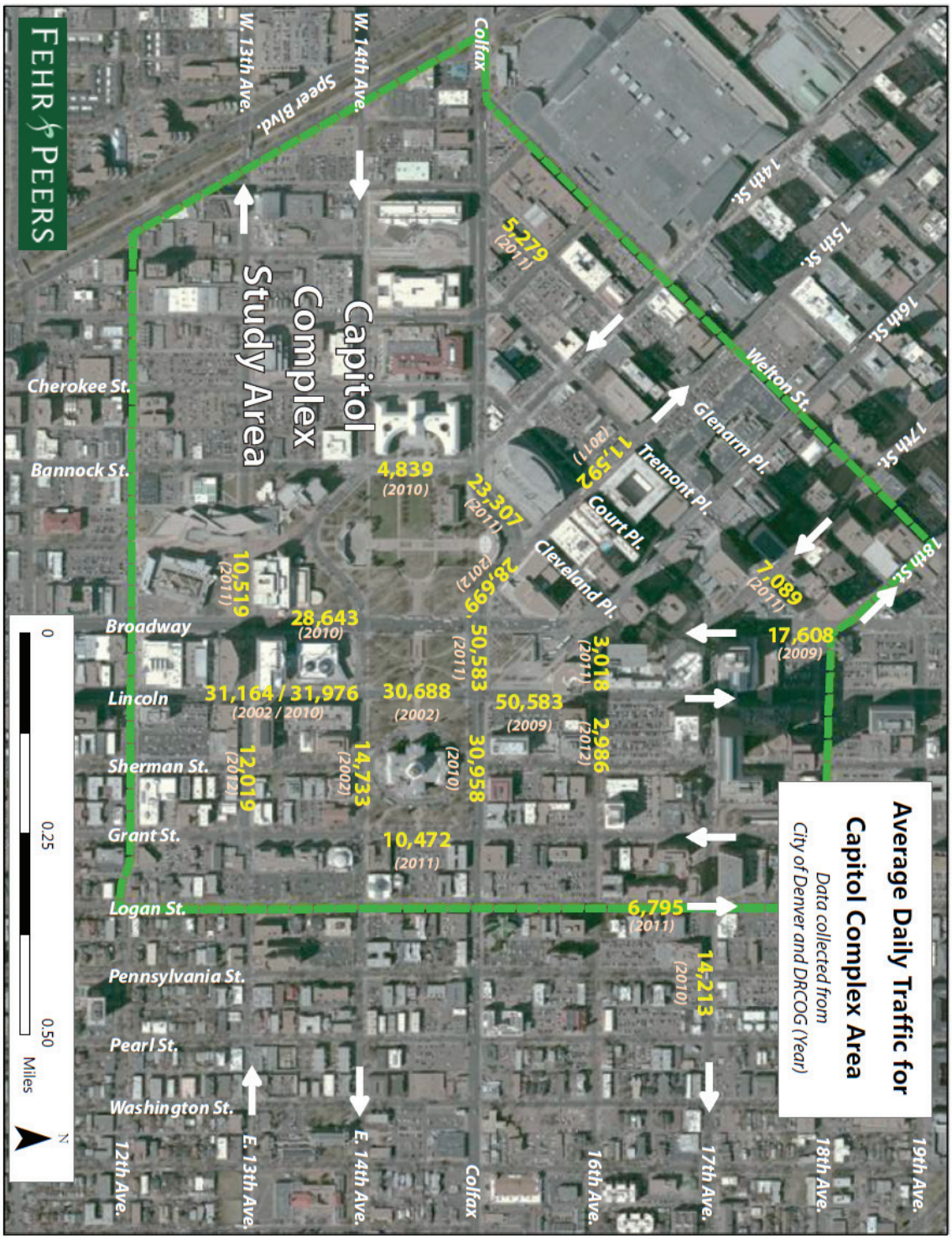


**Figure 1: Average Daily Traffic**

## D. INTERSECTIONS

All of the intersections bordering the Capitol building and grounds are currently signalized. These include:

- Lincoln Street and 14th Avenue
- Lincoln Street and Colfax Avenue
- Sherman Street and 14th Avenue
- Sherman Street and Colfax Avenue
- Grant Street and 14th Avenue
- Grant Street and Colfax Avenue

The intersection of 13th Avenue and Lincoln Street, south of the Capitol, has a bus priority signal allowing for buses to shift lanes in advance of other vehicles. The advance signal phase assists buses on Lincoln Street that make left-turns on Colfax Avenue and into Civic Center Station.

## E. TRIP GENERATION

Trip generation for the underground parking garage was obtained from ITE Parking Generation, 4th edition (2010), where the Capitol building and grounds is classified as Land Use 730: Government Office Building. Ingress and egress percentages for the AM and PM peak hours were obtained from ***Parking*** (Weant and Levinson, 1990). Based on a parking garage with 195 spaces, the trip generation during the AM and PM peak hours was determined, as shown in Table 1. As shown, most of the traffic is generated during the AM peak hour, with 158 trips. Due to the nature of a state government office, the PM peak generates fewer trips, with 133 vehicles.

| ITE Land Use Code | Land Use Description | Size | | Trip Generation Rates | | | | | | Trips Generated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AM Peak | | | PM Peak | | | AM Peak | | | PM Peak | | |
| | | | | Rate | % Enter | % Exit | Rate | % Enter | % Exit | Trips IN | Trips OUT | Total | Trips IN | Trips OUT | Total |
| **Proposed Parking Garage** | | | | | | | | | | | | | | | |
| 730 | Government Office Building | 190 | spaces | 0.83 | 70% | 30% | 0.70 | 40% | 60% | 111 | 47 | 158 | 53 | 80 | 133 |

[1] Values obtained from ITE Parking Manual, 4th Edition

**Table 1: Trip Generation**

## F. OPERATIONAL ANALYSIS

A rough, preliminary traffic simulation in Synchro was used to gauge how the Capitol parking garage could affect existing traffic patterns. To gain a more accurate understanding of traffic operations, updated vehicle counts and signal timing will need to be included in the model.

Based on the preliminary Synchro model, a rough estimate shows that there may be some delays along Lincoln Street. Screen captures from the preliminary SimTraffic model are shown in **Figure 2**. In the AM peak hour, northbound traffic on Lincoln could queue from Colfax past 14th Avenue. This may limit the efficiency of vehicles entering and exiting the Capitol garage. During the PM peak hour, heavy northbound traffic on Lincoln may create difficulties for vehicles exiting the garage. In particular, vehicles heading for a left-turn onto westbound Colfax may struggle crossing over three lanes of traffic.

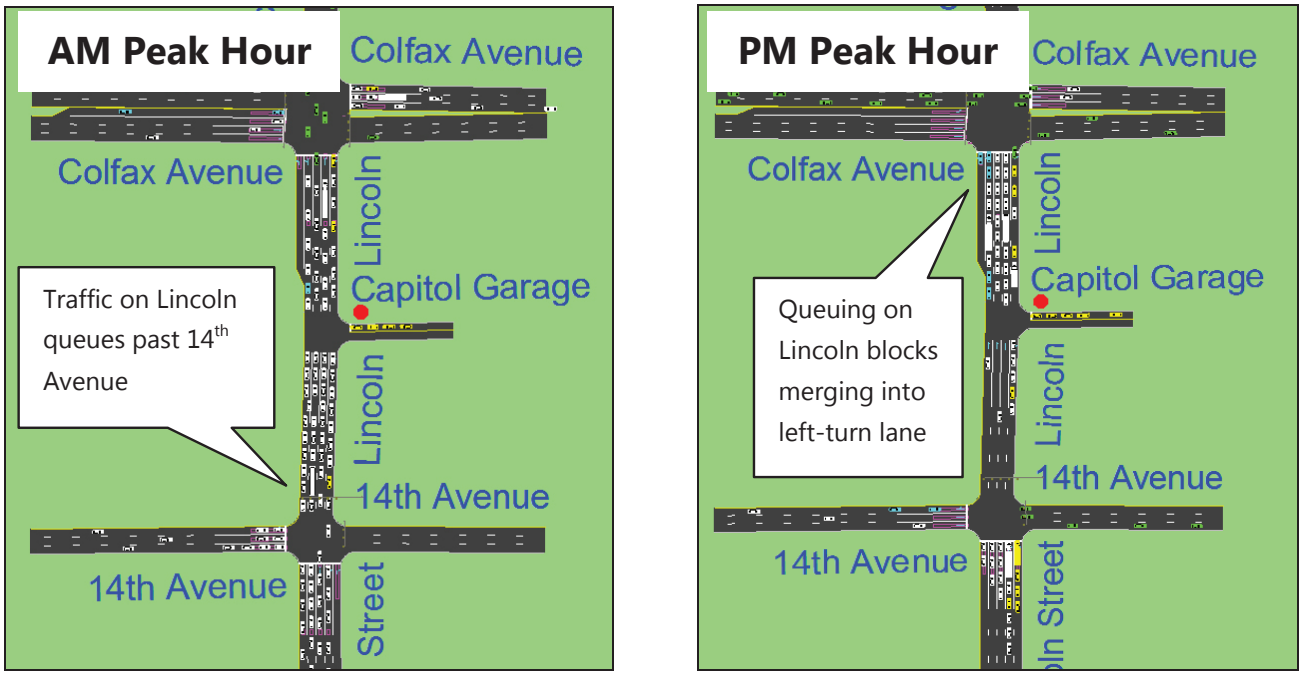


**Figure 2: Preliminary Synchro Models (Need Verification)**

## G. INGRESS/EGRESS REQUIREMENTS

The underground garage at the Capitol is expected to hold 195 vehicles. Concept plans anticipate a majority of this traffic to be from employees, who will access the garage via gate entrance by coded card. Assuming the Capitol building classifies as an office building land use, the expected number of lanes for the facility are:

- Inbound = 1 lane
- Outbound = 1 to 2 lanes, depended on control type

These results were interpreted from the graph on **Figure 3**, which is used to assess the entrance-exit design for parking facilities (Crommelin, Robert W.)

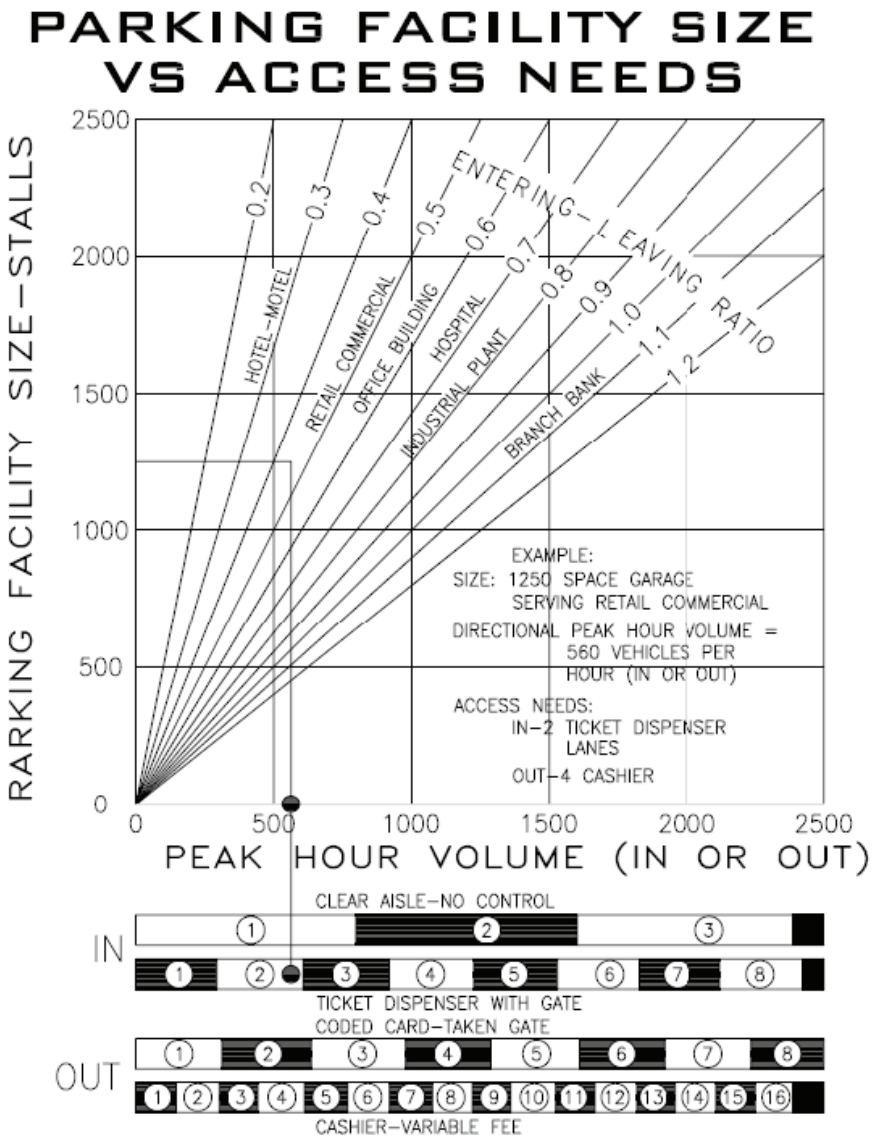


**Figure 3: Inbound/Outbound Lane Design**

## H. MULTI-MODAL CIRCULATION

Located in central Denver and on the cusp of the Denver CBD, the Capitol experiences heavy volumes from all transport modes, including vehicles, transit, bicyclists, and pedestrians. The following section provides details for alternative transportation modes, including transit, bicycles, and pedestrians. Current services and facilities will be presented, as well as areas for potential improvement.

## I. TRANSIT

With a centralized site in downtown Denver, the Capitol is located adjacent to the core of several bus routes. Located one block away from Civic Center Station, there are multiple transit routes to access the site. A map of transit routes in the Capitol area is shown in **Figure 4**.

- **Lincoln Street/Broadway:** The one-way couplet of Lincoln Street and Broadway serves as a primary bus corridor, facilitating multiple routes into and out of downtown Denver at Civic Center Station. During peak hours, the corridor may see up to 17 bus routes, including express, limited, local, and regional services. Peak hour bus operations are accommodated by a reserved bus and right-turning vehicle lane.
- **Colfax Avenue:** The Colfax corridor facilitates regular bus service throughout the day, providing a key connection between Denver, Aurora, and Lakewood. In the Capitol area, buses provide local and limited services. At the northeast corner of the Capitol site, a bus stop provides convenient transit access to users of the Capitol. The following section describes details on two current transit studies for the Colfax Corridor.
- **Grant Street:** One local bus route runs on Grant Street, bordering the east side of the Capitol.

## J. TRANSIT IMPROVEMENTS

Currently, two separate projects are underway to study transit improvements on Colfax Avenue. As described below, the Colfax Corridor Connections project is led by the City and County of Denver, while the 15/15L Transit Priority Study is led by RTD. Although these projects are not tied together, both organizations are coordinating in planning efforts.

- **Study #1: Colfax Corridor Connections (City and County of Denver)** – This long-term study is intended to identify multi-modal transportation improvements on the East Colfax corridor, stretching from I-25 to I-225. As a follow-up to Denver's 2010 Streetcar Feasibility Study, the Colfax Corridor Connections project looks at a wider range of transit modes and alignments. The three modes being analyzed in the Alternatives Analysis (AA) evaluation include enhanced bus, bus rapid transit (BRT), and modern streetcar. As of summer 2013, the project is completing its AA evaluation and working to select a locally preferred alternative. Next steps will include conducting environmental clearance and hosting public meetings.

- **Study #2: 15/15L Transit Priority Study (RTD)** – This short-term study is intended to reduce travel times and increase security and ridership for bus routes 15/15L. The focus area is on East Colfax between Broadway and Yosemite. Potential improvements being studied include stop amenities, bus bulbs, bypass lanes/queue jumps, and transit signal priority. Currently, preliminary analysis has been completed and stakeholder meetings are underway. Next steps will include design, slated to start in late fall 2013, and construction in late 2014.

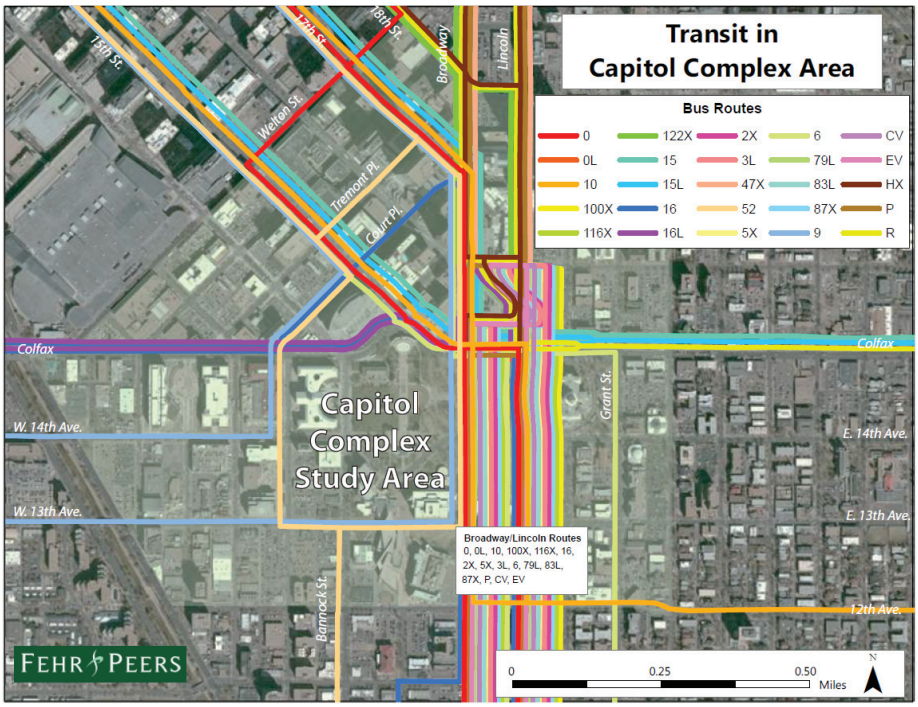


**Figure 4: Transit in Study Area**

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## 2.9 PARKING OPERATIONS

### A. PARKING OPERATIONS AND CONTROL FOR WEST LAWN PARKING STRUCTURE

The proposed West Lawn Project includes a parking structure which will be used by authorized parkers only (e.g., legislators and/or authorized staff). The facility will not provide daily visitor parking or outside monthly parking. Basic facility operations will be as follows:

- Parking access will be provided to authorized personnel by the State of Colorado.
- Authorized parkers will be issued Automatic Vehicle Identification (AVI) tags for access to the parking structure. The AVI tags will be affixed to the lower driver-side windshield of each authorized vehicle. The tags can be affixed using Velcro to allow for movement between different user vehicles. The AVI system will provide faster entry/exit speeds and a higher lane capacity than other forms of access control. This system will also provide a higher level of customer service (e.g., parkers will not have to roll down their windows to swipe or present an access card).
- To enter the facility, authorized parkers will pull into the entry lane. An AVI reader mounted in the lane will automatically detect the vehicle's AVI tag and send the tag's identification information to an access control computer. The access control computer will determine if the tag is valid. If the tag is valid, the control gate or high-speed overhead door will open automatically. The vehicle will then enter the facility and park. If the tag is not valid, or no tag is detected, the gate/door will remain closed.
- To exit the facility, parkers will pull into the exit lane. An AVI reader mounted in the lane will automatically detect the vehicle's AVI tag and send the tag's identification information to an access control computer. The access control computer will determine if the tag is valid. If the tag is valid, the control gate or high-speed overhead door will open automatically. The vehicle will then exit the facility. If the tag is not valid, the gate/door will remain closed.
- If necessary, security personnel could be located at the facility entry/exit lanes to monitor vehicle movements and assist parkers.

The parking structure will provide a layered approach to security. On typical weekdays, access to/from the facility will be controlled using traditional parking control gates only. After hours and on weekends, access to the facility will be controlled using high-speed overhead doors. The overhead doors will not allow pedestrians to access the parking structure through the entry/exit lanes. When a higher level of security is required on weekdays, the high-speed overhead doors will be used at all times. The doors operate at a speed similar to the traditional access control gates, so lane capacity is not negatively impacted. During periods of time when the highest level of security is needed, hydraulic bollards or wedge barricades can be raised to close vehicle access to the structure completely.

The basic access control equipment needed will include:

- Parking Control Gates (one in each lane)
- High-Speed Overhead Doors (one in each lane)
- AVI Readers (one in each lane)
- AVI Tags (one for each authorized user, plus a small replacement supply)
- Vehicle Detectors (one in each lane)
- Magnetic Detector Loops (two in each lane)
- Hydraulic Bollards or Wedge Barricades (for each lane)
- ADA-Accessible Security Booth (one, located between the entry and exit lanes)
- Access Control Computer and Software

## 2.10 SECURITY AND FORCE PROTECTION

This report represents a basic set of security considerations surrounding the West Lawn project as well as preliminary estimates regarding the impact of the project in terms of FTE as well as costs. It should be noted that these estimations are based on a variety of assumptions and are not reflective of any of a number of contingencies that it would be very difficult to predict at this stage. As mentioned several times throughout the report, these are estimations. It would be necessary to do a much more in-depth analysis of the costs and impacts to FTE and security should the project be green-lighted that might potentially reveal additional costs.

### A. SECURITY OPPORTUNITIES

- From the security perspective there exist a couple of distinct, but related benefits:
    - The underground parking structure would provide a greater level of security for the Governor, members of the general assembly and staff when parking, entering, and exiting the Capitol. The garage would provide them with a secure structure in which to park their vehicles affording them the ability to enter and exit away from other criminal and protest activity.
    - Relocating parking to the underground structure from the Capitol circle would eliminate an existing security concern regarding traffic and parking near the building. All parking underground ensures that any parking near the building would be access controlled and that vehicular traffic in the circle would be anomalous rather than the norm.

### B. SECURITY CHALLENGES

- The underground parking structure would allow vehicles to park in very close proximity to the foundation of the Capitol creating a significant security concern in the event of an incident involving explosive materials.
- Parking structures are inherently difficult to observe and detect criminal activity due to their construction, numerous blind spots and relative low light.
- Entrance/egress through the parking structure allows access to the building directly adjacent and under the Governor's office.

- The Lincoln tunnel might provide opportunities for criminal activity in an environment not easily detected by law enforcement. In addition, pedestrian traffic along the sidewalks might provide relatively easy access to the underground parking structure and access to the Capitol circumventing the existing screening process.
- As it currently stands, Lincoln Park presents the biggest law enforcement challenge within the Capitol Complex. That criminal activity largely remains within the park due in part to the natural barrier that Lincoln Street provides. Elimination of that barrier may introduce more criminal activity on Capitol grounds.
- The plan as proposed would create distinct line of sight challenges for officer patrolling the perimeter of the West Lawn and Lincoln Park. As it stands, troopers have visibility into the interior of the park from the perimeter. That lack of visibility due to proposed increased grade across the West Lawn would require consistent patrols of the interior of the park.
- Under current conditions, when the State Patrol encounters unpermitted protest activity on the west steps of the Capitol, troopers frequently guide protesters to the sidewalk immediately in front of the building on Lincoln Street. This provides demonstrators with an opportunity and a venue to still exercise their right to free speech immediately adjacent to the Capitol, but to do so in a place that does not require a permit. This plan would leave troopers and demonstrators with the only option of moving to Broadway, a considerable distance from the building.
- The current plan provides pedestrian access immediately over Lincoln Street. This may provide an opportunity for individuals to throw missiles at passing vehicles or provide a place to engage in unpermitted demonstrations.

**C. BASIC MITIGATION STRATEGIES**

- Because of the inherent concerns any plan to provide underground parking on Capitol grounds must include a robust plan for securing the facility to include:
    - Stringent access control through the use of State Partrol security personnel posted at the entrance to monitor vehicles entering the facility as well as monitoring security cameras within the structure.
    - Placement of security gates/doors at the ingress and egress

points.

- Employment of a solid door or barrier to control access outside of normal business hours.
- Access control from the parking structure into the Capitol through the use of key pads or electronic keypads.
- Placement and monitoring of security cameras on each of the access points and throughout the structure as well as cameras positioned within the tunnel.
- Routine foot patrols of the structure.

- Given the challenges that may potentially be faced with expansion of the West Lawn into Lincoln Park, an increased patrolling strategy for the park would include:
  - Increased foot and bike patrols by troopers within the park and on Capitol grounds.
  - Increasing the number of cameras within the park and on Capitol grounds.

**D. BASIC COST ESTIMATION**

It should be noted that these are basic estimations of cost and are based on the current threat picture. As noted below, this is not reflective of future security considerations that cannot be logically predicted at this time and represents a minimum.

- 2 Trooper FTE: Would allow for increased patrolling of Capitol grounds, Lincoln Park and the parking structure.
  - $192,904.80 - This reflects an ongoing cost and includes annual salary and benefits for two troopers at current rates.
- 2 State Patrol Security Guard FTE: Would allow for the posting of a security officer at the entrance to monitor vehicles and pedestrian traffic attempting to enter the structure. In addition to the monitoring of security cameras within the parking garage.
  - $98,675.52 - This reflects an ongoing cost and includes annual salary and benefits for two security guards at current rates.
- Placement of a minimum of 15 additional security cameras both within

the park/West Lawn and within the parking structure.

- $39,000 - This figure is based solely on the cost of a recent camera installation by a current vendor. This does not reflect any additional costs that may be realized by challenges related to integrating new cameras into the existing system.

Captain John Hahn
Colorado State Patrol
Executive Security Unit
303-866-3697

## 2.11 VENTILATION SYSTEMS AND LIGHTING SYSTEMS

### A. TUNNEL MECHANICAL REQUIREMENTS

The proposed Lincoln Tunnel would require a ventilation system designed to handle noxious emissions from vehicles using the tunnel and the handling of smoke during a fire. The ventilation system could be either longitudinal ventilation or transverse ventilation.

Per ASHRAE Applications handbook, preliminary calculations of 100 cfm per lane-foot is a reasonable first pass at an emergency ventilation rate for a road tunnel.

- Provide air quality monitoring system.
- Provide automatic fire detection system along with fire alarm control panel.
- Provide stand pipe system designed and installed as per NFPA 14. Stand pipe systems shall be either wet or dry, depending on the climatic conditions.

### B. GARAGE MECHANICAL REQUIREMENTS

- Provide mechanical ventilation system capable of producing minimum ventilation airflow rate of 0.05 cfm per square foot and maximum ventilation rate of 0.75 cfm per square foot. This will include supply and exhaust fans.
- The garage is approximately 7,000 sq. ft, which would require supply fan delivering approximately 5000 cfm air flow and exhaust fan exhausting 5500 cfm airflow.
- Control system to detect CO levels and vehicle operation or presence of occupants.
- Sprinkler system
- Heating system to maintain space above freezing (50 deg. F). This will require gas fired unit heaters at both levels of parking
- Venting (flue) from unit heaters to outside.

## C. TUNNEL

- Power: A 400 amp, 480/277V, 42 circuit panelboard that is service rated and fed from the Capitol building that will feed lighting, pumps, fan motors and all loads associated with the tunnel mechanical systems is needed. A 30kVA transformer feeding a 100amp, 208/120V, 30 circuit panelboard for miscellaneous 208/120V loads is also needed. The electrical gear can be located in an electrical room in the garage.

- Emergency Power: A 200 amp, 480/277V, 42 circuit panelboard that is service rated and fed from the existing generator located behind the power house is needed. There is a feed from the generator located behind the power house into the Capitol building; the circuit can be taken from there. The generator will feed all the life safety systems such as: emergency smoke evacuation system, fire alarm system, emergency lighting system, sump pump system. Also, a 30kVA transformer feeding a 100amp, 208/120V, for miscellaneous emergency 208/120V loads, will be required.
- Fire Alarm: A fire alarm system with notification will be required. A VESDA system may be the best for this condition with the amount of particles in the air. The VESDA system also requires less maintenance.
- Lighting: Lighting will be required to light the tunnel. The lighting shall be designed per the IESNA standard RP-22-10. Due to the short length of the tunnel the entire tunnel must be lit uniformly to 21 foot candles (horizontal). Approximately 25 IP66 rated LED light fixtures (10,000 lumens each) will be needed to achieve this light level. These fixtures can be found for approximately $500 each, and will consume approximately 2700 Watts combined. LED fixtures are recommended due to their good color rendering characteristics, color temperature, and energy efficiency, as well as their low maintenance requirements and long life. A lighting distribution pattern should be selected that provides the highest vertical illuminance possible, and assures that the vertical tunnel surfaces are lit as highly as possible given the 21 foot candle horizontal light level.
- Lighting Controls: Automatic lighting controls are not required for the tunnel because the lanes of traffic are not divided to avoid head-on collisions. Because the tunnel is undivided the IESNA recommends maintaining the daytime lighting design levels at night for safety. Due to this recommendation only an on/off manual control needs to be provided to turn the tunnel lights off for maintenance purposes.

## D. GARAGE

- Power: A 400 amp, 480/277V, 42 circuit panelboard that is service rated and fed from the Capitol building is needed. A 30kVA transformer feeding a 100amp, 208/120V, 30 circuit panelboard for miscellaneous 208/120V loads is also needed. The electrical gear can be located in an electrical room in the garage.
- Emergency Power: A 200 amp, 480/277V, 42 circuit panelboard that is service rated and fed from the existing generator located behind the power house is needed. There is a feed from the generator located behind the power house into the Capitol building; the circuit can be taken from there. Also, a 30kVA transformer feeding a 100amp, 208/120V, 30 circuit panelboard, for miscellaneous emergency 208/120V loads, will be required.
- Fire Alarm: A fire alarm system with notification will be required. A VESDA system may be the best for this condition with the amount of particles in the air. The VESDA system also requires less maintenance.
- Lighting: Lighting will be required to light the garage. The lighting in the garage shall be designed per IESNA recommendations. An appropriate light level should be selected that maximizes energy efficiency while also addressing security requirements. LED fixtures should be provided on a 30'x30' spacing throughout the garage and mounted to structure or structural beams dependent on ceiling clearance and placement for optimal horizontal and vertical lighting uniformities. LED fixtures are recommended due to their good color rendering characteristics, color temperature, and energy efficiency, as well as their low maintenance requirements and long life.
- Lighting Controls: Occupancy sensors should be provided throughout the garage to maximize energy efficiency. Garage fixtures can either switch from 0% light output to 100% output when occupied, or 50% light output to 100% output when occupied, dependent on the level of security desired. The lighting controls should be programmed to maximize energy efficiency while also addressing security requirements. Stairwell light fixtures should have occupancy sensors as well and switch from 50% light output when unoccupied to 100% light output when occupied.

## E. ASSUMPTIONS

- The Capitol building has sufficient spare capacity for these buildings. If not, a new service will be required from a nearby location.
- The emergency generator has sufficient spare capacity for these buildings. If not, a new generator will be required.
- The Tunnel Lighting Design Assumes: Fixation Point = 4.75', Adaptation Distance = 24', Portal = 15', Windshield Cutoff Angle= 25 degrees, Threshold Zone = 309' from each tunnel entrance, Traffic Speed, 40 miles per hour, Downgrade = 6%, Tunnel Scene = Urban tunnel 4,5,6, Driver Direction = North, Traffic Volume = >15,000, Tunnel Category=251'-410', Cyclist=Yes, Daylight Penetration=Poor, Wall Reflectance=Low, Exit Visible From Safe Sight Stopping Distance=Yes.
- The Garage Lighting Design Assumes: Average Light Level=3 foot candles, Max/Min Ratio=<10:1, Fixture Spacing=30'x30'

## F. SCHEDULE OF FIXTURES

# D-Series
## LED Parking Garage

DESIGNLIGHTS CONSORTIUM

Catalog Number

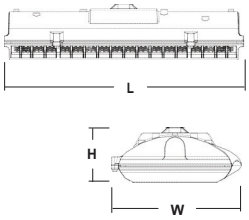
Notes

Type

*Hit the Tab key or mouse over the page to see all interactive elements.*

### Specifications

| | |
|---|---|
| **Length:** | 17-3/4" *(45.1 cm)* |
| **Width:** | 8-1/2" *(21.6 cm)* |
| **Height:** | 3-7/16" *(8.7 cm)* |
| **Weight (max):** | 16 lbs *(7.3 kg)* |




### Introduction

The D-Series LED Parking Garage luminaire provides energy savings of 88% when replacing 175W metal halide luminaires. With an expected service life of over 100,000 hours (10+ years of 24/7 operation), up to ten metal halide lamp changes are avoided over the life of the product. All of this adds up to quick paybacks and a very low total cost of ownership.

Five dedicated precision refractive optics allow the D-Series Parking Garage luminaire to meet the desired criteria for minimums, verticals and uniformity. Exceptional glare control is achieved while delivering the required vertical illumination.

## Ordering Information

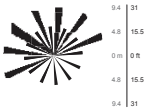
**EXAMPLE:** DSXPG LED 20C 1000 40K T5M MVOLT DWHXD

| DSXPG LED | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Series** | **LEDs** | **Drive current** | **Color temperature** | **Distribution** | **Voltage** | **Mounting** | **Options** | **Finish** *(required)* |
| DSXPG LED | 10C 10 LEDs (one engine) [1,2]<br>20C 20 LEDs (two engines)<br>30C 30 LEDs (three engines) | 350 350 mA<br>530 530 mA<br>700 700 mA<br>1000 1000 mA (1 A) | 30K 3000K<br>40K 4000K<br>50K 5000K | T5E Type V, entryway<br>T5M Type V, medium<br>T5W Type V, wide<br>T5R Type V, reclangular<br>ASY Asymmetric | MVOLT [3]<br>120 [3]<br>208 [3]<br>240 [3]<br>277 [3]<br>347 [1]<br>480 [1] | **Shipped included**<br>(blank) Pendant mount [4]<br>SRM Surface mount<br>**Shipped separately**<br>YK Yoke/ trunnion mount [5] | **Shipped installed**<br>DMG 0-10V dimming driver (no controls) [2]<br>HS House-sideshield (housing visor) [5]<br>SF Single fuse (120, 277, 347V) [6]<br>DF Double fuse (208, 240, 480V) [6]<br>PIR360SS Motion/ambient light sensor [7]<br>SPD Separate surge protection [8]<br>**Shipped separately**<br>SLVRD Pendant swivel cover for round or octagonal j-box<br>SLVSQ Pendant swivel cover for 4" square j-box<br>BDS Bird shroud [4] | DWHXD White<br>DNAXD Natural aluminum<br>DDBXD Dark bronze |

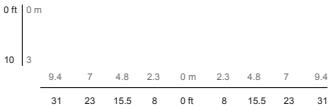
### Motion Sensing

The motion sensor option (PIR360SS) has 360° of passive infrared sensing and adjustable bi-level dimming to save energy when there is no occupancy.

**TOP VIEW**

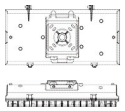



**SIDE VIEW**

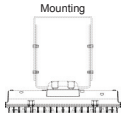



### Mounting Options

Surface Mounting



Yoke/Trunnion Mounting



### Accessories

*Ordered and shipped separately.*

| | |
|---|---|
| DSXPGYK DWHXD U | Yoke/trunnion accessory, white (other finishes available) |
| DSXPGHS U | House-side shield (1 per light engine) |
| DSXPGBDS DWHXD U | Bird shroud for pendant or yoke, white (other finishes available) |
| DSXPGBDSSJ DWHXD U | Bird shroud for SRM on surface J-box only, white (other finishes available) |

**NOTES**

1. Available with 700mA option only.
2. Not available with 347 or 480V.
3. MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120, 208, 240 or 277 options only when ordering with fusing (SF, DF options).
4. Compatible with 3/4" NPT pendant stem, by others.
5. Also available as a separate accessory; see Accessories information at left.
6. Single fuse (SF) requires 120, 277 or 347 voltage option. Double fuse (DF) requires 208, 240 or 480 voltage option.
7. Specifies the SensorSwitch SBOR-10-ODP control; see Motion Sensor Guide for details. Dimming driver standard.
8. See the electrical section on page 3 for more details.


LITHONIA LIGHTING

One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • Fax: 770.918.1209 • www.lithonia.com

## Performance Data

### Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Actual wattage may differ by +/- 8% when operating between 120-480V +/- 10%.

| Light Engines | Drive Current (mA) | Performance Package | System Watts | Dist. Type | 30K (3000K, 80 CRI) | | | | | 40K (4000K, 70 CRI) | | | | | 50K (5000K, 65 CRI) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lumens | B | U | G | LPW | Lumens | B | U | G | LPW | Lumens | B | U | G | LPW |
| 10C (10 LEDs) | 700 mA | 10C 700–K | 26W | ASY | 1,792 | 0 | 0 | 1 | 69 | 2,253 | 1 | 0 | 1 | 87 | 2,428 | 1 | 0 | 1 | 93 |
| | | | | T5E | 1,882 | 1 | 0 | 0 | 72 | 2,366 | 1 | 0 | 0 | 91 | 2,550 | 1 | 0 | 0 | 98 |
| | | | | T5M | 1,889 | 1 | 0 | 0 | 73 | 2,375 | 2 | 0 | 0 | 91 | 2,560 | 2 | 0 | 0 | 98 |
| | | | | T5R | 1,860 | 2 | 0 | 2 | 72 | 2,339 | 2 | 0 | 2 | 90 | 2,521 | 2 | 0 | 2 | 97 |
| | | | | T5W | 1,771 | 2 | 0 | 1 | 68 | 2,226 | 2 | 0 | 1 | 86 | 2,399 | 2 | 0 | 1 | 92 |
| | 1000 mA | 10C1000 –K | 37W | ASY | 2,444 | 1 | 0 | 1 | 66 | 3,074 | 1 | 0 | 1 | 83 | 3,314 | 1 | 0 | 1 | 90 |
| | | | | T5E | 2,566 | 1 | 0 | 0 | 69 | 3,227 | 2 | 0 | 0 | 87 | 3,479 | 2 | 0 | 0 | 94 |
| | | | | T5M | 2,576 | 2 | 0 | 0 | 70 | 3,241 | 2 | 0 | 1 | 88 | 3,493 | 2 | 0 | 1 | 94 |
| | | | | T5R | 2,537 | 2 | 0 | 2 | 69 | 3,191 | 2 | 0 | 2 | 86 | 3,440 | 3 | 0 | 3 | 93 |
| | | | | T5W | 2,414 | 2 | 0 | 1 | 65 | 3,037 | 2 | 0 | 1 | 82 | 3,274 | 3 | 0 | 1 | 88 |
| 20C (20 LEDs) | 350 mA | 20C350–K | 25W | ASY | 1,995 | 1 | 0 | 1 | 80 | 2,511 | 1 | 0 | 1 | 100 | 2,705 | 1 | 0 | 1 | 108 |
| | | | | T5E | 2,095 | 1 | 0 | 0 | 84 | 2,637 | 1 | 0 | 0 | 105 | 2,840 | 2 | 0 | 0 | 114 |
| | | | | T5M | 2,103 | 2 | 0 | 0 | 84 | 2,647 | 2 | 0 | 0 | 106 | 2,851 | 2 | 0 | 1 | 114 |
| | | | | T5R | 2,071 | 2 | 0 | 2 | 83 | 2,607 | 2 | 0 | 2 | 104 | 2,808 | 2 | 0 | 2 | 112 |
| | | | | T5W | 1,971 | 2 | 0 | 1 | 79 | 2,481 | 2 | 0 | 1 | 99 | 2,672 | 2 | 0 | 1 | 107 |
| | 530 mA | 20C530–K | 37W | ASY | 2,803 | 1 | 0 | 1 | 76 | 3,526 | 1 | 0 | 1 | 95 | 3,799 | 1 | 0 | 1 | 103 |
| | | | | T5E | 2,943 | 2 | 0 | 0 | 80 | 3,702 | 2 | 0 | 0 | 100 | 3,989 | 2 | 0 | 0 | 108 |
| | | | | T5M | 2,955 | 2 | 0 | 1 | 80 | 3,717 | 2 | 0 | 1 | 100 | 4,005 | 2 | 0 | 1 | 108 |
| | | | | T5R | 2,910 | 2 | 0 | 2 | 79 | 3,660 | 3 | 0 | 3 | 99 | 3,944 | 3 | 0 | 3 | 107 |
| | | | | T5W | 2,770 | 2 | 0 | 1 | 75 | 3,483 | 3 | 0 | 1 | 94 | 3,754 | 3 | 0 | 1 | 101 |
| | 700 mA | 20C700–K | 46W | ASY | 3,449 | 1 | 0 | 1 | 75 | 4,337 | 1 | 0 | 1 | 94 | 4,675 | 1 | 0 | 1 | 102 |
| | | | | T5E | 3,621 | 2 | 0 | 0 | 79 | 4,554 | 2 | 0 | 0 | 99 | 4,909 | 2 | 0 | 0 | 107 |
| | | | | T5M | 3,636 | 2 | 0 | 1 | 79 | 4,572 | 3 | 0 | 1 | 99 | 4,928 | 3 | 0 | 1 | 107 |
| | | | | T5R | 3,580 | 3 | 0 | 3 | 78 | 4,502 | 3 | 0 | 3 | 98 | 4,853 | 3 | 0 | 3 | 106 |
| | | | | T5W | 3,407 | 3 | 0 | 1 | 74 | 4,285 | 3 | 0 | 1 | 93 | 4,619 | 3 | 0 | 1 | 100 |
| | 1000 mA | 20C1000–K | 74W | ASY | 4,632 | 1 | 0 | 1 | 63 | 5,828 | 1 | 0 | 1 | 79 | 6,283 | 1 | 0 | 2 | 85 |
| | | | | T5E | 4,864 | 2 | 0 | 0 | 66 | 6,119 | 2 | 0 | 0 | 83 | 6,597 | 2 | 0 | 1 | 89 |
| | | | | T5M | 4,883 | 3 | 0 | 1 | 66 | 6,143 | 3 | 1 | 1 | 83 | 6,623 | 3 | 0 | 1 | 90 |
| | | | | T5R | 4,808 | 3 | 0 | 3 | 65 | 6,050 | 3 | 0 | 3 | 82 | 6,522 | 3 | 0 | 3 | 88 |
| | | | | T5W | 4,577 | 3 | 0 | 1 | 62 | 5,758 | 3 | 0 | 2 | 78 | 6,207 | 3 | 0 | 2 | 84 |
| 30C (30 LEDs) | 350 mA | 30C350–K | 35W | ASY | 3,022 | 1 | 0 | 1 | 86 | 3,799 | 1 | 0 | 1 | 109 | 4,097 | 1 | 0 | 1 | 117 |
| | | | | T5E | 3,172 | 2 | 0 | 0 | 91 | 3,989 | 2 | 0 | 0 | 114 | 4,302 | 2 | 0 | 0 | 123 |
| | | | | T5M | 3,185 | 2 | 0 | 1 | 91 | 4,005 | 2 | 0 | 1 | 114 | 4,319 | 3 | 0 | 1 | 123 |
| | | | | T5R | 3,137 | 2 | 0 | 2 | 90 | 3,944 | 3 | 0 | 3 | 113 | 4,253 | 3 | 0 | 3 | 122 |
| | | | | T5W | 2,985 | 2 | 0 | 1 | 85 | 3,754 | 3 | 0 | 1 | 107 | 4,048 | 3 | 0 | 1 | 116 |
| | 530 mA | 30C530–K | 53W | ASY | 4,239 | 1 | 0 | 1 | 80 | 5,333 | 1 | 0 | 1 | 101 | 5,748 | 1 | 0 | 1 | 108 |
| | | | | T5E | 4,451 | 2 | 0 | 0 | 84 | 5,599 | 2 | 0 | 0 | 106 | 6,035 | 2 | 0 | 0 | 114 |
| | | | | T5M | 4,468 | 3 | 0 | 1 | 84 | 5,622 | 3 | 0 | 1 | 106 | 6,059 | 3 | 0 | 1 | 114 |
| | | | | T5R | 4,400 | 3 | 0 | 3 | 83 | 5,536 | 3 | 0 | 3 | 104 | 5,967 | 3 | 0 | 3 | 113 |
| | | | | T5W | 4,188 | 3 | 0 | 1 | 79 | 5,269 | 3 | 0 | 1 | 99 | 5,679 | 3 | 0 | 1 | 107 |
| | 700 mA | 30C700–K | 67W | ASY | 5,170 | 1 | 0 | 1 | 77 | 6,504 | 1 | 0 | 2 | 97 | 7,011 | 1 | 0 | 2 | 105 |
| | | | | T5E | 5,428 | 2 | 0 | 0 | 81 | 6,829 | 3 | 0 | 1 | 102 | 7,362 | 3 | 0 | 1 | 110 |
| | | | | T5M | 5,450 | 3 | 0 | 1 | 81 | 6,856 | 3 | 0 | 1 | 102 | 7,391 | 3 | 0 | 2 | 110 |
| | | | | T5R | 5,367 | 3 | 0 | 3 | 80 | 6,752 | 3 | 0 | 3 | 101 | 7,278 | 3 | 0 | 3 | 109 |
| | | | | T5W | 5,108 | 3 | 0 | 1 | 76 | 6,426 | 3 | 0 | 2 | 96 | 6,927 | 3 | 0 | 2 | 103 |
| | 1000 mA | 30C1000–K | 107W | ASY | 6,775 | 1 | 0 | 2 | 63 | 8,520 | 2 | 0 | 2 | 80 | 9,187 | 2 | 0 | 2 | 86 |
| | | | | T5E | 7,113 | 3 | 0 | 1 | 66 | 8,946 | 3 | 0 | 1 | 84 | 9,646 | 3 | 0 | 1 | 90 |
| | | | | T5M | 7,141 | 3 | 0 | 1 | 67 | 8,982 | 3 | 0 | 2 | 84 | 9,685 | 3 | 0 | 2 | 91 |
| | | | | T5R | 7,032 | 3 | 0 | 3 | 66 | 8,845 | 4 | 0 | 4 | 83 | 9,537 | 4 | 0 | 4 | 89 |
| | | | | T5W | 6,693 | 3 | 0 | 2 | 63 | 8,418 | 4 | 0 | 2 | 79 | 9,077 | 4 | 0 | 2 | 85 |

### Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-122°F).

| Ambient | | Lumen Multiplier |
|---|---|---|
| 0°C | 32°F | 1.02 |
| 10°C | 50°F | 1.01 |
| 20°C | 68°F | 1.00 |
| **25°C** | **77°F** | **1.00** |
| 30°C | 86°F | 1.00 |
| 40°C | 104°F | 0.98 |

### Electrical Load

| LEDs | Drive Current (mA) | System Watts | Current (A) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 120 | 208 | 240 | 277 | 347 | 480 |
| 10C | 700 | 26W | 0.25 | 0.15 | 0.13 | 0.11 | – | – |
| | 1000 | 37W | 0.37 | 0.21 | 0.18 | 0.16 | – | – |
| 20C | 350 | 25W | 0.23 | 0.13 | 0.12 | 0.10 | – | – |
| | 530 | 37W | 0.33 | 0.19 | 0.17 | 0.14 | – | – |
| | 700 | 46W | 0.43 | 0.25 | 0.22 | 0.19 | 0.15 | 0.11 |
| | 1000 | 74W | 0.68 | 0.39 | 0.34 | 0.29 | – | – |
| 30C | 350 | 35W | 0.33 | 0.19 | 0.16 | 0.14 | – | – |
| | 530 | 53W | 0.50 | 0.29 | 0.25 | 0.22 | – | – |
| | 700 | 67W | 0.66 | 0.38 | 0.33 | 0.29 | 0.23 | 0.17 |
| | 1000 | 107W | 1.01 | 0.58 | 0.50 | 0.44 | – | – |

### Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a 25°C ambient, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

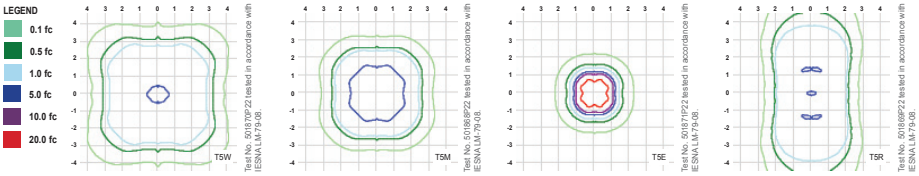
To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

| Operating Hours | 0 | 25,000 | 50,000 | 100,000 |
|---|---|---|---|---|
| Lumen Maintenance Factor | DSXPG LED 10C 1000 | | | |
| | 1.0 | 0.97 | 0.94 | 0.90 |
| | DSXPG LED 30C 1000 | | | |
| | 1.0 | 0.93 | 0.89 | 0.80 |
| | DSXPG LED 30C 700 | | | |
| | 1.0 | 0.98 | 0.97 | 0.95 |

## Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's D-Series Parking Garage homepage.

Isofootcandle plots for the DSXPG LED 30C 700 40K. Distances are in units of mounting height (8').




## FEATURES & SPECIFICATIONS

**INTENDED USE**
The energy savings, long life, and easy-to-install design of the D-Series LED Parking Garage luminaire make it the smart choice for commercial and municipal garage applications. It is designed to meet or exceed recommended illuminance criteria when installed as a direct replacement of most HID parking garage luminaires.

**CONSTRUCTION**
Two-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance and future light engine upgrades. The LED drivers are mounted in direct contact with the casting to promote low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP66) and is suitable for hose-down.

**FINISH**
Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling.

**OPTICS**
Precision-molded proprietary acrylic lenses provide five different photometric distributions tailored specifically to parking garage applications. Light engines are available in 3000K (80 min. CRI), 4000K (70 min. CRI) or 5000K (65 min. CRI) configurations.

**ELECTRICAL**
Light engines consist of 10 high-efficacy LEDs mounted to a metal-core circuit board to maximize heat dissipation and promote long life. The electronic driver has a power factor of >90%, THD <20%, and a minimum 2.5 KV surge rating. When ordering the SPD option, a separate surge protection device is installed within the luminaire which meets a minimum Category C low operation (per ANSI/IEEE C62.41.2).

**INSTALLATION**
Standard configuration accepts a rigid or free-swinging 3/4" NPT stem (by others) for pendant mounting. The surface mount option attaches to a 4 x 4" recessed or surface mount outlet box using a quick-mount kit (included); kit contains galvanized steel luminaire and outlet box plates and a full pad gasket. Kit has an integral mounting support that allows the luminaire to hinge down for easy electrical connections. Luminaire and plates are secured with set screws. Also available with a yoke/trunnion mount option with 3/4" NPT provision for flexible conduit entry (conduit by others); height can be adjusted from 10-18".

**LISTINGS**
CSA certified to U.S. and Canadian standards. Light engines and luminaire are IP66 rated. Rated for -40°C minimum ambient.

**WARRANTY**
Five year limited warranty. Full warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

**Note:** Specifications subject to change without notice.

LITHONIA LIGHTING
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DSXPG
Rev. 08/13/13

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# 3.0 PROJECT COSTS

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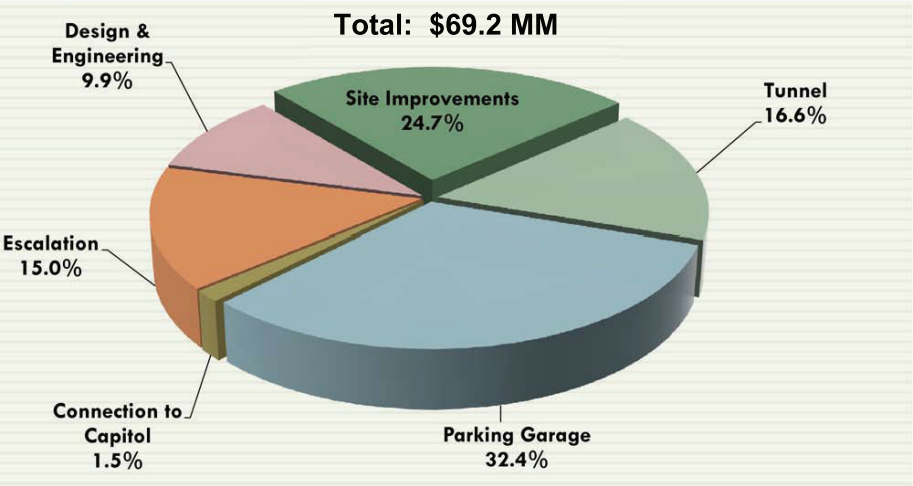
## 3.1 SUMMARY COST - OVERALL COST




| Item No. | Description | SF | Total | $/SF |
|---|---|---|---|---|
| 1 | Site Improvements | 250,000 | 17,339,973 | 69.36 |
| 2 | Tunnel | 40,174 | 11,380,063 | 283.27 |
| 3 | Parking Garage | 83,250 | 22,254,033 | 267.32 |
| 4 | Connection to Capitol Building | 3,640 | 1,008,532 | 277.07 |
| 5 | Contingency on Above | | w/ Above | |
| | **Subtotals:** | **377,064** | **51,982,601** | **138** |
| 6 | Escalation - 6.75% per year | | 9,464,082 | 25.10 |
| 7 | Contingency on Above | | 946,408 | 2.51 |
| | **Escalation Subtotal:** | | **10,410,491** | **27.61** |
| | **Base Price \ FF&E \ EscalationSubtotal:** | | **62,393,092** | **165** |
| 8 | Design Fees at 10% | | 6,239,309 | 16.55 |
| 9 | Contingency on Above | | 623,931 | 1.65 |
| | **Design Fee Subtotal:** | | **6,863,240** | **18.20** |
| | **Base Price \ Escalation \ Design Fee Subtotal:** | | **69,256,332** | **184** |

| | | |
|---|---|---|
| **PROJECTED COST AT TIME OF CONSTRUCTION** | **69,256,332** | **184** |

## 3.2 SUMMARY - SITE IMPROVEMENTS

| | | | | 250,000 |
|---|---|---|---|---|
| **Item No.** | **Description** | **$/SF** | **Total** | **Total w/Burdens** |
| | | | | |
| DIV 2 | EXISTING CONDITIONS | 2.21 | 552,492 | 779,045 |
| DIV 3 | CONCRETE | 0.84 | 210,945 | 297,444 |
| DIV 4 | STONE & MASONRY | 19.79 | 4,946,856 | 6,975,350 |
| DIV 5 | METALS | 0.86 | 214,650 | 302,669 |
| DIV 6 | WOODS & PLASTICS | w/ Other Estimates | | |
| DIV 7 | THERMAL PROTECTION | w/ Other Estimates | | |
| DIV 8 | OPENINGS, DOORS, WINDOWS | w/ Other Estimates | | |
| DIV 9 | FINISHES | w/ Other Estimates | | |
| DIV 10 | SPECIALITIES | w/ Other Estimates | | |
| DIV 11 | EQUIPMENT | w/ Other Estimates | | |
| DIV 12 | FURNISHINGS | | EXCLUDED | |
| DIV 13 | SPECIAL CONSTRUCTION | w/ Other Estimates | | |
| DIV 14 | CONVEYING SYSTEMS | w/ Other Estimates | | |
| DIV 21 | FIRE SUPPRESSION | w/ Other Estimates | | |
| DIV 22 | PLUMBING | w/ Other Estimates | | |
| DIV 23 | HVAC | w/ Other Estimates | | |
| DIV 26 | ELECTRICAL | w/ Other Estimates | | |
| DIV 27 | COMMUNICATIONS | w/ Other Estimates | | |
| DIV 31 | EARTHWORK | 17.43 | 4,356,857 | 6,143,417 |
| DIV 32 | EXTERIOR IMPROVEMENTS | 5.06 | 1,263,957 | 1,782,251 |
| DIV 33 | UTILITIES | 2.57 | 641,598 | 904,690 |
| DIV 34 | TRANSPORTATION | 0.44 | 110,000 | 155,106 |
| | | | | |
| | **Subtotal Direct Construction Costs** | **49.19** | **12,297,354** | **17,339,973** |

| | | | |
|---|---|---|---|
| | Allowance for Historical / Memorial Markers | | 250,000 |
| | **Direct Cost Subtotal with GFP** | **50.19** | **12,547,354** |
| | **Material Testing (w/ GC's Onsite Overhead)** | 0.75% | 94,105 |
| | **Owner's Design & Preconstruction Contingency** | 10.00% | 1,254,735 |
| | **Owner's Construction Contingency (after NTP)** | 5.00% | 627,368 |
| | **Permits** | 1.90% | 238,400 |
| | **Total Direct Construction Costs** | **59.05** | **14,761,962** |
| | **Standard General Conditions (GC's Onsite Overhead)** | | 1,542,453 |
| | **Subtotal NET Construction Cost** | **65.22** | **16,304,415** |
| | **GC's Off-Site & Overhead** | 3.40% | 545,850 |
| | **GC's Profit** | w/ Above | w/ Above |
| | **Construction Cost w/o Bonds & Escalation** | **67.40** | **16,850,265** |
| | **Builder's Risk Insurance** | 1.50% | 249,004 |
| | **Performance & Payment Bond** | 1.20% | 199,203 |
| | **Bid Bond** | 0.25% | 41,501 |
| | **Escalation per Year** | | EXCLUDED |
| | **Total Estimated Cost of Construction** | **69.36** | **17,339,973** |

## A. DETAILED ESTIMATE - SITE

**Reviewed By:** Chris Squadra
**Date:** 16-Sep-13

**Building GSF:** 250,000 **Total Cost:** $12,297,354

| DIV 02 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **EXISTING SITE CONDITIONS / DEMOLITION** | | | | |
| | Asphalt Cutting | 196 | LF | 15.00 | 2,940 |
| | Concrete Cutting | 188 | LF | 11.00 | 2,068 |
| | Asphalt Street Removal & Recycling | 106,449 | SF | 2.18 | 232,016 |
| | Site Granite Walkway Removal & Salvage | 57,929 | SF | 3.46 | 200,272 |
| | Site Granite Stair Removal & Salvage | 4,926 | SF | 3.46 | 17,030 |
| | Site Granite Walls Removal & Salvage | 358 | SF | 3.46 | 1,238 |
| | Temporary Pedestrian Walkways | 39,436 | SF | 1.12 | 44,168 |
| | Rotomilling @ Transitions | 1,200 | SF | 1.80 | 2,160 |
| | Remove Trees | 31 | EA | 750.00 | 23,250 |
| | Remove Bollards | 71 | EA | 50.00 | 3,550 |
| | Remove Gates | 5 | EA | 250.00 | 1,250 |
| | Remove Flagpoles | 2 | EA | 750.00 | 1,500 |
| | Remove Exterior Metal Railings | 742 | LF | 6.50 | 4,823 |
| | Remove Existing Street Lights | 30 | EA | 250.00 | 7,500 |
| | Remove & Salvage Existing Memorial (Allowance) | 128 | HRS | 40.05 | 5,126 |
| | Remove & Salvage Historical Markers (Allowance) | 24 | EA | 150.00 | 3,600 |
| | **SUBTOTAL EXISTING SITE CONDITIONS / DEMOLITION** | | | | **552,492** |

| DIV 03 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **CONCRETE / FOUNDATIONS** | | | | |
| | 6" Concrete Slab | 14,568 | SF | 9.98 | 145,389 |
| | Add for Colored Concrete | 14,568 | SF | 4.50 | 65,556 |
| | **SUBTOTAL FOUNDATIONS** | | | | **210,945** |

| DIV 04 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **MASONRY** | | | | |
| | Install New Granite Pavers | 48,603 | SF | 50.00 | 2,430,135 |
| | Reinstall Granite Pavers | 40,550 | SF | 20.00 | 811,006 |
| | Install Granite Stairs/Steps | 2,181 | SF | 125.00 | 272,625 |
| | Install New Granite Site Walls | 4,581 | SF | 65.00 | 297,765 |
| | Install New Granite Walls @ Tunnel Entry | 3,360 | SF | 65.00 | 218,400 |
| | Install New Granite Seats | 204 | SF | 65.00 | 13,260 |

| | | | | | |
|---|---|---|---|---|---|
| | Install New Limestone Ballustrade | 710 | LF | 1,000.00 | 710,000 |
| | Install Granite Walls @ Ballustrade | 1,420 | SF | 75.00 | 106,500 |
| | | | | | |
| | **SUBTOTAL MASONRY** | | | | **4,946,856** |

| DIV 05 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **METALS** | | | | |
| | | | | | |
| | 4.5' tall Exterior Iron Guard Rails (ADA Ramp) | 954 | LF | 225.00 | 214,650 |
| | | | | | |
| | **SUBTOTAL METALS** | | | | **214,650** |

| DIV 06 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **WOODS** | | | | |
| | **SUBTOTAL WOODS** | | | **w/ Other Estimates** | |

| DIV 07 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **THERMAL & MOISTURE PROTECTION** | | | | |
| | **SUBTOTAL THERMAL** | | | **w/ Other Estimates** | |

| DIV 08 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **OPENINGS** | | | | |
| | **SUBTOTAL OPENINGS** | | | **w/ Other Estimates** | |

| DIV 09 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **INTERIOR FINISHES** | | | | |
| | **SUBTOTAL INTERIOR FINISHES** | | | **w/ Other Estimates** | |

| DIV 10 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SPECIALITIES** | | | | |
| | **SUBTOTAL SPECIALITIES** | | | **w/ Other Estimates** | |

| DIV 11 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **EQUIPMENT** | | | | |
| | **SUBTOTAL EQUIPMENT** | | | **w/ Other Estimates** | |

| DIV 12 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | FURNISHINGS | | | | |
| | SUBTOTAL FURNISHINGS | | | | EXCLUDED |

| DIV 13 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | SPECIAL CONSTRUCTION | | | | |
| | SUBTOTAL SPECIAL CONSTRUCTION | | | | w/ Other Estimates |

| DIV 14 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | CONVEYING SYSTEMS | | | | |
| | SUBTOTAL CONVEYING SYSTEMS | | | | w/ Other Estimates |

| DIV 21 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | FIRE SUPPRESSION | | | | |
| | SUBTOTAL FIRE SUPPRESSION | | | | w/ Other Estimates |

| DIV 22 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | PLUMBING | | | | |
| | SUBTOTAL PLUMBING | | | | w/ Other Estimates |

| DIV 23 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | HVAC | | | | |
| | SUBTOTAL HVAC | | | | w/ Other Estimates |

| DIV 26 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | ELECTRICAL | | | | |
| | SUBTOTAL ELECTRICAL | | | | w/ Other Estimates |

| DIV 27 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | COMMUNICATIONS | | | | |
| | SUBTOTAL COMMUNICATIONS | | | | w/ Other Estimates |

| DIV 031 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE PREPARATION / EARTHWORK** | | | | |
| | | | | | |
| | **General Site Prep** | | | | |
| | Mobilization / Demobilization | 2 | LS | 30,000.00 | 60,000 |
| | Clear & Grub | 250,000 | SF | 0.20 | 50,000 |
| | Topsoil Strip | 2,641 | CY | 2.00 | 5,283 |
| | Stockpile Topsoil on-site | 2,641 | CY | 0.86 | 2,272 |
| | De-watering Allowance | 112 | DAYS | 626.22 | 70,137 |
| | Mass Excavate | 105,028 | CY | 2.90 | 304,581 |
| | Excavate for South Exit | 64 | CY | 3.40 | 217 |
| | Excavate Staging 1 for Shoring/Underpinning | 6,481 | CY | 0.96 | 6,203 |
| | Excavate Staging 2 for Shoring/Underpinning | 6,481 | CY | 0.96 | 6,203 |
| | Excavate Staging 3 for Shoring/Underpinning | 6,481 | CY | 0.96 | 6,203 |
| | Shoring & Underpinning @ Parking Structure | 15,501 | SF | 39.82 | 617,256 |
| | Clean-Up Caisson Staging | 40 | HRS | 175.00 | 7,000 |
| | Mass Backfill | 15,111 | CY | 9.88 | 149,222 |
| | 4" Screened Rock SOG Prep - Tunnel | 40,174 | SF | 2.00 | 80,348 |
| | 4" Screened Rock SOG Prep - Level P1 | 41,625 | SF | 2.00 | 83,250 |
| | Granite Paver & Stair Prep & Sidewalk Paving Prep | 91,334 | SF | 2.00 | 182,668 |
| | Foundation Drain System - Exterior (tie to existing) | 2,116 | LF | 13.68 | 28,947 |
| | Ejector Pumps | 3 | EA | 12,612.00 | 37,836 |
| | Export Trucking (assume 1-1/2 hr turn-around) | 105,028 | CY | 14.40 | 1,512,403 |
| | Export Dump Fees | 105,028 | CY | 1.40 | 147,039 |
| | Import Structural Material (purchased $12/ton) | 15,111 | CY | 32.20 | 486,578 |
| | Import Topsoil Material (1' depth assumed) | 3,316 | CY | 16.10 | 53,388 |
| | Place Topsoil Material | 5,957 | CY | 2.00 | 11,915 |
| | Vehicle Tracking Pads | 2 | EA | 5,250.00 | 10,500 |
| | Concrete Washout / Fuel Containment Area / Stabilized Staging Area | 1 | LS | 2,500.00 | 2,500 |
| | Traffic Control (3 person crew) | 12 | MO | 25,000.00 | 300,000 |
| | Temporary Traffic Control Signage | 12 | MO | 2,500.00 | 30,000 |
| | 6' ht Chain Link Temporary Construction Fencing & (2) Access Gates | 2,809 | LF | 7.80 | 21,910 |
| | Orange Construction Fence | 2,500 | LF | 1.00 | 2,500 |
| | Erosion Control | 3,000 | LF | 2.50 | 7,500 |
| | Erosion Control Fabric on Slopes over 4:1 | 16,667 | SY | 0.75 | 12,500 |
| | Inlet Protection | 6 | EA | 500.00 | 3,000 |
| | Storm Water Management - Erosion Logs | 1,500 | LF | 5.00 | 7,500 |
| | Erosion Control Maintenance | 1 | LS | 40,000.00 | 40,000 |
| | Tree Protection Fencing - Assume none required | | | | Excluded |
| | Water Remediation Allowance | | | | Excluded |
| | Hazardous Materials Removal | | | | Excluded |
| | Soil Remediation | | | | Excluded |
| | Construction Layout & Survey to Confirm Grades | 1 | LS | 10,000.00 | 10,000 |
| | | | | | |
| | **SUBTOTAL SITE PREPARATION** | | | | **4,356,857** |

| DIV 032 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE IMPROVEMENTS** | | | | |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | **Paving** | | | | |
| | 4" Asphalt Patchback | 960 | SF | 15.25 | 14,636 |
| | 6" x 18" Concrete Curb & Gutter | 1,760 | LF | 36.20 | 63,712 |
| | 5' w Sidewalks @ Tunnel | 2,800 | SF | 4.33 | 12,124 |
| | Bollards | 30 | EA | 880.00 | 26,400 |
| | ABA, Traffic, Street & Parking Signs (traffic) | 46 | EA | 286.70 | 13,188 |
| | Street Striping | 3,000 | LF | 5.97 | 17,900 |
| | Parking Lot Striping (per parking space) | 5,265 | LF | 4.20 | 22,113 |
| | Traffic Markings | 17 | EA | 950.00 | 16,150 |
| | Crosswalk Striping (Allowance) | 4 | EA | 1,350.00 | 5,400 |
| | Rock Excavation | | | | Excluded |
| | | | | | |
| | **Landscape** | | | | |
| | Fine Grade Topsoil | 234,312 | SF | 0.08 | 18,745 |
| | Sod | 111,005 | SF | 0.78 | 86,584 |
| | Mulch - Fiber Mulch | | | | |
| | 3 inch depth under trees & shrubs | 7,400 | SF | 0.22 | 1,628 |
| | Ground Cover (Allowance) | 38,204 | SF | 2.50 | 95,510 |
| | Shrub Bed Spray Irrigation | 38,204 | SF | 0.15 | 5,731 |
| | Temporary Irrigation (For Establishment) | 1 | AL | 10,000.00 | 10,000 |
| | Permanent Irrigation (Allowance) | 250,000 | SF | 0.48 | 120,000 |
| | 6" caliper Deciduous Trees | 37 | EA | 4,800.00 | 177,600 |
| | 8' - 10' tall Conifer Evergreen Trees | | | | Excluded |
| | | | | | |
| | **Site Furnishings** | | | | |
| | Install Salvaged Park Benches | 6 | EA | 150.00 | 900 |
| | New Bike Racks | 14 | EA | 850.00 | 11,900 |
| | Flag Poles (30' tall) | 4 | EA | 2,184.00 | 8,736 |
| | Tunnel Monument Signage | 2 | EA | 5,000.00 | 10,000 |
| | Install Memorial & Historical Markers (Allowance) | 25 | EA | 1,000.00 | 25,000 |
| | Supply & Install Public Art (Allowance) | 1 | EA | 500,000.00 | 500,000 |
| | | | | | |
| | **SUBTOTAL SITE IMPROVEMENTS** | | | | **1,263,957** |

| DIV 033 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE CIVIL/MECHANICAL UTILITIES** | | | | |
| | | | | | |
| | **Site Utilites - Water Supply** | | | | |
| | Relocate Water Utilities at Intersections (Allowance) | 1 | AL | 50,000.00 | 50,000 |
| | (NOTE: NO UTILITIES IN LINCOLN STREET PER CE) | | | | |
| | | | | | |
| | **Site Utilites - Sanitary** | | | | |
| | 8" DIP - tie to existing | 833 | LF | 117.33 | 97,673 |
| | | | | | |
| | **Dry Utilities - Gas** | | | | |
| | Relocate Gas Utilities at Intersections (Allowance) | 1 | AL | 25,000.00 | 25,000 |
| | | | | | |
| | **Site Utilites - Drainage** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Trench Drains | 75 | LF | 175.00 | 13,125 |
| | 36" RCP Storm | 2,240 | LF | 95.00 | 212,800 |
| | Tie to Existing | 8 | EA | 1,500.00 | 12,000 |
| | Area Inlets | 12 | EA | 5,000.00 | 60,000 |
| | Sand / Oil Interceptor | 2 | EA | 5,000.00 | 10,000 |
| | | | | | |
| | **Site Utilites - Electrical** | | | | |
| | Relocate Electrical Utility Allowance | 1 | AL | 50,000.00 | 50,000 |
| | 25'-0" Light Pole for Site Lighting (Allowance) | 30 | EA | 2,500.00 | 75,000 |
| | Site Lighting Trenching | 2,000 | LF | 18.00 | 36,000 |
| | | | | | |
| | | | | | |
| | **SUBTOTAL SITE CIVIL/MECHANICAL UTILITES** | | | | **641,598** |

| DIV 034 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **Transportation** | | | | |
| | | | | | |
| | Bus Stop & Shelter | 4 | EA | 25,000.00 | 100,000 |
| | Shuttle Services Stops | 1 | EA | 10,000.00 | 10,000 |
| | Tram / Train / BRT Stops | | | | Excluded |
| | | | | | |
| | **SUBTOTAL TRANSPORTATION** | | | | **110,000** |

| | | | | | |
|---|---|---|---|---|---|
| **TOTAL COST -** | | | | | **12,297,354** |
| | | | | | **49** |

## 3.3 SUMMARY - TUNNEL

| | | | | 40,174 |
|---|---|---|---|---|
| **Item No.** | **Description** | **$/SF** | **Total** | **Total w/Burdens** |
| | | | | |
| DIV 2 | EXISTING CONDITIONS | See Site Improvements | | |
| DIV 3 | CONCRETE | 144.35 | 5,799,313 | 7,435,382 |
| DIV 4 | STONE & MASONRY | w/ Site Improvements | | |
| DIV 5 | METALS | 36.39 | 1,462,115 | 1,874,598 |
| DIV 6 | WOODS & PLASTICS | 1.62 | 65,160 | 83,542 |
| DIV 7 | THERMAL PROTECTION | 19.75 | 793,276 | 1,017,070 |
| DIV 8 | OPENINGS, DOORS, WINDOWS | w/ Parking Garage | | |
| DIV 9 | FINISHES | | 20,965 | |
| DIV 10 | SPECIALITIES | 0.07 | 2,850 | 3,654 |
| DIV 11 | EQUIPMENT | w/ Parking Garage | | |
| DIV 12 | FURNISHINGS | | EXCLUDED | |
| DIV 13 | SPECIAL CONSTRUCTION | w/ Parking Garage | | |
| DIV 14 | CONVEYING SYSTEMS | w/ Connection to Capitol | | |
| DIV 21 | FIRE SUPPRESSION | 1.60 | 64,278 | 82,412 |
| DIV 22 | PLUMBING | 1.85 | 74,322 | 95,289 |
| DIV 23 | HVAC | 8.31 | 333,846 | 428,029 |
| DIV 26 | ELECTRICAL | 4.57 | 183,439 | 235,190 |
| DIV 27 | COMMUNICATIONS | 1.90 | 76,450 | 98,017 |
| DIV 31 | EARTHWORK | w/ Site Improvements | | |
| DIV 32 | EXTERIOR IMPROVEMENTS | w/ Site Improvements | | |
| DIV 33 | UTILITIES | w/ Site Improvements | | |
| DIV 34 | TRANSPORTATION | w/ Site Improvements | | |
| | | | | |
| | **Subtotal Direct Construction Costs** | **220.94** | **8,876,012** | **11,380,063** |

| | Allowance for Historical / Memorial Markers | w/ Site Improvements | |
|---|---|---|---|
| | **Direct Cost Subtotal with GFP** | **220.94** | **8,876,012** |
| | **Material Testing (w/ GC's Onsite Overhead)** | 0.75% | 66,570 |
| | **Owner's Design & Preconstruction Contingency** | 10.00% | 887,601 |
| | **Owner's Construction Contingency (after NTP)** | 5.00% | 443,801 |
| | **Permits** | 1.90% | 168,644 |
| | **Total Direct Construction Costs** | **259.93** | **10,442,629** |
| | **Standard General Conditions (GC's Onsite Overhead)** | | 247,866 |
| | **Subtotal NET Construction Cost** | **266.10** | **10,690,495** |
| | **GC's Off-Site & Overhead** | 3.40% | 363,477 |
| | **GC's Profit** | w/ Above | w/ Above |
| | **Construction Cost w/o Bonds & Escalation** | **275.15** | **11,053,971** |
| | **Builder's Risk Insurance** | 1.50% | 165,810 |
| | **Performance & Payment Bond** | 1.20% | 132,648 |
| | **Bid Bond** | 0.25% | 27,635 |
| | **Escalation per Year** | | EXCLUDED |
| | **Total Estimated Cost of Construction** | **283.27** | **11,380,063** |

## A. DETAILED ESTIMATE - TUNNEL

| DIV 02 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | EXISTING SITE CONDITIONS / DEMOLITION | | | | |
| | SUBTOTAL EXISTING SITE CONDITIONS / DEMOLITION | | | See Site Improvements | |

| DIV 03 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | CONCRETE / FOUNDATIONS | | | | |
| | | | | | |
| | 24" dia x 100'-0" Long/ea Concrete Caissons | 47 | EA | 14,500.00 | 684,980 |
| | Pier Caps @ Caissons | 47 | EA | 250.00 | 11,810 |
| | 12" th Grade Wall @ Tunnel | 933 | CY | 475.00 | 443,157 |
| | 5'-0" thick CIP Structural Concrete @ Roof Deck | 3,459 | CY | 503.30 | 1,740,918 |
| | 3'0" thick CIP Concrete @ Tunnel Slab | 7,412 | CY | 390.00 | 2,890,680 |
| | 1'0" thick CIP Concrete @ Vent Shafts | 65 | CY | 390.00 | 25,168 |
| | 4" thick Equipment Pads & Curbs | 520 | SF | 5.00 | 2,599 |
| | | | | | |
| | SUBTOTAL FOUNDATIONS | | | | 5,799,313 |

| DIV 04 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | MASONRY | | | | |
| | SUBTOTAL MASONRY | | | w/ Site Improvements | |

| DIV 05 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | METALS | | | | |
| | | | | | |
| | Structural Steel Connectors / Shoring / Reinforcing | 188 | TONS | 5,818.98 | 1,091,059 |
| | Structural Steel Installation | | | | w/ Above |
| | Crane / Hoisting | 180 | HRS | 275.00 | 49,500 |
| | Misc Connections, Bolts, Hangers, & Hardware | 1 | LS | 109,105.88 | 109,106 |
| | Steel Fireproofing | | | | Excluded |
| | 5' tall Exterior Iron Guard Rails @ Tunnel Entrances | 337 | LF | 250.00 | 84,250 |
| | 4' tall Exterior Pipe Guard Rails @ Tunnel | 1,000 | LF | 128.20 | 128,200 |
| | | | | | |
| | SUBTOTAL METALS | | | | 1,462,115 |

| DIV 06 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | WOODS | | | | |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Rough Carpentry Materials | 40,174 | SF | 0.75 | 30,131 |
| | Rough Carpentry Labor | 875 | HRS | 40.05 | 35,029 |
| | | | | | |
| | **SUBTOTAL WOODS** | | | | **65,160** |

| DIV 07 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **THERMAL & MOISTURE PROTECTION** | | | | |
| | | | | | |
| | Vertical Waterproofing w/ 2" Drainage Board @ Tunnel | 27,500 | SF | 13.21 | 363,275 |
| | Waterproof Barrier @ Parking Tunnel | 40,174 | SF | 9.20 | 369,601 |
| | Concrete Epoxy Coating | | | | Excluded |
| | Metal Fascia, Flashings, & Trims | 40,174 | SF | 0.19 | 7,633 |
| | Scuppers, Gutters & Downspouts | 172 | LF | 26.50 | 4,558 |
| | Caulking & Sealants | 40,174 | SF | 1.20 | 48,209 |
| | | | | | |
| | **SUBTOTAL THERMAL** | | | | **793,276** |

| DIV 08 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **OPENINGS** | | | | |
| | **SUBTOTAL OPENINGS** | | | | **w/ Parking Garage** |

| DIV 09 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **INTERIOR FINISHES** | | | | |
| | | | | | |
| | Epoxy Painted Floor @ Mech Rooms | 1,575 | SF | 9.80 | 15,435 |
| | Epoxy Painted Walls @ Mech Rooms | 1,728 | SF | 3.20 | 5,530 |
| | | | | | |
| | **SUBTOTAL INTERIOR FINISHES** | | | | **20,965** |

| DIV 10 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SPECIALITIES** | | | | |
| | | | | | |
| | Fire Extinguishers | 2 | EA | 175.00 | 350 |
| | Wayfinding Signage | 1 | LS | 2,500.00 | 2,500 |
| | | | | | |
| | **SUBTOTAL SPECIALITIES** | | | | **2,850** |

| DIV 11 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **EQUIPMENT** | | | | |
| | **SUBTOTAL EQUIPMENT** | | | | **w/ Parking Garage** |

| DIV 12 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |

| | | | | | |
|---|---|---|---|---|---|
| | FURNISHINGS | | | | |
| | SUBTOTAL FURNISHINGS | | | | EXCLUDED |

| DIV 13 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | SPECIAL CONSTRUCTION | | | | |
| | SUBTOTAL SPECIAL CONSTRUCTION | | | | w/ Parking Garage |

| DIV 14 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | CONVEYING SYSTEMS | | | | |
| | SUBTOTAL CONVEYING SYSTEMS | | | | w/ Connection to Capitol |

| DIV 21 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | FIRE SUPPRESSION | | | | |
| | Fire Sprinklers (Tunnel) | 40,174 | SF | 1.60 | 64,278 |
| | Backflow Prevention | | | | w/ Parking Garage |
| | Fire Department Connections | | | | w/ Parking Garage |
| | Booster Pump | | | | w/ Parking Garage |
| | SUBTOTAL FIRE SUPPRESSION | | | | 64,278 |

| DIV 22 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | PLUMBING | | | | |
| | Plumbing Systems (Drains, Waste & Vent) | 40,174 | SF | 1.85 | 74,322 |
| | SUBTOTAL PLUMBING | | | | 74,322 |

| DIV 23 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | HVAC | | | | |
| | HVAC - Tunnel | 40,174 | SF | 8.31 | 333,846 |
| | SUBTOTAL HVAC | | | | 333,846 |

| DIV 26 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | ELECTRICAL | | | | |
| | Electrical | 40,174 | SF | 2.98 | 119,729 |
| | CO2 Detection System | | | | w/ Above |
| | Light Fixtures | 40,174 | SF | 1.59 | 63,710 |

| | | | | | |
|---|---|---|---|---|---|
| | Emergency GenSet (300 kw, gas fired) | | | | w/ Parking Garage |
| | Solar Photovoltaic System | | | | Excluded |
| | Wind Turbine System | | | | Excluded |
| | Lightning Protection System | | | | Excluded |
| | | | | | |
| | **SUBTOTAL ELECTRICAL** | | | | **183,439** |

| DIV 27 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **COMMUNICATIONS** | | | | |
| | | | | | |
| | Fire Alarm System | 40,174 | SF | 0.35 | 14,180 |
| | Security System | 40,174 | SF | 0.92 | 36,960 |
| | Data & Communications Conduit | 40,174 | SF | 0.63 | 25,310 |
| | Data & Communications Equipment | | | | Excluded |
| | A/V Equipment | | | | Excluded |
| | | | | | |
| | **SUBTOTAL COMMUNICATIONS** | | | | **76,450** |

| DIV 031 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE PREPARATION / EARTHWORK** | | | | |
| | **SUBTOTAL SITE PREPARATION** | | | | **w/ Site Improvements** |

| DIV 032 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE IMPROVEMENTS** | | | | |
| | **SUBTOTAL SITE IMPROVEMENTS** | | | | **w/ Site Improvements** |

| DIV 033 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE CIVIL/MECHANICAL UTILITIES** | | | | |
| | **SUBTOTAL SITE CIVIL/MECHANICAL UTILITES** | | | | **w/ Site Improvements** |

| DIV 034 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **TRANSPORTATION** | | | | |
| | **SUBTOTAL TRANSPORTATION** | | | | **w/ Site Improvements** |

| | | | | | |
|---|---|---|---|---|---|
| **TOTAL COST -** | | | | | **8,876,012** |
| | | | | | **221** |

## 3.4 SUMMARY GARAGE

| | | | | 83,250 |
|---|---|---|---|---|
| **Item No.** | **Description** | **$/SF** | **Total** | **Total w/Burdens** |
| | | | | |
| DIV 2 | EXISTING CONDITIONS | See Site Improvements | | |
| DIV 3 | CONCRETE | 113.95 | 9,485,959 | 12,179,338 |
| DIV 4 | STONE & MASONRY | | 159,000 | |
| DIV 5 | METALS | 15.28 | 1,272,013 | 1,633,179 |
| DIV 6 | WOODS & PLASTICS | 1.25 | 104,090 | 133,644 |
| DIV 7 | THERMAL PROTECTION | 15.49 | 1,289,313 | 1,655,391 |
| DIV 8 | OPENINGS, DOORS, WINDOWS | 1.21 | 100,329 | 128,815 |
| DIV 9 | FINISHES | 0.01 | 1,025 | 1,315 |
| DIV 10 | SPECIALITIES | 0.47 | 39,254 | 50,400 |
| DIV 11 | EQUIPMENT | 2.85 | 236,875 | 304,132 |
| DIV 12 | FURNISHINGS | | EXCLUDED | |
| DIV 13 | SPECIAL CONSTRUCTION | 37.72 | 3,140,100 | 4,031,679 |
| DIV 14 | CONVEYING SYSTEMS | w/ Connection to Capitol | | |
| DIV 21 | FIRE SUPPRESSION | 1.74 | 145,098 | 186,296 |
| DIV 22 | PLUMBING | 1.80 | 149,850 | 192,397 |
| DIV 23 | HVAC | 6.98 | 581,085 | 746,074 |
| DIV 26 | ELECTRICAL | 5.65 | 470,292 | 603,823 |
| DIV 27 | COMMUNICATIONS | 1.90 | 158,422 | 203,403 |
| DIV 31 | EARTHWORK | w/ Site Improvements | | |
| DIV 32 | EXTERIOR IMPROVEMENTS | w/ Site Improvements | | |
| DIV 33 | UTILITIES | w/ Site Improvements | | |
| DIV 34 | TRANSPORTATION | w/ Site Improvements | | |
| | | | | |
| | **Subtotal Direct Construction Costs** | **208.20** | **17,332,703** | **22,254,033** |

| | Allowance for Historical / Memorial Markers | w/ Site Improvements | |
|---|---|---|---|
| | **Direct Cost Subtotal with GFP** | **208.20** | **17,332,703** |
| | **Material Testing (w/ GC's Onsite Overhead)** | 0.75% | 129,995 |
| | **Owner's Design & Preconstruction Contingency** | 10.00% | 1,733,270 |
| | **Owner's Construction Contingency (after NTP)** | 5.00% | 866,635 |
| | **Permits** | 1.90% | 329,321 |
| | **Total Direct Construction Costs** | **244.95** | **20,391,925** |
| | **Standard General Conditions (GC's Onsite Overhead)** | | 513,637 |
| | **Subtotal NET Construction Cost** | **251.12** | **20,905,562** |
| | **GC's Off-Site & Overhead** | 3.40% | 710,789 |
| | **GC's Profit** | w/ Above | w/ Above |
| | **Construction Cost w/o Bonds & Escalation** | **259.66** | **21,616,351** |
| | **Builder's Risk Insurance** | 1.50% | 324,245 |
| | **Performance & Payment Bond** | 1.20% | 259,396 |
| | **Bid Bond** | 0.25% | 54,041 |
| | **Escalation per Year** | | EXCLUDED |
| | **Total Estimated Cost of Construction** | **267.32** | **22,254,033** |

## A. DETAILED ESTIMATE - GARAGE

**Building GSF:** 83,250 **Total Cost:** $17,332,703

| DIV 02 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | EXISTING SITE CONDITIONS / DEMOLITION | | | | |
| | SUBTOTAL EXISTING SITE CONDITIONS / DEMOLITION | | | See Site Improvements | |

| DIV 03 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | CONCRETE / FOUNDATIONS | | | | |
| | | | | | |
| | 24" dia x 100'-0" Long/ea Concrete Caissons | 56 | EA | 14,500.00 | 812,000 |
| | Pier Caps @ Caissons | 56 | EA | 250.00 | 14,000 |
| | 12" th Grade Wall @ Garage | 1,306 | CY | 475.00 | 620,420 |
| | 3'-0" thick CIP Concrete @ P1 Slab | 5,334 | CY | 390.00 | 2,080,260 |
| | 3'-0" thick CIP Concrete @ P2 Slab | 5,334 | CY | 390.00 | 2,080,260 |
| | 5'-0" thick CIP Structural Concrete @ Roof Deck | 7,567 | CY | 503.30 | 3,808,479 |
| | 18" Columns between Parking Decks | 76 | CY | 516.21 | 39,393 |
| | Footer & Wall Foundation for Vent Structures | 16 | CY | 671.07 | 10,737 |
| | Footer & Wall Foundation for South Exit | 26 | CY | 671.07 | 17,497 |
| | Concrete @ Metal Pan Steps | 56 | EA | 52.00 | 2,912 |
| | | | | | |
| | SUBTOTAL FOUNDATIONS | | | | 9,485,959 |

| DIV 04 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | MASONRY | | | | |
| | | | | | |
| | 8" CMU Walls @ Vent Structures | 720 | SF | 18.00 | 12,960 |
| | 8" CMU Interior Walls @ Mechanical Rooms | 1,680 | SF | 18.00 | 30,240 |
| | 8" CMU Walls - Grout Filled @ Stair Well | 2,160 | SF | 20.00 | 43,200 |
| | Install Granite Walls @ South Pedestrian Exit | 344 | SF | 75.00 | 25,800 |
| | Install New Granite Walls @ Vent Structures | 720 | SF | 65.00 | 46,800 |
| | | | | | |
| | SUBTOTAL MASONRY | | | | 159,000 |

| DIV 05 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | METALS | | | | |
| | | | | | |
| | Structural Steel Connectors / Shoring / Reinforcing | 188 | TONS | 5,818.98 | 1,091,059 |
| | Metal Stairs | 2 | FLTS | 7,580.00 | 15,160 |
| | 1 1/2" Pipe Grab Rail | 56 | LF | 128.36 | 7,188 |
| | Structural Steel Installation | | | | w/ Above |
| | Crane / Hoisting | 180 | HRS | 275.00 | 49,500 |

| | | | | | |
|---|---|---|---|---|---|
| | Misc Connections, Bolts, Hangers, & Hardware | 1 | LS | 109,105.88 | 109,106 |
| | Steel Fireproofing | | | | Excluded |
| | | | | | |
| | **SUBTOTAL METALS** | | | | **1,272,013** |

| DIV 06 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **WOODS** | | | | |
| | | | | | |
| | Rough Carpentry Materials | 83,250 | SF | 0.75 | 62,438 |
| | Rough Carpentry Labor | 1,040 | HRS | 40.05 | 41,652 |
| | | | | | |
| | **SUBTOTAL WOODS** | | | | **104,090** |

| DIV 07 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **THERMAL & MOISTURE PROTECTION** | | | | |
| | | | | | |
| | Foundation Waterproofing Repair @ Existing Foundation | | | | w/ Connection to Capitol |
| | Vertical Waterproofing w/ 2" Drainage Board @ Garage Walls | 32,060 | SF | 13.21 | 423,513 |
| | Waterproof Barrier @ Parking Garage Roof | 83,250 | SF | 9.20 | 765,900 |
| | Concrete Epoxy Coating | | | | Excluded |
| | Caulking & Sealants | 83,250 | SF | 1.20 | 99,900 |
| | | | | | |
| | **SUBTOTAL THERMAL** | | | | **1,289,313** |

| DIV 08 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **OPENINGS** | | | | |
| | | | | | |
| | 3'-0"x 7'-0" Security Grade HM Steel Door, Frame & Hardware | 12 | EA | 1,987.17 | 23,846 |
| | PR 3'-0"x 7'-0" Security Grade HM, Frame & Hardware | 3 | EA | 4,410.90 | 13,233 |
| | High Speed OH Security Grade Doors w/ Operators | 5 | EA | 12,250.00 | 61,250 |
| | Mechanical Access Doors | 8 | EA | 250.00 | 2,000 |
| | | | | | |
| | **SUBTOTAL OPENINGS** | | | | **100,329** |

| DIV 09 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **INTERIOR FINISHES** | | | | |
| | | | | | |
| | Paint 3'-0"x 7'-0" HM Door & Frame | 15 | EA | 68.30 | 1,025 |
| | | | | | |
| | **SUBTOTAL INTERIOR FINISHES** | | | | **1,025** |

| DIV 10 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |

| | | | | | |
|---|---|---|---|---|---|
| | **SPECIALITIES** | | | | |
| | Fire Extinguishers | 4 | EA | 175.00 | 700 |
| | Code Required Signage | 20 | EA | 55.20 | 1,104 |
| | Parking Signage | 193 | EA | 150.00 | 28,950 |
| | Wayfinding Signage | 1 | LS | 7,500.00 | 7,500 |
| | Access Ladders | 4 | EA | 250.00 | 1,000 |
| | **SUBTOTAL SPECIALITIES** | | | | **39,254** |

| DIV 11 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **EQUIPMENT** | | | | |
| | AVI Access Control & Software System (Allowance) | 1 | LS | 35,000.00 | 35,000 |
| | AVI Readers (Allowance) | 5 | EA | 12,500.00 | 62,500 |
| | AVI Tags | 244 | EA | 100.00 | 24,375 |
| | Vehicle Detectors (Allowance) | 8 | EA | 5,000.00 | 40,000 |
| | Magnetic Detector Loops (Allowance) | 6 | EA | 5,000.00 | 30,000 |
| | Hydraulic Bollards (Allowance) | 6 | EA | 5,000.00 | 30,000 |
| | ADA Security Booth (Allowance) | 1 | LS | 15,000.00 | 15,000 |
| | **SUBTOTAL EQUIPMENT** | | | | **236,875** |

| DIV 12 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **FURNISHINGS** | | | | |
| | **SUBTOTAL FURNISHINGS** | | | | **EXCLUDED** |

| DIV 13 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SPECIAL CONSTRUCTION** | | | | |
| | Expansion Joints | 2,100 | LF | 180.00 | 378,000 |
| | Lane Signalization & Traffic Signals (Allowance) | 1 | AL | 75,000.00 | 75,000 |
| | Security Upgrade Allowance | 1 | LS | 2,687,100.00 | 2,687,100 |
| | Alternative Energy Systems | | | | Excluded |
| | Alternative Fuel Vehicle Fueling Stations | | | | Excluded |
| | **SUBTOTAL SPECIAL CONSTRUCTION** | | | | **3,140,100** |

| DIV 14 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **CONVEYING SYSTEMS** | | | | |
| | Double Entry - Elevator | | | w/ Connection to Capitol | |
| | Elevator Cab Finish Upgrade (Allowance) | | | w/ Connection to Capitol | |
| | **SUBTOTAL CONVEYING SYSTEMS** | | | **w/ Connection to Capitol** | |

| DIV 21 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **FIRE SUPPRESSION** | | | | |
| | Fire Sprinklers (Garage & Elevator Lobbies) | 83,250 | SF | 1.60 | 133,200 |
| | Backflow Prevention | 1 | EA | 1,998.00 | 1,998 |
| | Fire Department Connections | 3 | EA | 800.00 | 2,400 |
| | Booster Pump | 1 | LS | 7,500.00 | 7,500 |
| | **SUBTOTAL FIRE SUPPRESSION** | | | | **145,098** |

| DIV 22 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **PLUMBING** | | | | |
| | Plumbing Systems (Drains, Waste & Vent) | 83,250 | SF | 1.80 | 149,850 |
| | **SUBTOTAL PLUMBING** | | | | **149,850** |

| DIV 23 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **HVAC** | | | | |
| | HVAC - Parking Garage | 83,250 | SF | 6.98 | 581,085 |
| | 8' x 10' Louvers | | | | w/ Above |
| | **SUBTOTAL HVAC** | | | | **581,085** |

| DIV 26 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **ELECTRICAL** | | | | |
| | Electrical | 83,250 | SF | 2.98 | 248,107 |
| | CO2 Detection System | | | | w/ Above |
| | Light Fixtures | 83,250 | SF | 1.59 | 132,022 |
| | Emergency GenSet (300 kw, gas fired) | 1 | LS | 90,162.50 | 90,163 |
| | Solar Photovoltaic System | | | | Excluded |
| | Wind Turbine System | | | | Excluded |
| | Lightning Protection System | | | | Excluded |
| | **SUBTOTAL ELECTRICAL** | | | | **470,292** |

| DIV 27 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **COMMUNICATIONS** | | | | |
| | Fire Alarm System | 83,250 | SF | 0.35 | 29,384 |
| | Security System | 83,250 | SF | 0.92 | 76,590 |
| | Data & Communications Conduit | 83,250 | SF | 0.63 | 52,448 |
| | Data & Communications Equipment | | | | Excluded |
| | A/V Equipment | | | | Excluded |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | SUBTOTAL COMMUNICATIONS | | | | 158,422 |

| DIV 031 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | SITE PREPARATION / EARTHWORK | | | | |
| | SUBTOTAL SITE PREPARATION | | | w/ Site Improvements | |

| DIV 032 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | SITE IMPROVEMENTS | | | | |
| | SUBTOTAL SITE IMPROVEMENTS | | | w/ Site Improvements | |

| DIV 033 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | SITE CIVIL/MECHANICAL UTILITIES | | | | |
| | SUBTOTAL SITE CIVIL/MECHANICAL UTILITES | | | w/ Site Improvements | |

| DIV 034 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | Transportation | | | | |
| | SUBTOTAL TRANSPORTATION | | | w/ Site Improvements | |

| | | | | | |
|---|---|---|---|---|---|
| TOTAL COST - | | | | | 17,332,703 |
| | | | | | 208 |

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## 3.5 SUMMARY - CONNECTION TO CAPITOL

| | | | | 3,640 |
|---|---|---|---|---|
| **Item No.** | **Description** | **$/SF** | **Total** | **Total w/Burdens** |
| | | | | |
| DIV 2 | EXISTING CONDITIONS | 26.01 | 94,671 | 121,444 |
| DIV 3 | CONCRETE | | w/ Garage | |
| DIV 4 | STONE & MASONRY | | w/ Site Improvements | |
| DIV 5 | METALS | 19.32 | 70,309 | 90,192 |
| DIV 6 | WOODS & PLASTICS | 7.67 | 27,909 | 35,802 |
| DIV 7 | THERMAL PROTECTION | 10.49 | 38,188 | 48,987 |
| DIV 8 | OPENINGS, DOORS, WINDOWS | 4.89 | 17,796 | 22,829 |
| DIV 9 | FINISHES | 77.90 | 283,562 | 363,753 |
| DIV 10 | SPECIALITIES | 1.04 | 3,776 | 4,843 |
| DIV 11 | EQUIPMENT | | w/ Parking Garage | |
| DIV 12 | FURNISHINGS | | EXCLUDED | |
| DIV 13 | SPECIAL CONSTRUCTION | | w/ Parking Garage | |
| DIV 14 | CONVEYING SYSTEMS | 35.08 | 127,700 | 163,813 |
| DIV 21 | FIRE SUPPRESSION | 1.60 | 5,824 | 7,471 |
| DIV 22 | PLUMBING | 2.45 | 8,930 | 11,455 |
| DIV 23 | HVAC | 21.77 | 79,230 | 101,636 |
| DIV 26 | ELECTRICAL | 5.87 | 21,377 | 27,422 |
| DIV 27 | COMMUNICATIONS | 1.90 | 6,927 | 8,886 |
| DIV 31 | EARTHWORK | | w/ Site Improvements | |
| DIV 32 | EXTERIOR IMPROVEMENTS | | w/ Site Improvements | |
| DIV 33 | UTILITIES | | w/ Site Improvements | |
| DIV 34 | TRANSPORTATION | | w/ Site Improvements | |
| | | | | |
| | **Subtotal Direct Construction Costs** | **215.99** | **786,199** | **1,008,532** |

| | | | |
|---|---|---|---|
| | Allowance for Historical / Memorial Markers | | |
| | **Direct Cost Subtotal with GFP** | **215.99** | **786,199** |
| | **Material Testing (w/ GC's Onsite Overhead)** | 0.75% | 5,896 |
| | **Owner's Design & Preconstruction Contingency** | 10.00% | 78,620 |
| | **Owner's Construction Contingency (after NTP)** | 5.00% | 39,310 |
| | **Permits** | 1.90% | 14,938 |
| | **Total Direct Construction Costs** | **254.11** | **924,963** |
| | **Standard General Conditions (GC's Onsite Overhead)** | | 22,458 |
| | **Subtotal NET Construction Cost** | **260.28** | **947,421** |
| | **GC's Off-Site & Overhead** | 3.40% | 32,212 |
| | **GC's Profit** | w/ Above | w/ Above |
| | **Construction Cost w/o Bonds & Escalation** | **269.13** | **979,633** |
| | **Builder's Risk Insurance** | 1.50% | 14,694 |
| | **Performance & Payment Bond** | 1.20% | 11,756 |
| | **Bid Bond** | 0.25% | 2,449 |
| | **Escalation per Year** | | EXCLUDED |
| | **Total Estimated Cost of Construction** | **277.07** | **1,008,532** |

## A. DETAILED ESTIMATE - CONNECTION

**Building GSF:** 3,640 **Total Cost:** $786,199

| DIV 02 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | **EXISTING SITE CONDITIONS / DEMOLITION** | | | | |
| | Concrete Foundation Removal | 29 | CY | 150.00 | 4,350 |
| | Existing Building Demolition for New Elevator & Stairs | 80 | HRS | 195.15 | 15,612 |
| | Existing Building Demolition for Circulation Corridor | 60 | HRS | 195.15 | 11,709 |
| | Temporary Building Shoring & Underpinning | 1,125 | SF | 56.00 | 63,000 |
| | **SUBTOTAL EXISTING SITE CONDITIONS / DEMOLITION** | | | | **94,671** |

| DIV 03 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | **CONCRETE / FOUNDATIONS** | | | | |
| | **SUBTOTAL FOUNDATIONS** | | | | **w/ Garage** |

| DIV 04 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | **MASONRY** | | | | |
| | **SUBTOTAL MASONRY** | | | | **w/ Site Improvements** |

| DIV 05 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | **METALS** | | | | |
| | Structural Steel Connectors / Shoring / Reinforcing | 3 | TONS | 2,745.00 | 7,494 |
| | Structural Steel Installation | | | | w/ Above |
| | Crane / Hoisting | 40 | HRS | 275.00 | 11,000 |
| | Misc Connections, Bolts, Hangers, & Hardware | 1 | LS | 749.39 | 749 |
| | Steel Fireproofing | | | | Excluded |
| | Concrete Filled Pan Stair Systems | 2 | FLTS | 7,800.00 | 15,600 |
| | Interior Stringer Railings | 88 | LF | 128.20 | 11,282 |
| | Interior Grab Railings @ Wall | 67 | LF | 85.08 | 5,700 |
| | Interior Bronze Grab Rail @ Grand Stair | 72 | LF | 256.72 | 18,484 |
| | **SUBTOTAL METALS** | | | | **70,309** |

| DIV 06 | Description | Quantity | Unit | TOTALS Cost/Unit | TOTALS Total Cost |
|---|---|---|---|---|---|
| | **WOODS** | | | | |
| | Rough Carpentry Materials | 3,640 | SF | 0.75 | 2,730 |
| | Rough Carpentry Labor | 100 | HRS | 40.05 | 4,005 |

| | | | | | |
|---|---|---|---|---|---|
| | Finish Carpentry Materials | 300 | LF | 6.50 | 1,950 |
| | Finish Carpentry Labor* | 480 | HRS | 40.05 | 19,224 |
| | **Includes time for trim installation, casework installation, door installation, hardware installation* | | | | |
| | | | | | |
| | **SUBTOTAL WOODS** | | | | **27,909** |

| DIV 07 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **THERMAL & MOISTURE PROTECTION** | | | | |
| | | | | | |
| | Foundation Waterproofing Repair @ Existing Foundation | 2,000 | SF | 16.91 | 33,820 |
| | Caulking & Sealants | 3,640 | SF | 1.20 | 4,368 |
| | | | | | |
| | **SUBTOTAL THERMAL** | | | | **38,188** |

| DIV 08 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **OPENINGS** | | | | |
| | | | | | |
| | 3'-0"x 7'-0" Security Grade HM Steel Door, Frame & Hardware | 2 | EA | 1,987.17 | 3,974 |
| | PR 3'-0"x 7'-0" Security Grade HM, Frame & Hardware | 2 | EA | 4,410.90 | 8,822 |
| | Key Card Access Hardware (assumes connection to existing system) | 2 | EA | 2,000.00 | 4,000 |
| | Mechanical Access Doors | 4 | EA | 250.00 | 1,000 |
| | | | | | |
| | **SUBTOTAL OPENINGS** | | | | **17,796** |

| DIV 09 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **INTERIOR FINISHES** | | | | |
| | | | | | |
| | Metal Stud Wall Furring w/ (1) layer of 5/8" Gyp Board | 2,020 | SF | 2.90 | 5,858 |
| | 3 5/8" Mtl Std & (4) layers of 5/8" Gyp Board - Fire Separation Walls | 2,020 | SF | 4.80 | 9,696 |
| | 5/8" Gyp Bd Ceilings @ Stairs / Lobby | 3,640 | SF | 3.20 | 11,648 |
| | ACT Ceilings @ Elevator Lobby | 1,820 | SF | 3.21 | 5,842 |
| | Gyp Bd Detailing @ Int Soffits, Columns, etc. | 1 | LS | 15,000.00 | 15,000 |
| | Terrazo Flooring @ Elevator Lobby to match existing | 1,004 | SF | 43.21 | 43,383 |
| | Terrazo Stone Base to match existing | 202 | LF | 26.32 | 5,317 |
| | Paint Gyp Bd Walls & Ceilings w/2 Coats Latex | 5,660 | SF | 0.44 | 2,490 |
| | Additional Paint @ Fire Separation Walls | | | | w/ Above |
| | Miscellaneous Accent Painting & Historic Finishes Allowance | 1 | LS | 75,000.00 | 75,000 |
| | Paint 3'-0"x 7'-0" HM w/Full Lite Door & Frame | 4 | EA | 68.30 | 273 |
| | Circulation Corridor Wall / Floor / Ceiling Finishes | 2,378 | SF | 45.86 | 109,055 |
| | | | | | |
| | **SUBTOTAL INTERIOR FINISHES** | | | | **283,562** |

| DIV 10 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |

| | | | | | |
|---|---|---|---|---|---|
| | **SPECIALITIES** | | | | |
| | Fire Extinguishers | 2 | EA | 175.00 | 350 |
| | Vinyl Corner Guards | 16 | EA | 12.80 | 205 |
| | Code Required Signage | 4 | EA | 55.20 | 221 |
| | Wayfinding Signage | 1 | LS | 2,500.00 | 2,500 |
| | Access Ladders | 2 | EA | 250.00 | 500 |
| | **SUBTOTAL SPECIALITIES** | | | | **3,776** |

| DIV 11 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **EQUIPMENT** | | | | |
| | **SUBTOTAL EQUIPMENT** | | | | **w/ Parking Garage** |

| DIV 12 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **FURNISHINGS** | | | | |
| | **SUBTOTAL FURNISHINGS** | | | | **EXCLUDED** |

| DIV 13 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SPECIAL CONSTRUCTION** | | | | |
| | **SUBTOTAL SPECIAL CONSTRUCTION** | | | | **w/ Parking Garage** |

| DIV 14 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **CONVEYING SYSTEMS** | | | | |
| | Double Entry - Elevator | 4 | STPS | 28,800.00 | 115,200 |
| | Elevator Cab Finish Upgrade (Allowance) | 1 | AL | 12,500.00 | 12,500 |
| | **SUBTOTAL CONVEYING SYSTEMS** | | | | **127,700** |

| DIV 21 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **FIRE SUPPRESSION** | | | | |
| | Fire Sprinklers (Garage & Elevator Lobbies) | 3,640 | SF | 1.60 | 5,824 |
| | Backflow Prevention | | | | w/ Parking Garage |
| | Fire Department Connections | | | | w/ Parking Garage |
| | Booster Pump | | | | w/ Parking Garage |
| | **SUBTOTAL FIRE SUPPRESSION** | | | | **5,824** |

| DIV 22 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **PLUMBING** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Plumbing Systems (Drains, Waste & Vent) | 3,640 | SF | 1.80 | 6,552 |
| | Plumbing - Relocation of existing items | 2,378 | SF | 1.00 | 2,378 |
| | **SUBTOTAL PLUMBING** | | | | **8,930** |

| DIV 23 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **HVAC** | | | | |
| | HVAC - Stairs & Elevator Lobby | 3,640 | SF | 18.50 | 67,340 |
| | HVAC - Relocation of existing items | 2,378 | SF | 5.00 | 11,890 |
| | **SUBTOTAL HVAC** | | | | **79,230** |

| DIV 26 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **ELECTRICAL** | | | | |
| | Electrical | 3,640 | SF | 2.98 | 10,848 |
| | Electrical - Relocation of existing items | 2,378 | SF | 2.00 | 4,756 |
| | CO2 Detection System | | | | w/ Above |
| | Light Fixtures | 3,640 | SF | 1.59 | 5,772 |
| | Emergency GenSet (300 kw, gas fired) | | | | w/ Parking Garage |
| | Solar Photovoltaic System | | | | Excluded |
| | Wind Turbine System | | | | Excluded |
| | Lightning Protection System | | | | Excluded |
| | **SUBTOTAL ELECTRICAL** | | | | **21,377** |

| DIV 27 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **COMMUNICATIONS** | | | | |
| | Fire Alarm System | 3,640 | SF | 0.35 | 1,285 |
| | Security System | 3,640 | SF | 0.92 | 3,349 |
| | Data & Communications Conduit | 3,640 | SF | 0.63 | 2,293 |
| | Data & Communications Equipment | | | | Excluded |
| | A/V Equipment | | | | Excluded |
| | **SUBTOTAL COMMUNICATIONS** | | | | **6,927** |

| DIV 031 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | **SITE PREPARATION / EARTHWORK** | | | | |
| | **SUBTOTAL SITE PREPARATION** | | | | **w/ Site Improvements** |

| DIV 033 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | SITE CIVIL/MECHANICAL UTILITIES | | | | |
| | SUBTOTAL SITE CIVIL/MECHANICAL UTILITES | | | w/ Site Improvements | |

| DIV 034 | Description | Quantity | Unit | TOTALS | |
|---|---|---|---|---|---|
| | | | | Cost/Unit | Total Cost |
| | Transportation | | | | |
| | SUBTOTAL TRANSPORTATION | | | w/ Site Improvements | |

| | | | | | |
|---|---|---|---|---|---|
| TOTAL COST - | | | | | 786,199 |
| | | | | | 216 |

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## 3.6 BASIS OF ESTIMATE

### Cost Estimating Information & Assumptions

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Location:** | Denver, CO | | | | | Estimated By: | Kyle Hoiland | |
| **Project:** | Capitol / West Lawn Project | | | | | Reviewed By: | Chris Squadra | |
| **Cost Models** | **GSF / EA** | | **QTY** | **TOTAL** | | Estimate Contact: | Kyle Hoiland | |
| **Tunnel:** | 40,174 | SF | 1 | 40,174 | SF | Phone: | 970.390.4208 | |
| **P1 Parking Structure:** | 41,625 | SF | 1 | 41,625 | SF | Email: | kyle.hoiland@cbre.com | |
| **P2 Parking Structure:** | 41,625 | SF | 1 | 41,625 | SF | | | |
| **Stair & Elevator Lobby:** | 1,820 | SF | 2 | 3,640 | SF | Cost Data: | Based on Quarter 3/2013 | |
| **TOTAL PROJECT GROSS SQUARE FOOTAGE:** | | | | **127,064** | **GSF** | | Historical Cost Data | |
| | | | | | | | Regional Research | |
| **Sitework :** | **250,000** | **SF** | | **5.74** | **ACRES** | | | |

### Estimate Revision Status

| Description | REV 01 - 03 | REV 04 | REV 05 | REV 06 | REV 07 | REV 08 |
|---|---|---|---|---|---|---|
| Receive Drawings/Info: | 05 Sep 13 | 23-Sep-13 | 24 Jan 14 | 10 Feb 14 | 21 Mar 14 | 31 Mar 14 |
| Date of Estimate (QTO Complete): | 10 Sep 13 | 28 Sep 13 | 28 Jan 14 | 14 Feb 14 | 28 Mar 14 | 02 Apr 14 |
| Date of Estimate (Final Review): | 16 Sep 13 | 28 Sep 13 | 29 Jan 14 | 14 Feb 14 | 28 Mar 14 | 02 Apr 14 |

### Estimating Information Sources

| Design Documents | Originator | REV 01 - 03 | REV 04 | REV 05 | REV 06 | REV 07 | REV 07 |
|---|---|---|---|---|---|---|---|
| 2013_0905 Pricing Docs | RNL | 05 Sep 13 | | | | | |
| Capitol Basement Sketches | AHA | 05 Sep 13 | | | | | |
| Pricing Package (Landscape) | DAK | 05 Sep 13 | | | | | |
| 2013.09.05 Pricing Plans | MME | 05 Sep 13 | | | | | |
| Structural Narrative West Lawn Parking Structure | MME | 05 Sep 13 | | | | | |
| West Lawn Civil Pricing Narrative | MME | 05 Sep 13 | | | | | |
| West Lawn Narrative_rev | MME | 05 Sep 13 | | | | | |
| Tunnel Electrical Narrative | RMH | 05 Sep 13 | | | | | |
| Tunnel Mechanical Narrative | RMH | 05 Sep 13 | | | | | |
| Parking Operations & Control for West Lawn Parking Structure | WPC | 05 Sep 13 | | | | | |
| In house Comments | CBRE | | 28 Sep 13 | | | | |
| 2014_0124 Tunnel Sketches.pdf | RNL | | | 24 Jan 14 | | | |
| Email | RNL | | | 24 Jan 14 | | | |
| Capitol Basement Access Sketch | RNL | | | | 10 Feb 14 | | |
| 2014_0321 West Lawn Ramp Sketch | RNL | | | | | 21 Mar 14 | 21 Mar 14 |
| Email from Tom Gardner | RNL | | | | | | 31 Mar 14 |
| Communications | | | | | | | |
| Conference Call | Various | | | | | | |
| Comments (E-Mails) | Various | | | | | | |
| Meetings | Various | | | | | | |

Key

| | | | |
|---|---|---|---|
| CBRE | CBRE, Inc. | AHA | Anderson Hallas |
| RNL | RNL Design | MME | Martin Martin Civil Engineering |
| RMH | RMH Group | WP | Walker Parking Consultants |
| DAK | Dunn & Kiley | FP | Fehr & Peers |

### Schedule Assumptions

| Construction Phase | Start | | Finish | | Duration |
|---|---|---|---|---|---|
| **Site Demolition** | 01 Apr 2015 | → | 01 Aug 2015 | | 4 Months |
| **Site Construction** | 01 Jun 2015 | → | 01 Dec 2016 | | 18 Months |

**Site & Building Construction to run concurrently*

| Soft Costs & Other Assumptions & Clarifications | | | |
|---|---|---|---|
| Comments | Basic Construction-Driven Soft Costs | Factor | Calculations & Constants |
| | State/Local Sales & Use Taxes | Exempt | |
| | Allowance for Historical / Memorial Markers | $ 250,000 | |
| | Material Testing (w/ GC's Onsite Overhead) | 0.75% | |
| | Owner's Design & Preconstruction Contingency | 10.0% | |
| | Owner's Construction Contingency (after NTP) | 5.0% | |
| | Permits | 1.9% | |
| | Standard General Conditions (GC's Onsite Overhead) | $ 2,326,414 | $ 6.17 sf |
| | GC's Off-Site & Overhead | 3.4% | |
| | GC's Profit | w/ Above | |
| | GC's General Liability Insurance | w/Above | |
| | Builder's Risk Insurance | 1.5% | |
| | Performance & Payment Bond | 1.2% | |
| | Bid Bond | 0.25% | |
| | Escalation per Year | Excluded | |
| | Escalation Period in Months (to mid-point of construction) | 32 | |
| | Tap Fees | Excluded | |
| | Financing & Attorney's Fees | Excluded | |
| | Hazardous Material Abatement | Excluded | |
| | Fixtures, Furnishings, and Equipment (FF&E) | Included | See Detailed Estimate - Site |
| | Owner Personnel Costs, Time & Expenses | Excluded | |
| | Relocation/Moving Expenses | Not Required | |
| | Utilities During Construction | Excluded | |
| | Other Owner's Soft Costs | Excluded | |

| General Clarifications & Assumptions | |
|---|---|
| 1 | This estimate & General Conditions assumes all components will take place together at one time. If various components are removed or constructed at a different time, then the General Conditions will need to be reviewed & revised. |
| 2 | Existing granite pavers to be removed, salvaged & reinstalled. 90% recovery of all granite is assumed. |
| 3 | Assumes existing utilities are adequate for the proposed tunnel, parking garage & stair/elevator lobby area. |
| 4 | Purchase of public art and installation are included as an allowance @ 1% of construction costs. |
| 5 | 6" Deciduous Trees are assumed for new trees. |
| 6 | Large boulder removal, blasting or soil mitigation are excluded. |
| | Assumed 2,600 cy of topsoil material could be stored on site, to be reused. Additional structural material could possibly be stored, if properly staged & approved by Owner. |
| 7 | Assumed a purchase price of 15,000 cy of structural material at $12/ton. Potential savings could be realized if project site can be utilized to store spoils from project. |
| 8 | Assumed 12" depth of new topsoil to be placed on top of 4' of structural material. |
| 9 | Sod & standard irrigation provided at "Turf Areas". |
| 10 | New street lights are included. Potential savings if existing street lights are salvaged. |
| 11 | Fire suppression at Tunnel is included. |
| 12 | Railings at interior of Tunnel are included. |
| 13 | Concrete epoxy sealer at Tunnel driving surfaces is excluded. |
| 14 | Granite Balustrade is excluded. Limestone Balustrade priced in-lieu of granite. |

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