Appendix D

Long Term/Visionary Ideas

- New 300 Block Station
  - Convert mail platform – Phase 2
  - Widen all platforms
  - Space planning concepts
  - Fourth North lead track
- New 200 Block Station
  - Space planning concepts
- Canal/Clinton Subway
  - Clinton Subway Profile
  - Clinton Subway Plan View (north-south segment)
  - Canal Subway Profile
  - Canal Subway Plan View (north-south segment)
  - Clinton & Canal subway plan view (east-west segment)
  - Constructability Analysis
Chicago Union Station
300 South Riverside Station
Proposed Long Term Street Level Plan
Chicago Union Station
300 South Riverside Station
Proposed Long Term Office Mezzanine Level Plan
Chicago Union Station
300 South Riverside Station
Proposed Long Term
Concourse Level Plan
Chicago Union Station
300 South Riverside Station
Proposed Long Term Basement Level Plan
NOTES:
1. EXISTING CURVES ARE APPROXIMATELY 16°.
2. PROPOSED CURVES ARE 15.5°.

LEGEND:
- EXISTING 3 TRACKS
- PROPOSED 4 TRACKS
- 9' CLEARANCE FROM CENTER OF OUTSIDE PROPOSED TRACK

REVISIONS:
- AS SHOWN
- PROPOSED RIVERBEND DEVELOPMENT
- REMOVE BUILDING (CASIDY TIRES)
- REMOVE EXISTING PARKING LOT
- REPLACE EXISTING BRIDGE
- EXISTING GUARDRAIL
- LEFT BANK RESIDENCES
- NEW TRACK
- PROPOSED 14' TRACK CENTERS
- PROPOSED 14' TRACK CENTERS

DEPARTMENT OF TRANSPORTATION
CITY OF CHICAGO
CHICAGO CITY OF
MASTER PLAN STUDY
CHICAGO UNION STATION
CONSULTANT:
(312) 669-9601
Suite 2320
222 South Riverside Plaza
Chicago, Illinois 60606

DRAWN:
CHECKED:
APPROVED:
DATE:
SCALE:
CONTRACT NO.:
SHEET NO.
PROJECT NO.:

G: \CD0 3\0 0 0 2\Plan nin g\3 d\0 2-REF-TRACK.d gn
Chicago Union Station
222 South Riverside Station
Proposed Long Term Street Level Plan

- New Through Track Platforms
- Pedestrian Circulation & Lobbies
- Existing Platforms
- Vertical Circulation
- New Vertical Circulation
- Amtrak Waiting Area
- Metra Waiting Area
- Ticketing
- Retail/Food
- Building Cores
- Train Operations
- Office Space
- Vacant

Chicago River
Van Buren
Jackson
Adams
Chicago Union Station
222 South Riverside Station
Proposed Long Term Office Mezzanine Level Plan
To: David Phillips, TranSystems
From: Derek Penrice
Date: November 18, 2011
Project #: 268208
Page: 1 of 197
CC: Mike Vitale

Subject: Chicago Union Station Master Plan Project

1. Introduction

This Memo provides technical discussion related to the provision of capacity expansion at the existing Union Station in Chicago. Opinions of probable construction methods and construction costs for two underground construction options, on Canal Street and Clinton Street Respectively are provided. All assumptions made relative to the extent of the construction methods and used in the calculation of the construction costs are presented herein.

Based on the assumptions, the calculated costs for excavating the tunnels, constructing the tunnel linings and provided associated ventilation facilities and tunnel operating systems are estimated to be as follows:

- Canal Street - $823-million
- Clinton Street - $841-million

These figures exclude contingency, soft costs and other elements of construction as described in Section 4.

2. Existing Conditions

General assumptions used in the development of approximate construction cost estimates for the underground construction options on Canal Street and Clinton Street are as follows:

a. Ground Conditions

Existing soil and groundwater conditions are as presented in the West Loop Transportation Center Corridor Right of Way Proofing Exercise, prepared on behalf of TranSystems Corporation by Arup in December of 2004.
As measured from the surface, the site geology is generally expected to comprise of the following:

- Fill: 0-10 feet depth
- Clay, soft to medium: 10-50 feet
- Clay, hard: 50-100 feet
- Hardpan/limestone bedrock: 100 feet plus

The Arup report states that groundwater can be expected to be encountered at depths of 5 to 15 feet below ground surface, though the report goes on to state that groundwater was found within the fill in almost all borings, suggesting groundwater is generally at the shallower end of the range indicated. Correspondingly for the purposes of this study, groundwater is assumed to be 5 feet below ground surface.

b. Existing Infrastructure

From north to south, both the Canal Street and Clinton Street alignments pass under or adjacent to the following infrastructure, which must be protected in place during construction:

- The proposed alignment will pass under a structured parking deck between Union Street and Desplaines Street, and the Desplaines Street bridge/overpass. This may necessitate grade lowering, or the use of low headroom equipment to install the required support of excavation. The actual tunnel is proposed to start by entering a portal on the east ROW line of Desplaines Street.
- High rise rental apartment buildings have been constructed in the block bounded by West Kinzie Street to the north, Clinton Street to the east, Metra tracks to the south, and Jefferson Street to the west on both sides of the proposed passenger rail below grade alignment under a park and Jefferson Street. The towers were developed to accommodate the future guideway construction.
- The alignment passes directly under the Metra-owned three track surface passenger rail route (the north leads to Union Station).
- The alignment passes directly underneath the Fulton Station Condominiums, a recently constructed residential development comprising a series of 3, 5 and 7 story structures, all of which are supported on shallow foundations. The condominiums are bounded by Clinton Street to the east, the Metra tracks to the north and Fulton Street to the south.
• The proposed tunnel crosses the existing CTA Blue Line subway tunnel, which crosses Clinton Street at Fulton Street, at a 45° skew. The proposed alignment will pass over the top of the subway tunnel. The Blue Line will require instrumentation/monitoring during construction.

• The alignment passes under the northeast corner of Clinton Lofts, a 5 story residential development located at the intersection of Clinton Street and Fulton Street. This building is estimated to be over 100 years old and is assumed to be supported on shallow foundations.

• The existing former C&NW railroad powerhouse is located on a site next to the Ogilvie Transportation Center track on a site east of Clinton Street, south of Milwaukee Avenue and north of Lake Street. The structure was built about 1910 and includes a chimney of approximately 10-12 stories in height. The condition of the chimney is unknown, but it is assumed that this structure is vulnerable to tunneling induced settlement. While abandoned for a number of years the site was recently redeveloped as a restaurant/bar, and includes a small amount of office space.

• At Lake Street, the alignment crosses under the CTA Green Line Clinton Street ‘L’ station. The station span of Clinton Street is supported on caissons which extend to the hardpan layer, consistent with standard City practice.

• The alignment passes under the Old Post Office Building, a historic structure supported upon caisson foundations. The building is currently unused, but has been purchased by a developer. Based upon the original alignments indicated in the March 2007 West Loop Transportation Center Conceptual Design Plans, several of the caissons appear to be in direct conflict with the track alignment. To mitigate this impact, some reframing of the superstructure, underpinning and installation of new foundations will likely be required to transfer load from the caissons, to permit removal during tunneling.

• The alignment also passes under the New Post Office Building. This structure is similarly supported on a series of columns aligned with the Union Station Platform locations which are in turn supported on caisson foundations. Again based on the March 2007 alignments, some of the caissons conflict with the tunnel construction. Per the Old Post Office a combination of reframing, underpinning and new foundations will be necessary to accommodate the tunnel construction.

In addition the Canal Street alignment impacts the following infrastructure:
The alignment crosses the trainshed/platform area of the Ogilvie Transportation Center at a skew angle. The trainshed/platform area comprises a column supported elevated deck supported on columns and shallow footings.

The alignment passes under the existing Union Station tracks (both north and south of the Station concourse. The trainshed area appears to be supported on a mat foundation. The trainshed will be partially demolished to support the Canal Street Station construction. The platforms/track and structure will be reinstated at the conclusion of the new Guideway and station construction.

The Clinton Street alignment has conflicts with the following infrastructure located immediately south of the Clinton Street Station.

- The southwest corner of the historic Great Hall building of the existing Union Station.
- The Amtrak parking garage located between Clinton and Canal Streets. However, the garage is proposed for demolition.
- The northeast corner of an approximately 15 story office building, located south of Van Buren Street immediately south of the parking structure.

These impacts are primarily a result of the Guideway widening to a four track alignment. It may be possible to revise the alignment such that some of the structure impacts can be avoided, in particular to the Great Hall, a historic structure of considerable importance.

The Arup Report indicates that for ease of construction, much of the existing infrastructure, particularly at the north of the alignment should be demolished. We would concur with that sentiment. However, understanding that there are also community issues to be taken into consideration, for the purposes of this study it is assumed that the identified infrastructure must remain, and be protected in place during tunnel construction. However, based upon the proposed rail profile, the difficulty of tunneling under the Fulton Station Condominiums at shallow depth cannot be understated.

c. Ventilation/Fire Life safety

The tunnels will be ventilated in a push-pull method. Ventilation plant will be provided at each end of the underground station at concourse level, and near each portal. These fixed ventilation facilities can be supplemented by jet fans as necessary, located within sections of cut and cover or stacked drift tunnel.
Emergency egress requirements will comply with NFPA 130. For the most part the tunnels and cross passages will comprise of two separate bores, or cells in cut and cover areas. Correspondingly emergency egress will be provided by means of cross passages located at a maximum of 800 feet on center.

3. Proposed Construction Methods

The underground sections of the Canal Street and Clinton Street Options each have an overall length of approximately 8,125 feet. As a result of the site and alignment constraints a number of different construction methods will be necessary to complete the Guideway. For the purposes of the study it is assumed that the following construction methods will be required:

a. U-Wall:

U-wall structures will be used to transition the rail profile from grade to a point where the structure can be fully buried. U-Wall concepts and their corresponding construction cost estimates shall be developed by TranSystems.

b. Cut and Cover Construction:

Cut and cover structures will be used in areas where the track profile is relatively shallow, in areas of complex track geometry, and for excavation of the Canal and Clinton Street Stations, the cross sectional openings for which are too large to be safely mined in the prevailing ground conditions at the profile depth indicated.

For the station and transition structures to either side, the sequence of construction will be complex. For the purposes of the study the following sequence of construction is assumed. This sequence has been developed relative to station concepts depicted for the Canal Street Station in exhibits EXI1-EXI6.

- Close Eastern side of Canal Street to surface traffic
- Take CUS north and south tracks 1, 2, 3, and 4 out of service, install safety barrier in trainshed at platform edge.
- Partially remove deck/surface local to east slurry wall location.
- Install east slurry wall. Soldier piles to project above trench to street level
- Shift traffic to east side of street (above tracks 1 & 2 & west)
- Install west slurry wall
- Install temporary surface traffic decking, restore surface traffic pattern
- Sequentially excavate &install internal bracing to excavation invert
c. **Stacked Drift Construction:**

Stacked drift construction is a process of mining whereby a series of small adits are excavated in sequence to form a structural perimeter. The core of the arch can be subsequently excavated in safety to allow the construction of the permanent structure. This process is not often used due to its associated slow progress rates and correspondingly high costs. However, it is useful in areas where control of ground movements is essential. A representation of the stacked drift concept is included as Figure 1.

*Figure 1: Stacked Drift Option*

The construction sequence for the stacked drift tunnel will be as follows:
1. Perform permeation grouting, or other appropriate ground improvement methods, to stabilize fill and loose materials
2. Excavate left and right Adit 1 simultaneously from both ends. Once excavation is complete, concrete Adit 1.
3. Repeat for Adit 2
4. Excavate Adit 3. In conjunction with Adit 3 excavation and initial support, turn and excavate Cross Adits 4. Concrete cross adits as they are completed
5. Concrete 3.
6. Excavate core, including any part of Cross Adit 4.
7. Construct permanent structure.

As indicated this method of construction has been used infrequently. However there is precedent for its use. Specific examples of this type of construction include the Rio Pedrio Station, constructed as part of the Tren Urbano Project in Puerto Rico, and the Central Artery/Tunnel Project in Boston, where stacked drift methods were employed to underpin the existing Red Line subway tunnels prior to construction of the highway tunnels. This method of construction was also originally proposed for the Downtown Extension Project, part of the Transbay Transit Center Program in San Francisco. The construction process is indicated in Figures 2 and 3 below.

*Figure 2: Excavation of Individual Drift*
**Sequential Excavation Methods (SEM):**

Where greater ground cover exists between the surface and the crown of the tunnel, SEM will be adopted. It is assumed that each track will be maintained in a separate bore, to help minimize construction risk from ground movements. The full tunnel cross section will be excavated in a series of smaller adits for the tunnel crown, bench and invert. Additional ground support measures – pipe canopy, grouting, dewatering will also be required. A representation of the two track SEM configuration is presented in Figure 4.
Variations on the tunnel configuration indicated in the figure are achievable. The ‘pillar’ between the two bores can be reduced to zero, such that both bores would have a common dividing wall. This may be achievable but would necessitate more detailed analysis to confirm. Where the two single cell option may not be achievable, due to alignment constraints produced by existing building columns etc, then the configuration could be adjusted as necessary to a single bore section with both tracks located in a single opening.

e. Construction Methods - Canal Street Option

Based upon a review of the existing conditions, and the infrastructure on and adjacent to the alignment, a number of different construction methods are proposed for the construction of the Canal Street option, at least for cost estimating purposes. As the design continues, there may be opportunities to optimize the number of technologies proposed. The extent of each of the construction methods is presented in the Table below. Additional requirements/assumptions relative to the use of each of these construction methods are also provided.

<table>
<thead>
<tr>
<th>Canal Street Option</th>
<th>Approximate Stationing</th>
<th>Construction Method</th>
<th>Additional Requirements/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>54+90 – 59+00</td>
<td>U-wall</td>
<td>Construction within operating rail environment. Will require closure of tracks on the u-wall alignment and temporarily of tracks adjacent to the alignment.</td>
<td></td>
</tr>
<tr>
<td>59+00 – 62+50</td>
<td>Cut and cover</td>
<td>Transition from U-wall to SEM construction. Structure will widen from a basic two track U-wall configuration to accommodate the required bore separation of the SEM tunnels. A vent plant will be located over the cut and cover transition. The transition to SEM is assumed to be located immediately south of Polk street to minimize traffic/utility impacts.</td>
<td></td>
</tr>
<tr>
<td>62+50 – 78+50</td>
<td>SEM</td>
<td>SEM construction is proposed for tunneling under the existing and former Post Office facilities. A two track alignment is assumed, with each track in a single bore. This configuration shall be maintained until the alignment emerges into Canal Street.</td>
<td></td>
</tr>
<tr>
<td>78+50 – 82+00</td>
<td>Cut and cover</td>
<td>Transition from 2-track SEM tunnel to 4-track, 2-platform station similar to that indicated at the north of the station. Accommodate transition to 2-tracks within Canal Street to minimize SEM tunneling risk.</td>
<td></td>
</tr>
<tr>
<td>82+00 – 97+00</td>
<td>Canal Street Station</td>
<td>4-track, 2-platform station box. Station comprises a concourse level and platform level. Ventilation structures and other ancillary spaces will be provided at concourse level, either within the station or over the cut and</td>
<td></td>
</tr>
</tbody>
</table>

4301 Hacienda Drive, Suite 300 Pleasanton CA 94588  T • 925–469–8010 •  F 925–469–8011
www.hatchmott.com
### Canal Street Option

<table>
<thead>
<tr>
<th>Approximate Stationing</th>
<th>Construction Method</th>
<th>Additional Requirements/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>cover transition structures. A separate ventilation plant will be provided at each end of the station.</td>
</tr>
<tr>
<td>97+00 – 100+50</td>
<td>Cut and cover</td>
<td>Transition from 2-track SEM tunnel to 4-track, 2-platform station. Station comprises a concourse level and a platform level. Transition to 2-track tunneling within Canal Street to minimize surface impacts – traffic and utilities.</td>
</tr>
<tr>
<td>100+50 – 116+70</td>
<td>SEM</td>
<td>SEM construction is proposed for tunneling under the existing Ogilvie Transportation Center to a limit at the south of Fulton Street. A two track alignment is assumed, with each track in a single bore.</td>
</tr>
<tr>
<td>116+70 - 118+50</td>
<td>Cut and cover</td>
<td>This structure will be used both as a construction shaft, and to enable a transition between the SEM and stacked drift construction methods to be made. The excavation will be decked over to maintain surface traffic. Construction will be directly over the existing Blue Line tunnels. Structure wider than regular 2-track tunnel to accommodate SEM tunnel bore separation.</td>
</tr>
<tr>
<td>118+50 – 121+50</td>
<td>Stacked Drift</td>
<td>Stacked drift tunnel under Fulton Street Condominiums, Single bore tunnel with 2 tracks within bore. Central dividing wall can be constructed to maintain ventilation flows.</td>
</tr>
<tr>
<td>121+50 – 129+00</td>
<td>Cut and cover</td>
<td>2-track cut and cover. Existing Metra tracks to be sequentially removed, underpinned and replaced, to allow construction under tracks. Development on Site A and Site B will accommodate cut and cover construction. A ventilation/egress structure will be provided at Station 122+00 approximately.</td>
</tr>
<tr>
<td>129+00 – 135+25</td>
<td>U-Wall</td>
<td>2 track transition from cut and cover portal to grade. Low headroom equipment may be necessary to construct excavation support under existing supermarket parking deck between Desplaines Street and Union Street</td>
</tr>
</tbody>
</table>

### Construction Methods – Clinton Street Option

Between the following limits, the Clinton Street Option will be per the Canal Street Option:

- Station 54+00 and Station 77+00 (face of the Old Post Office Building)
- Station 118+50 at Fulton Street and Station 135+25
Between Station 77+00 and Station 113+75, all construction will be by cut and cover methods to accommodate the proposed track and platform configuration. The two track leads split horizontally to provide a four track alignment. Once this is fully developed, the inner two tracks drop to accommodate a stacked platform arrangement. The extent of the various construction methods required for the Clinton Street Option is as follows:

<table>
<thead>
<tr>
<th>Approximate Stationing</th>
<th>Construction Method</th>
<th>Additional Requirements/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>54+00 – 59+00</td>
<td>U-wall</td>
<td>Construction within operating rail environment. Will require closure of tracks on the u-wall alignment and temporarily of tracks adjacent to the alignment.</td>
</tr>
<tr>
<td>59+00 – 62+50</td>
<td>Cut and cover</td>
<td>Transition from U-wall to SEM construction. Structure will widen from a basic two track U-wall configuration to accommodate the required bore separation of the SEM tunnels. A vent plant will be located over the cut and cover transition. The transition to SEM is assumed to be located immediately south of Polk street to minimize traffic/utility impacts.</td>
</tr>
<tr>
<td>62+50 – 77+00</td>
<td>SEM</td>
<td>SEM construction is proposed for tunneling under the existing and former Post Office facilities. A two track alignment is assumed, with each track in a single bore. This configuration shall be maintained until the alignment emerges into Canal Street.</td>
</tr>
</tbody>
</table>
| 77+00 -87+00           | Cut and cover       | The cut and cover structure will transition from 2-tracked SEM to a four track vertically stacked (2+2 tracks) configuration in the following steps:  
  • Turnouts transition the 2 tracks to a four track alignment.  
  • Once the four track alignment is developed, the center tracks drop at maximum gradient to provide vertical separation.  
  • One full vertical clearance/separation is achieved, the lower tracks move under the upper tracks to align with the station platforms. |
<p>| 87+00-102+00           | Clinton Street Station | 2-track, 1-platform wide station box. Platforms on 3 levels for commuter rail and CTA Red Line. Station comprises a concourse level and three platform levels. Ventilation structures and other ancillary spaces will be provided at concourse level, either within the station or over the cut and cover transition structures. A separate ventilation plant will be provided at each end of the station. Station and cut and cover construction to each side will include stubs for future CTA Red Line connections, which can be constructed with minimal impact to the ongoing station operation. |
| 102+00-113+75          | Cut and cover       | The track configuration transitions to the 2 track stacked drift in the opposite sequence as that described for the cut and cover |</p>
<table>
<thead>
<tr>
<th>Clinton Street Option</th>
<th>Approximate Stationing</th>
<th>Construction Method</th>
<th>Additional Requirements/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>section between Station 75+00 and 87+00. In addition the cut and cover section will include provision for a future CTA Red Line connection. Excavation will be as deep as for the Clinton Street station &amp; the amount of structure required will be similar (approximately).</td>
<td></td>
</tr>
<tr>
<td>113+75 – 116+70</td>
<td>SEM</td>
<td>SEM construction is proposed for tunneling under the Clinton Lofts. A two track alignment is assumed, with each track in a single bore. At station 113+75 sufficient vertical separation can be maintained between the rail tunnel and the future CTA Red Line tunnels to allow the latter to be safely mined.</td>
<td></td>
</tr>
<tr>
<td>116+70 - 118+50</td>
<td>Cut and cover</td>
<td>This structure will be used both as a construction shaft, and to enable a transition between the SEM and stacked drift construction methods to be made. The excavation will be decked over to maintain surface traffic. Construction will be directly over the existing Blue Line tunnels. Structure wider than regular 2-track tunnel to accommodate SEM tunnel bore separation.</td>
<td></td>
</tr>
<tr>
<td>118+50 – 121+50</td>
<td>Stacked Drift</td>
<td>Stacked drift tunnel under Fulton Street Condominiums, Single bore tunnel with 2 tracks within bore. Central dividing wall can be constructed to maintain ventilation flows.</td>
<td></td>
</tr>
<tr>
<td>121+50 – 129+00</td>
<td>Cut and cover</td>
<td>A 2-track cut and cover structure. Existing Metra tracks to be sequentially removed, underpinned and replaced, to allow construction under tracks. Development on Site A and Site B will accommodate cut and cover construction. A ventilation/egress structure will be provided at Station 122+00 approximately.</td>
<td></td>
</tr>
<tr>
<td>129+00 – 135+25</td>
<td>U-Wall</td>
<td>2 track transition from cut and cover portal to grade. Low headroom equipment may be necessary to construct excavation support under existing supermarket parking deck between Desplanes Street and Union Street</td>
<td></td>
</tr>
</tbody>
</table>
4. Construction Cost Estimate Basis

a. Assumptions

The cost estimate assumes the following:

- Prices and rates provided are in $2011.
- Rates are assumed to be inclusive of Contractors other indirect costs, overhead and profit.
- It is assumed that appropriately sized construction staging areas can be made available for the Tunnel Contractor, and that the City will not enforce unusually restrictive conditions upon the Contractors means, methods, and hours of operation.

b. Inclusions

The construction costs developed for the cut and cover and mined tunnels are inclusive of the following:

- Contractor mobilization, capped at 5% of the General Construction Cost figure
- Excavation support wall, bracing, temporary traffic decking, excavation and backfill for cut and cover structures
- Excavation and initial ground support for mined tunnels
- Waterproofing system
- Final cast-in-place reinforced concrete lining for all structures

c. Allowances

Allowances have been made for items which will likely be required, but which cannot be accurately quantified at this stage in the project development. Allowances are based upon projects currently in design and construction, based upon relative percentages of the total construction cost for these projects. Allowances have been provided for the following items:

- Ventilation Structures and equipment
- Preconstruction surveys
- Instrumentation and monitoring
- Ground Improvement: Dewatering, permeation/consolidation grouting
- Contaminated soil removal and disposal
• Underpinning or other protection of adjacent and overlying buildings, including reframing of building superstructures and addition of new columns/foundation elements.
• Reconfiguration of existing building basements to provide access to Canal Street Station
• Remedial cosmetic repairs to buildings
• Tunnel operating systems including lighting, blue light station, standpipe etc
• Tunnel and station finishes and fit out (architectural finishes, escalators, elevators etc)

d. Exclusions

The estimate does not include the following items:

• Utility relocation, replacement or support work
• Street restoration – paving curbs etc.
• Track and rail
• Rail systems including overhead contact system, train control and communications
• Costs associated with Metra/Amtrak track outages, or force account work
• Soft costs such as Owner’s administration and engineering staff, Financing costs, professional services (final design, construction management, etc), cost of legal, permits and interagency review,
• Financing costs
• Escalation

e. Unit Prices

Unit rates provided for major quantity items for the tunnel construction have been derived from a database of unit prices for recent, similar projects in the US maintained by Hatch Mott MacDonald. The estimates used to generate the comparison include figures from contractors bid tabs, construction cost estimates prepared by contracting firms, and Engineers Estimates for projects currently in design.

f. Contingency

Contingency has not been applied to the estimate to account for unanticipated costs, arising from uncertainties in the project scope, refinements in the design as it progresses through the DD, FD and Construction Documents phases of the project, unexpected material or labor cost increases, the bidding climate or level of competition at the time of bid, and to account for the
potential for change orders and claims during construction. It is recommended at this stage in planning that a contingency of at least 35% be adopted.

5. Cost Estimates

More detailed construction cost estimates for the Canal Street and Clinton Street Options are included as Appendix A and Appendix B respectively. The construction cost totals for the options are as follows:

- Canal Street - $823-million
- Clinton Street - $841-million

While the geometry at and around the central station areas is significantly different, the cost differential is minor. While this may appear unusual, it can be explained as follows:

Of the 8,125 foot alignment, between Station 54+00 and 77+00 and between 113+75 and Station 135+25, or over a length of 4,450 feet the construction methods and costs are identical.

The Station box at 1,500 feet long itself comprises a significant portion of the remaining alignment. The price per foot and overall price of the two station concepts is similar. While the Clinton Street Station requires a very deep excavation to accommodate the concourse and platform levels, the Canal Street Station is 33% wider, and almost as deep as the Clinton Street Station based upon the track profiles developed. Correspondingly the costs of construction are similar. The costs of fitting out the Clinton Street Station are increased due to the increased number of levels, additional requirements for escalators, elevators, ventilation, finishes etc.

Of the remaining alignment there is little difference in unit price of the construction methods. For Canal Street SEM is required to pass under the Ogilvie Trainshed. For Clinton Street cut and cover construction is necessary to accommodate the changing track and structure geometry. The costs for each method are similar. The SEM excavation is expensive, to account for anticipated slow production rates, and the high level of risk associated with this construction – at relatively shallow depth under sensitive and important infrastructure.

It is expected that the cost differential between the two concepts will increase when other project cost elements, such as utilities, and surface reinstatement are introduced.
6. Conclusions/Recommendations

- Based upon the assumed construction methods indicated herein, the construction of the physical infrastructure necessary to support rail operations for the Canal Street and Clinton Street Station alignments may be in excess of $800-million, with the Canal Street Option priced at $823-million and the Clinton Street Option priced slightly higher at $841-million.

- A significant proportion of each of the estimates is made up of allowances. Many allowances are based upon similar level of effort for similar projects. However, the extent of the scope and work required within other allowances such as requirements for building protection and reconfiguration cannot be easily identified and quantified at this time. Correspondingly such allowances are considered as ‘placeholders’, and have been assigned a value which feels appropriate based upon the type of adjacent construction, the extent of the conflict, and the nature and significance of the existing facility.

- As the study is progressed, it is recommended that the track alignment be refined such that impacts upon existing infrastructure can be minimized – such as at the Great Hall, and the tower block south of the Amtrak parking garage. Correspondingly allowance figures can be reduced.

- Similarly, one of the major issues for construction contractors in this area will be the location of appropriate construction staging and laydown areas. Further consideration should be given to the acquisition/demolition of some of the structures noted as being at high risk of damage from construction such as the Clinton Lofts. While expensive, the costs would be offset by a corresponding reduction in construction costs through the ability to alter construction methods, and ultimately by the resale of the properties post-guideway construction.

- The above figures are exclusive of contingency. It is recommended that a contingency of at least 35% be included in the determination of an overall project cost/budget.

7. References

The following were used in the development of the construction methods and construction cost estimates:

- West Loop Transportation Center Conceptual Design Plans, TranSystems, March 2007
8. Limitations

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Hatch Mott MacDonald being obtained. Hatch Mott MacDonald accepts no responsibility or liability for the consequence of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm his agreement to indemnify Hatch Mott MacDonald for all loss or damage resulting therefrom. Hatch Mott MacDonald accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

To the extent that this report is based on information supplied by other parties, Hatch Mott MacDonald accepts no liability for any loss or damage suffered by the client, whether contractual or tortious, stemming from any conclusions based on data supplied by parties other than Hatch Mott MacDonald and used by Hatch Mott MacDonald in preparing this report.
Chicago Union Station Capacity Expansion
Alternative A:
WLTC Through-Track Concept
Alt A2/A3: West Loop
Transportation Center
Alt I: New Thru Tracks Under Canal Street