



Conduct of Construction Plan



Developed by:

DENVER TRANSIT CONSTRUCTION GROUP

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DRAFT VERSION

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The Conduct of Construction Plan for the West Corridor addresses the integration of compliance with local, state and federal regulations and neighborhood concerns with the logistics of constructing a major civil project within an urban setting. The project encompasses many major work components, multiple work headings and requires significant coordination with third parties. This document responds to comments gathered during the preconstruction process from these third parties and offers an approach to the work that is consistent with the revised preliminary schedule submitted by Denver Transit Construction Group on December 7, 2007 and the ongoing refinement and development of that document.

1. PROJECT DESCRIPTION

The FasTracks West Corridor project will construct a new light rail transit (LRT) corridor to complement the previous corridors that are currently in operation in the metro Denver area. The West Corridor will extend approximately 12 miles from the vicinity of the Auraria Higher Education campus in Denver, where the line will connect to the present LRT system, then follow a westerly alignment to an end-of-line station near the Jefferson County Government Center in Golden.

The alignment primarily follows an out-of-service freight rail line for the easterly 75% of its route and utilizes the US Highway 6 right-of-way for the westerly 25%. The corridor traverses through industrial property, park land, open space, residential neighborhoods and along side busily-traveled highways.

The major items of work identified in the preliminary 90% plans are:

- 14 LRT or vehicular bridge structures – Primarily steel and concrete girders with one tied-arch and one bowstring truss
- 2 tunnels – One will be open cut top-down construction and the other constructed through conventional bored tunnel advances under a spiling-stabilized crown
- 5 pedestrian structures with 4 bridges and 1 tunnel
- 12 stations (1 relocated) with varying amenities
- Over 115 retaining walls
- 16,000 feet of noise wall
- 1 parking garage with 549 spaces and 1 major surface parking lot
- 21 at-grade highway crossings
- Significant re-grading of local streets and roadways parallel to the guideway and at LRT crossings
- Major underground storm drainage installation and surface drainage re-grading and slope protection
- Significant replacement, relocation, adjustment and protection of existing public and private utilities
- Traction power/distribution, train control and communication systems
- 9 miles of double-tracked and 3 miles of single-tracked alignment with limited crossovers, pocket tracks and end-of-line tail tracks

It is important to note that these major items of work or individual elements of the work within these items may be modified as budgets are refined and intergovernmental agreements (IGA's) are concluded. In addition there are numerous scope elements and costs that are considered Concurrent Non-Project Activities or "Betterments" that will be constructed as part of this project

subject to reimbursement from other governmental agencies through Inter-Governmental Agreements.

2. TRAFFIC AND SAFETY CONSIDERATIONS / MAJOR WORK COMPONENTS

Construction of the West Corridor will demand a high level of sensitivity to the interface between major construction activities, private, public and emergency access, the safety of the public and the safety of our workers. While it will be our intent to minimize public inconvenience, there will be times when it is in the interest of public or worker safety to close roadways, bikeways and other public access through parts of the corridor. Close coordination between DTCG's Public Information Team and the construction team will ensure that local residents, businesses, emergency services and the traveling public will be carefully considered in this planning effort and will be notified in advance of any intended closures. Weekly planning meetings will address expected impacts to private property and to the public. Minutes of these meetings will be available to representatives of local agencies. An AATSA certified traffic control coordinator will prepare Method of Handling Traffic plans (MHT'S) for typical situations as well as for site-specific locations where traffic is impacted.

A. UTILITY RELOCATIONS

It is evident that, with over 450 utility replacements, relocations or resets having been identified, this element of work will require thoughtful analysis as it relates to auto, bike and pedestrian traffic and there will be many situations where utility-related work will require partial or full street closures. In addition to the 22 streets that will have at-grade LRT crossings, many of the other streets that are currently open to through traffic and the entire 13th Avenue alignment will require periodic closures for utility related work.

B. STRUCTURES

1. Bridges

There are 14 LRT or vehicular bridges that will be constructed within or adjacent to the corridor. Beginning at the west end of the project, the following must be carefully coordinated into the planning and construction process:

- The Colfax Avenue Bridge is a 6 span structure that is approximately 700 feet in length. Since the site has limited staging areas and refuge zones, protection of the workers, flagging for equipment as it travels into and out of the work areas and protection of the bridge falsework from traffic will be a critical consideration in the preparation of a MHT.
- At over 1540 feet in length and with a height of over 65 feet above Indiana Street, the Indiana Street LRT Bridge will be an imposing structure. With a main span of 270 feet, the girders on this section of the bridge will be over 9 feet in height. Setting of the steel girders across 6th Avenue as well as the installation and protection of the falsework required for the cast in place spans at both ends of the bridge will pose impacts to traffic. It is expected that multiple nighttime closures of mainline 6th Avenue and the Indiana Street on/off ramps will be required.
- The signature bridge for the West Corridor will be the "basket-handle, tied arch" bridge that carries LRT traffic over 6th Avenue. This structure has a main span that is over 285 feet in length and the top of the arches will be over 80 feet above the roadway. Due to the amount of traffic that travels on 6th Avenue, this bridge will be assembled to the south of its

final location and “rolled” into place. Launching of the completed superstructure into place will require a least one weekend closure of 6th Avenue.

- The Kipling Street Bridge will be constructed as part of the “early work”, prior to the formal NTP for the entire project. This 120 foot long bridge will have a superstructure constructed of precast bulb-tee girders. Nighttime closures of Kipling will be required to erect the girders and to pour the deck.
- The Wadsworth Boulevard Bridge is another notable structure with a 160 foot long main span that crosses all lanes of Wadsworth Boulevard and supports the Wadsworth station. Nighttime closures will be required to erect the girders and lane closures will be required to pour the deck. Special efforts will be required to protect both the workers and traffic during the significant amount of work that will occur above Wadsworth Boulevard.
- The Sheridan Boulevard Bridge will be approximately 400 feet in length and will carry vehicular traffic above the future LRT alignment and Sheridan Boulevard Station. One lane of traffic will be maintained in each direction during construction of the bridge, except during girder erection and deck placement, when nighttime closures will be required. Once the first phase of the structure is completed, both lanes of traffic will be transferred onto the new structure and the second phase will be built adjacent to the first. Due to the significant grade differences between the current and proposed vertical alignments of Sheridan, a number of nighttime traffic closures will be required during construction.
- The Federal Boulevard Bridge is a three-span prestressed girder structure that will carry vehicular and pedestrian traffic over the LRT and the Lakewood/Dry Gulch bike paths. Due to the need to keep two lanes of traffic open in each direction as well as having to maintain the existing 24” high pressure water line, the fiber optic lines and the 8” gas line during construction, it will be necessary to construct this bridge in phases. The first phase of construction will be to the west of the existing structure and will require minor demolition on the west side of the existing bridge. A subsequent phase will include demolition of the old bridge and construction of the second phase of the new bridge. In addition to periodic closures of the bike paths, individual lane closures on Federal Boulevard will be required during construction. During girder erection, connection of the gas line and paving tie-ins for the detour paving, it will be necessary to have a full closure of Federal. Lane restrictions and closures will be sensitive to the Bronco’s game schedule and to other special events that occur along Federal such as Cinco de Mayo.
- Construction of the Decatur Street and Howard Place Bridges will require closure of these streets during construction of the new bridges.
- The South Platte River Bridge is a bowstring truss with a span length of over 225 feet. Although maintenance of traffic on the Platte River Bike Path during construction of the bridge will be an objective, it is apparent that periodic closures will be required.
- The final LRT or vehicular bridge on the West Corridor spans across the Consolidated Mainline Railroad tracks. This 770 foot long, 5 span steel structure climbs at a 6% grade to gain adequate clearance over the mainline railroad and it will be critical that our construction plan is sensitive to the challenges of working over and adjacent to approximately 30 train movements per day. Coordination with the railroads will be closely

maintained, railroad flaggers will be utilized during construction and all workers will be trained on the requirements of working in proximity to railroad traffic.

- Three pedestrian bridges will be constructed between Sheridan Boulevard and Federal Boulevard with a fourth over 6th Avenue at the Red Rocks Station. Access to and use of the nearby bike paths will be incorporated into the planning for these structures. The Red Rocks Pedestrian Bridge is a prefabricated steel truss type bridge that will be partially assembled offsite, then spliced together at the site and erected into place. The installation of the structure over 6th Avenue will require an overnight closure of 6th Avenue.

2. Tunnels

- Two LRT tunnels under existing roadways will be constructed on the West Corridor. The first of these is the I-70 Tunnel that carries a single track under the Interstate highway just to the north of, and parallel with, 6th Avenue. Traffic cannot be detoured around the site and with the exception of construction notification signs, I-70 traffic is not expected to be impacted during the construction of this tunnel.
- Construction of the Simms/Union Tunnel that will carry LRT traffic under Simms/Union will require the detouring of traffic throughout the construction zone as the structure is built in three phases using a top-down construction method.

C. WALLS

The need to construct the significant grade changes that occur on the LRT alignment within the confines of the corridor necessitate the construction of over 115 retaining walls. The walls vary in height from over 30 feet to as little as 3 feet and in length from only a few feet to as many as 2200 feet. Dependent upon the proximity of the walls to traffic, it is expected that traffic will have to be detoured out of the construction zone while many of these walls are constructed.

D. TRACK AND SYSTEMS

1. Track

Although track construction is one of the more straight-forward activities on the West Corridor project, there will be periods when track installation will require closures of the at-grade crossings.

2. Systems

The major work elements associated with the installation and testing of signals, traction power and communications systems include:

- a) Systems Infrastructure
- b) Systems Hardware
- c) Traction Power Substations (TPSS's)
- d) Overhead Catenary System (OCS)
- e) Integrated and pre revenue testing

Most of these elements can be constructed without impact to the traveling public. During the stringing of the wire for the Overhead Catenary System, however, it will be necessary to close cross streets within a localized area.

3. Roadway Grade Crossings

There are 22 at-grade crossings which are scattered throughout the project. Construction work at these locations will require street closures that, in some cases, will be accelerated with multiple shifts and night operations. In all cases, this operation will require full roadway closures.

3. APPROACH TO THE WORK – CORRIDOR SEGMENTATION

The magnitude and variety of work elements within the project, the potential for delays to individual work elements and the possibility that acquisition of property may affect the availability of some worksites, are all factors that suggest that a multiple-heading plan is needed to complete the project within the 42 month schedule to which DTTCG has committed. A six-segment plan has been developed to break the work into manageable work activities and work quantities that afford a high level of flexibility in the event an individual work sequence is impacted. These segments also represent geographic areas that are defined by the nature of the corridor and by the municipal jurisdiction through which they run. It is evident that the magnitude of the project, access to the corridor and local traffic requirements will necessitate the spacing of work headings across the project and not ‘bunching’ the work in one local area.

Essential to the commencement of work within any of the segments is the need to secure temporary construction easements sufficient to access and safely construct the corridor improvements. Large staging areas such as the property owned by Red Rocks Community College have been identified and noted herein. Other small temporary easements that may be required due to limited access to get to the work site or to provide safe work areas are being assessed in conjunction with RTD’s right of way acquisition plan. It is planned that an agreed-upon allowance for cost of securing these temporary easements will be negotiated as part of the Guaranteed Maximum Price.

The segments are as follows:

A. Segment 1 – 6th Avenue West (CDOT/Jeffco County Justice Center to Indiana)

Due to the length of potential open grade on the west end of the Corridor, the plan anticipates working on multiple “clearing sections” that necessarily precede the associated walls and grading. Structures-related work within this segment will begin with the Colfax Avenue Bridge. Since trackway grading cannot be completed until the I-70 tunnel is constructed, this structure also warrants action shortly after receipt of Notice to Proceed. The current tunnel design and construction process have generated significant input from stakeholders and future plans may change to incorporate these comments and the need for CDOT/FHWA approval.

Other than at the Jeffco Parking Garage, there is minimal pedestrian traffic in this segment of the project that will need to be accommodated. Construction fencing will be placed around the individual work areas as necessary for public safety in keeping with the project safety plan to minimize unwarranted access. Traffic Management Plans will be developed for typical closures as well as site-specific plans for the Johnson Road Crossing, Ulysses Street work, the Colfax Bridge site and the I-70 tunnel site. A corridor-wide Stormwater Management Plan and Manual will be developed for approval prior to commencement of the work and work will be managed in accordance with the plan. Other permits, including a Fugitive Dust Permit and Point Discharge Permit, as required, will be secured by DTTCG and copies will be available to the local jurisdiction. Other segment-specific considerations, including emergency access, access to private property and any work hour restrictions will be addressed in pre-work meetings and will

also be presented in weekly construction meetings, at which local jurisdictions will be encouraged to attend.

It is planned that a site office and small yard will be located in the vicinity of the Justice Center to provide space for the DTCG's segment engineer, its parking garage contractor and parking garage subcontractors. A second site is planned in the vicinity of the Colfax Avenue Bridge for the bridge contractor and his subcontractors. A third yard with enclosed storage will be required in the vicinity of the I-70 Tunnel. All three yard sites will be fenced for safety and security and aggregate surfacing will be placed in the yards to minimize tracking of mud. During off hours, equipment will be parked within the corridor or at the fenced yards. Trash receptacles will be provided at the yards and at the work sites for construction waste as well as other debris.

Work hours within this segment will be consistent with local regulations except for variances requested for special operations such as work on Johnson Road, work on Ulysses Street and the setting of girders over Colfax Avenue. Noise from construction operations will be limited to daytime work hours unless variances are required for site-specific operations. Due to the use of drilled shafts in lieu of steel piling for bridge foundations, damage or noise from vibration caused by construction operations should be limited.

Minor localized utility interruptions will be required during connections of new utility improvements or relocation of existing lines. The dates and times for these interruptions will be discussed at the weekly meetings and businesses and residences that may be affected by these disruptions will be notified in advance through the Public Information process.

B. Segment 2 – 6th Avenue East (Indiana to 6th Avenue)

Bridge structures within this segment are the Indiana Street Overpass and the 6th Avenue Bridge. The Indiana structure will carry the West Corridor diagonally from the northwest corner of the Indiana/6th Avenue intersection to the southeast corner. The entire structure is in excess of 1500 feet and includes a main span that is nearly 300 feet in length. The 6th Avenue Bridge carries LRT vehicles over 6th Avenue and the north 6th Avenue frontage road from the Denver Federal Center into the vicinity of the Lakewood Industrial Park. This segment also includes the Union/Simms underpass that allows LRT vehicles to travel under Simms/Union, just to the south of 6th Avenue. This tunnel will be constructed in three phases, utilizing a top-down, cut and cover tunneling method. Construction of these structures is necessary to provide for continuity of follow-on activities and for access throughout the segment so it is planned that work will commence shortly after receipt of the NTP.

There is no identifiable pedestrian traffic in this area that has to be accommodated but construction fencing will be placed around the individual work sites as required for public safety in keeping with project safety plan to minimize unwarranted access. Traffic Management Plans will be developed for typical closures as well as site-specific plans for the Indiana Bridge site, work areas along the south 6th Avenue Frontage Road, Arbutus Drive @ Red Rocks Community College at the Simms/Union Tunnel site and at the Federal Center.

Stormwater management will be implemented and managed in accordance with the Corridor-Wide Stormwater Management Plan and Manual. Local jurisdictions with MS4 permits will have the opportunity to review this plan and to ensure that it is in compliance with their requirements. Other permits, including a Fugitive Dust Permit and Point Discharge Permit, as required, will be

secured by DTCCG and copies will be available to the local jurisdiction. Other segment-specific considerations, including maintaining emergency access and work hour restrictions will be addressed in pre-work meetings and will be presented in weekly construction meetings. There is no private property in this segment of work to which access will have to be maintained.

It is planned that a site office and small yard will be required in the vicinity of the Indiana Bridge to provide space for the DTCCG's segment engineer, its bridge contractor and the bridge contractor's subcontractors. Additionally, it is planned that a rail storage and welding site will be required in the vicinity of Red Rocks Community College. Representatives of the College have been contacted to discuss this need and the yard will be constructed in accordance with their requirements. A third yard with storage trailers will be required in the vicinity of the Simms/Union Tunnel. All storage/yard sites will be fenced and aggregate surfacing will be placed in the yards to minimize tracking of mud. Trash receptacles will be provided at the yards and at the work sites for construction waste as well as other debris. Construction equipment will be parked within the limits of the corridor or at one of the segment yards during off hours.

Work hours within this segment will be consistent with local regulations except for variances requested for special operations such as work on the Indiana Bridge, which will require at least one weekend closure to set the steel girders, and at the Simms/Union Tunnel, where it will be necessary to construct traffic detours during nighttime hours. Noise and vibration from construction operations may be minimized through the use of drilled shafts on structures in lieu of steel piling.

Localized utility interruptions will be required during connections of new utility improvements or relocation of existing lines. The dates and times for these interruptions will be addressed at the weekly meetings and businesses and residences that may be affected by these disruptions will be notified in advance through the Public Information process. Work on the west end of the Simms/Union Tunnel is known to be affected by relocation of the irrigation line and any suspension of service must be coordinated with the irrigation company.

C. Segment 3 – Lakewood West (6th Avenue to Wadsworth)

Early completion of the Kipling Street Bridge, in advance of the Notice to Proceed, allows for wet utility relocation, grading and wall work in this area to commence shortly after the NTP. Work within this area is impacted by the tight right of way restrictions adjacent to elevated parking lots, industrial buildings and neighborhoods and routine communication with impacted property owners is critical. Following completion of the Pikeview Pedestrian Tunnel and the Richey Park box culvert, there are no additional structures that affect the critical path and it is expected that this will be one of the first areas where station construction, as well as the track and systems work, can proceed.

There is minimal pedestrian traffic in the portion of this segment from the south side of 6th Avenue to Oak Street but from Oak to Wadsworth there is a significant exposure to pedestrian and bicycle traffic that will need to be accommodated. Local schools will be notified of the work plan and construction operations will be sensitive to increased pedestrian traffic during the before and after school hours. Construction fencing and signage will be placed around individual work sites to minimize unwarranted access as necessary for public safety in keeping with project safety plan and a significant Public Information effort will be made to inform the public about construction operations. The site will be regularly patrolled to ensure that the

construction fencing remains in place during non-work hours and to discourage vandalism. Storage yards will be fenced as necessary for security with chain link fencing to discourage unwanted intrusion. During off hours, construction equipment will be massed within the corridor, where it is easier for security personnel to observe or it will be placed within a fenced yard.

Traffic Management Plans will be developed for typical closures as well as site-specific plans for the 6th Avenue Bridge, 8th Avenue, Collins Avenue, Quail Street, Oak Street, Kipling Bridge, Independence Street, Garrison Street, Estes Street, Carr Street and along 13th Avenue. Streets that are to be closed as part of the LRT construction will be signed and residents will be notified in advance of the closure. It is intended that no two adjacent streets that will have at-grade LRT crossings will be closed simultaneously and the plans and schedule for these closures will be presented at the regular corridor meetings. Emergency services will be notified of these plans and will be encouraged to attend pre-work meetings and weekly meetings. Businesses and personal residences whose access may be impacted will be notified at least five days in advance of the closure and an alternate access plan will be developed.

Stormwater management will be implemented and managed in accordance with the Corridor-Wide Stormwater Management Plan and Manual. The City of Lakewood's MS4 permit requirements will be incorporated into the Plan and copies of all inspection reports will be made available for the City's review. Major utility work within this segment, including the construction of the Richey Park Box Culvert will require significant attention from DTCG's stormwater team. The Richey Park CBC will also require that DTCG secure a Point Discharge Permit from the Colorado Department of Public Health and Environment and copies of this Permit and regular reports will also be made available. Other permits, including a Fugitive Dust Permit will be secured by DTCG and copies will be available to the City.

This section of the corridor will be much more sensitive to the presence of additional construction vehicles and worker vehicle parking. An offsite parking area will be provided for employees and construction equipment will be parked within the corridor right of way during off hours. Other segment-specific considerations including work hour restrictions, noise and vibration from construction equipment will be developed in accordance with the City's regulations and will be addressed in pre-work meetings and discussed in weekly construction meetings. Due to the proximity of the corridor to existing residences, preconstruction surveys will be conducted to document the existing condition of structures where future issues may be raised relative to alleged damage from construction related operations such as vibration.

It is planned that a major project office and construction staging yard will be located at the RTD-owned property at 13th and Quail. In addition to serving as one of the primary rail storage and welding sites, this location will provide space for equipment storage during off hours, and an office site for DTCG's segment engineer, its systems contractor and other subcontractors. Additional yard sites are also being considered in the vicinity of the Oak Street Parking Lot and at the Kipling Bridge for the bridge contractor and his subcontractors. All three sites will be fenced and aggregate surfacing will be placed in the yards to minimize tracking of mud. Trash receptacles will be provided at the yards and at the work sites for construction waste as well as other debris. Work hours within this segment will be consistent with local regulations except for variances requested for special operations such as setting the bridge over 6th Avenue, which will require a weekend closure and setting girders over Kipling Street, which will require a single nighttime closure.

Localized utility interruptions will be required during connections of new utility improvements or relocation of existing lines. The dates and times for these interruptions will be discussed at the weekly meetings and businesses and residences that may be affected by these disruptions will be notified in advance through the Public Information process.

D. Segment 4 – Lakewood East (Wadsworth to Sheridan)

The critical path within this segment is clearly the Wadsworth Bridge and Station, which span Wadsworth Boulevard. Work within this area is also impacted by limited access, the need to close down several street crossings, adjacent neighborhoods that abut the corridor and a substantial number of utility relocations. Concurrent with construction of the Wadsworth structure, which is planned to be started as soon as the right of way is secured, it is planned that wet utility relocations, retaining walls, and grading will proceed in this area.

There is a significant exposure to pedestrian traffic that will need to be accommodated throughout this entire segment. Local schools will be notified of the work plan and construction operations will be sensitive to increased pedestrian traffic during the before and after school hours. At the Wadsworth Boulevard Bridge, a covered walkway will be provided to minimize pedestrian exposure to overhead construction activities. Construction fencing and signage will be placed around the individual work elements as necessary for public safety in keeping with project safety plan to minimize unwarranted access. A significant Public Information effort will be made to inform pedestrians about construction operations. The worksites will be regularly patrolled to ensure that the fencing is maintained during non-work hours and to discourage vandalism. Storage yards will be fenced with chain link fencing. Construction equipment will be parked in storage yards or massed together within the corridor to minimize vandalism during off hours.

Traffic Management Plans will be developed for typical closures as well as site-specific plans for the Wadsworth Boulevard, Teller Street, Pierce Street, Lamar Street, Harlan Street and along 13th Avenue. Streets that are to be closed as part of the LRT construction will be signed and residents will be notified in advance of the closure. It is intended that no more than two adjacent streets that will have at-grade LRT crossings will be closed simultaneously and the plans and schedule for these closures will be discussed at the regular corridor meetings. Emergency services will be notified of these plans and will be encouraged to attend pre-work meetings and weekly meetings to be informed of the plans. Businesses or personal residences whose access may be impacted will be notified at least five days in advance of the closure and an alternate access plan will be developed.

Stormwater management will be implemented and managed in accordance with the Corridor-Wide Stormwater Management Plan and Manual. The City of Lakewood's MS4 permit requirements will be incorporated into the Plan and copies of all inspection reports will be made available for the City's review. Major utility work within this segment, including the replacement of the City's sanitary sewer line and the Consolidated Mutual Water Line will require significant attention from DTCG's stormwater team. Construction of the Wadsworth Boulevard Bridge will require a Point Discharge Permit from the CDPHE and copies of this Permit and regular reports will also be made available. Other permits, including a Fugitive Dust Permit will be secured by DTCG and copies will be available to the City. This section of the corridor will also be sensitive to the presence of additional construction and personal vehicles and an offsite parking area will

be provided for employees. Noise and vibration from construction operations will be minimized though the use of concrete caissons in lieu of driven steel piling. Due to the proximity of existing structures and residences, preconstruction surveys will be conducted to document the existing condition of structures where future issues may be raised relative to alleged damage from construction related operations such as vibration.

It is planned that a field office and construction staging yard will be located at the property RTD is acquiring at Wadsworth Boulevard, between 13th and 14th Avenue. This location will provide space for offices and storage for DTCG's segment engineer, its bridge contractor, station subcontractors and other corridor subcontractors. The yard site will be fenced and the existing asphalt surfacing or a crushed aggregate surfacing will be maintained in the yard to minimize tracking of mud. Trash receptacles will be provided at the yards and at the work sites for construction waste as well as other debris. Work hours within this segment will be consistent with local regulations except for variances requested for special operations such as setting the girders over Wadsworth Boulevard, which will require multiple nighttime closures.

Minor localized utility interruptions will be required during connections of new utility improvements or relocation of existing lines. The dates and times for these interruptions will be discussed at the weekly meetings and businesses and residences that may be affected by these disruptions will be notified in advance through the Public Information process.

E. Segment 5 – Denver West (Sheridan Station to Platte River)

Early completion of the East and West Gulch bridges and pedestrian bridges between Sheridan and Federal open up much of this corridor to grading and walls but the critical path will still continue to center on the structures within this segment. Though the Sheridan and Federal bridges span over the corridor, they will both have to be built in phases to accommodate the maintenance of traffic. Grading operations and construction of walls under and adjacent to the structures cannot proceed until the bridges are complete. Commencement of work on at least one of these bridges will be critical as Sheridan Boulevard and Federal Boulevard represent the two major north-south arterials in this part of Denver. The remaining bridges in this segment include Knox Court, Decatur Street and Lakewood Gulch. These bridges are much less complicated than the Sheridan and Federal structures and their completion is essential to allow construction of the adjacent street and Lakewood Gulch improvements to proceed in advance of the LRT grading.

There is a significant exposure to pedestrian and bicycle traffic that will need to be accommodated within this segment. In addition to the traffic along Sheridan Boulevard and Federal Boulevard there is significant foot and bike traffic on the walkways and the Frisbee Golf Course along the Gulch. There is currently a lot of pedestrian traffic that traverses the Gulch but it is hoped that early construction of the pedestrian bridges at Wolfe, Tennyson and Hazel Court will offer a means to get pedestrian and bike traffic across the corridor during construction of the LRT alignment. During construction the existing pathway may have to be closed for periods of time. Local schools will be notified of the work plan and construction operations will be sensitive to increased pedestrian traffic during the before and after school hours. Construction fencing and signage will be placed around individual work elements as necessary for public safety in keeping with project safety plan to minimize unwarranted access. A significant Public Information effort will be made to inform pedestrians, bicyclists and local residents about planned construction operations. The worksites will be regularly patrolled to

ensure that fencing remains intact during non-work hours and to discourage vandalism. Storage yards will be fenced with chain link fencing.

Traffic Management Plans will be developed for typical closures as well as site-specific plans for Sheridan Boulevard, Perry Street, Knox Court, Federal Boulevard and at the intersection of Howard Street and Decatur Street. Construction operations, particularly the closing of Federal Boulevard for bridge-related work, will be sensitive to sporting or special events at Invesco at Mile High Stadium as well as other holiday traffic such as Cinco de Mayo that utilize this roadway. It is intended that Knox Court and Perry Street will not have to be closed simultaneously, but the plans and schedule for individual closures will be discussed at the regular corridor meetings. Emergency services will be notified of these plans and will be encouraged to attend pre-work meetings and weekly meetings to discuss the plans. Businesses along Federal Boulevard and personal residences at Knox or Perry whose access may be temporarily impacted will be notified at least ten days in advance of the closure and an alternate access plan will be developed.

Stormwater management will be implemented and managed in accordance with the Corridor-Wide Stormwater Management Plan and Manual. The City and County of Denver's MS4 permit requirements will be incorporated into the Plan and copies of all inspection reports will be made available for the City's review. Major utility work within this segment is focused primarily on the replacement of the Federal Boulevard Bridge where the service from the existing high pressure water conduit and an 8" gas line can only be shut down for very limited periods. Other significant utility construction includes the 30" waterline at Sheridan Boulevard and a lot of storm sewer and channel grading work along Lakewood Dry Gulch. Construction of the Sheridan Boulevard Bridge, East and West Dry Gulch Bridges, Wolfe Street Pedestrian Bridge, Tennyson Pedestrian Bridge, Hazel Court Pedestrian Bridge, Federal Boulevard Bridge, Decatur Street Bridge and Howard Place Bridge will all require Point Discharge Permit from the CDPHE and copies of this Permit and regular reports will also be made available. Required permits, including a Fugitive Dust Permit will be secured by DTCG and copies will be available at the Corridor Project Office.

This section of the corridor is primarily through City Open Space and Parkland so there is limited access for the parking of additional construction vehicles. An offsite parking area will be provided for employees to ensure that they don't park in local neighborhoods. Other segment-specific considerations, including work hour restrictions and noise or vibration from construction equipment, will be developed in accordance with the City's regulations and will be addressed in pre-work meetings and discussed in weekly construction meetings.

It is planned that a field office and construction staging yard will be located at the property RTD is acquiring along Sheridan Boulevard and smaller yards and staging areas will be required in the vicinity of the Federal Boulevard Bridge/Decatur Station and on the west end of the Platte River Bridge. These locations will provide space for offices and storage for DTCG's segment engineer, its bridge contractor, station subcontractors and other corridor subcontractors. The yard sites will be fenced and the existing asphalt surfacing or a crushed aggregate surfacing will be maintained in the yards to minimize tracking of mud. During off hours, construction equipment will be parked in the construction yards or massed together to allow security personnel the ability for better observation. Trash receptacles will be provided at the yards and at the work sites for construction waste as well as other debris. Work hours within this segment

will be consistent with local regulations except for variances requested for special operations such as setting the girders and making traffic or utility connections on the Sheridan Boulevard and Federal Boulevard Structures, which will require multiple nighttime closures.

In addition to the service interruptions required to tie in the water lines at Sheridan and Federal as well as the gas line at Federal Boulevard, minor localized utility interruptions will be required during connections of new utility improvements and relocation of existing lines. The dates and times for these interruptions will be discussed at the weekly meetings and businesses and residences that may be affected by these disruptions will be notified in advance through the Public Information process.

F. Segment 6 – Denver East (Platte River to CML)

This segment is thought to be one of the most congested in terms of ongoing freight railroad operations, existing light rail operations, construction activity, utility relocations/improvements and removal or relocation of other existing surface improvements. The schedule within this segment is also driven by major bridge structures, including the bowstring truss that spans the Platte River and a 750 foot long steel plate girder bridge that crosses the Consolidated Mainline railroad tracks. Once these structures are complete, grading will proceed along the ongrade sections in this heavy industrial area. The final tie-in to the existing line at the Auraria West Station will mark a critical milestone in the connection between the West Corridor and the existing RTD light rail system.

There is comparatively less exposure to pedestrian and bicycle traffic that will need to be accommodated within this segment. Officials at the Auraria Higher Education Campus will be notified of the work plan and construction operations. Construction fencing and signage will be placed around the individual work areas as necessary for public safety in keeping with project safety plan to minimize unwarranted access. Public Information efforts will focus on getting information to the local businesses, AHEC, and other local stakeholders about upcoming construction operations. The worksites will be regularly patrolled to ensure that the fencing is maintained during non-work hours and to discourage vandalism. Storage yards will be fenced with chain link fencing. Construction equipment will be parked within the fenced yards or massed together during non-work hours to minimize vandalism.

Traffic Management Plans will be developed for typical closures as well as site-specific plans for Zuni Street, Old Colfax Avenue, Curtis Street, Myrtle Place and Rio Court. Within this segment of the project, Old Colfax Avenue is the only street that will have to be closed as part of the LRT construction and both the City and County of Denver Emergency Services and AHEC security will be kept informed of the plans for this work and will be encouraged to attend pre-work meetings and weekly meetings to discuss the plans. Businesses along Zuni Street, Colfax Avenue and Myrtle Place, whose access may be temporarily affected, will be notified at least ten days in advance of the closure and an alternate access plan will be developed.

Stormwater management will be implemented and managed in accordance with the Corridor-Wide Stormwater Management Plan and Manual. The City and County of Denver's MS4 permit requirements will be incorporated into the Plan and copies of all inspection reports will be made available for the City's review. Major utility work within this segment is primarily associated with the "dry utility" relocations and it is planned that the majority of this work will be complete prior to receipt of the NTP. Construction of the Platte River Bridge and CML Bridge will both require

Point Discharge Permit from the CDPHE and copies of this Permit and regular reports will also be made available. Other permits, including a Fugitive Dust Permit will be secured by DTCCG and copies will be available to the City.

This section of the corridor is primarily through industrial areas or in the vicinity of AHEC campus so there is limited access for the parking of additional construction vehicles. An offsite parking area will be provided for employees. Other segment-specific considerations including work hour restrictions, noise and vibration from construction equipment will be developed in accordance with the City's regulations and will be addressed in pre-work meetings and discussed in weekly construction meetings. The use of drilled caissons in lieu of driven piling will help to minimize risk from noise or vibration. Due to the proximity of the corridor to existing structures, preconstruction surveys will be conducted to document the existing condition of structures where future issues may be raised relative to alleged damage from construction related operations, such as vibration.

It is planned that a field office and construction staging yard will be located on property that RTD is acquiring in the vicinity of the Colfax Bridge and at the east end of the Platte River Bridge. These locations will provide space for offices and storage for DTCCG's segment engineer, its bridge contractor and other corridor subcontractors. The yard sites will be fenced and the existing asphalt surfacing or a crushed aggregate surfacing will be maintained in the yards to minimize tracking of mud. Trash receptacles will be provided at the yards and at the work sites for construction waste as well as other debris. Work hours within this segment will be consistent with local regulations except for variances requested for special operations such as setting the girders on the CML Bridge and making traffic or utility connections on other roadways.

Minor localized utility interruptions will be required during connections of new utility improvements and relocation of existing lines. The dates and times for these interruptions will be discussed at the weekly meetings and businesses and residences that may be affected by these disruptions will be notified in advance through the Public Information process.

4. PROJECT PHASING

The 6 Project segments have been broken down into 11 Clearing Sections in order to provide more manageable work zones. Within these clearing sections the work activities will group into four phases, as follows:

PHASE 1 - (PROVIDES CORRIDOR ACCESS)

Construction in this phase will be comprised of implementing traffic management, installing erosion controls, laydown yard development, construction site preparation, stripping, clearing and grubbing, demolition and removals, mass excavation and embankment, retaining wall construction, bridges and tunnels.

Major Activity	Work Description and Notables
Clearing, grubbing & removals	Clear existing vegetation, structures and other obstructions from within the corridor

Implement MOT	Prior to any work that will impact traffic; provisions of the approved Maintenance of Traffic Plan must be implemented
Stormwater Management	Before any subsurface disturbance to existing trackway, the provisions of the approved Stormwater Management Plan will be in place
Strip and Stockpile Topsoil	Layout work area perimeters and strip topsoil to provide complete access to work and a base for embankment.
Minor Wet Utility Crossings	Construct wet utilities that crosses the trackway
Mass Excavation	Construct excavations and embankments. Rough-in entire work zone footprint
Lakewood/Dry Gulch Improvements	Construct and reroute canal as designed and in support of bridge and wall construction
Major Wall Construction	Wall construction may be concurrent with embankment construction (MSE walls) or stand alone (CIP walls)
Bridge Construction	Provides access to entire corridor and other major elements of work
Station Grade Beams	Construction of the track edge footing/grade beam provides a control line for track/station interface
Street Closures	Notify residents, install signage for street closures, construct improvements
Construct Laydown Sites	Storage areas, field office sites, employee parking, field fabrication locations and rail welding sites will be graded, fenced and stabilized prior to their use

PHASE 2 - (PROVIDES GUIDEWAY INFRASTRUCTURE)

The guideway will really begin to take shape in this phase with significant improvements to the proposed track infrastructure, road closures for the purpose of civil roadway improvements, and the beginning of the systems related work.

<u>Major Activity</u>	<u>Work Description and Notables</u>
Guideway Construction	
Combined System Ductbank	Prior to placement of the sub ballast, mainline ductbanks, vaults, laterals and pull boxes will be installed
Finegrade and Place Sub ballast	Proof roll subgrade, remove unacceptable soils, finegrade embankment and install sub ballast
Minor Dry Utility Crossings	Stub-ups into stations, minor signal crossings and any other conduits that are not part of the combined systems ductbanks
Ballast Walls	Construct cast-in-place ballast walls per design
Perforated Edge Drains	Construct ballasted track edge drains and structures
OCS Foundation	Drill and install foundations, connect feeder poles to duct bank laterals (protect anchor bolts)
(Overhead Contact System	
Grade-Plane Accuracy	Finegrade sub ballast, test compaction and test

for grade-plane accuracy

Non-guideway Construction
 Roadway Closures #1 - Civil

Construct all concrete flatwork items, grade for roadway improvements and pave

PHASE 3 - (HEAVY TRACK AND SYSTEMS)

Construction in this phase will focus on track construction and major systems components.

<u>Major Activity</u>	<u>Work Description and Notables</u>
<u>Track Construction</u>	
Direct Fixation Plinths	Form, pour and strip concrete plinths on DF bridges
Pull Rail Strings	Where possible, pull rail strings along the track corridor and store them off the edge of track bed
Ballast	Place bottom lift of ballast in preparation for track construction. Rough shape the shoulders as needed.
Distribute OTM (Other track Materials)	Place ties onto the initial ballast, distribute clips, bolts and any other tracked-related hardware.
Thread Rail Strings	Move rail strings onto the properly spaced ties and clip rail to the ties
Build CWR (Continuous Welded Rail)	Field weld rail strings into CWR of conforming length and allow for controlled expansion toward closures
Top Ballast	Place top ballast
Destress Track, Make Closure	Heat track to specified temperature, vibrate, clip and anchor. Work toward closure welds and install insulated joints.
Ballast Finishes	Shape shoulders
OCS poles and Gear	Install Poles and overhead contact wire hanging gear
OCS Gear, Systems & Wire	Install OCS wire supports, arms, messenger wire and contact wire runs
Track Circuitry	Stub up all required track connections

Non-track Construction

TPSS, Sig. Houses & Boxes	Install traction power substations, systems-related buildings, bungalows and features. Connect to wire runs and provide power.
Pull Wire	Pull wire through combined systems ductbank and make necessary project-wide connections

PHASE 4 - (FINISHES)

Construction in the final phase will primarily address the remaining items of work necessary to complete the project. These include irrigation, landscaping, road crossings and panels, bike paths, station finishes, final paving, signage, acceptance testing, integrated and pre-revenue testing.

<u>Major Activity</u>	<u>Work Description and Notables</u>
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Roadway Closures #2 Track Bike Paths	Install track crossings and panels Construct bike paths after heavy site traffic has been completed within an area
Install OCS, Systems & Wires	Finish all OCS contact wire runs. Make final terminations
Irrigation and Landscaping Striping and Signage	Install all mainline irrigation and plantings Install all required civil roadway surface improvements and signage as per plan.
Testing	Test for LRT including pre-revenue, static and dynamic in accordance with RTD/FTA specifications and guidelines
Station Finishes	Complete the stations and install passenger accessories

The phases do not necessarily indicate an actual same-day start for all segments but rather a general period when work can commence within a portion of the segment. Several specific issues have become evident in the preliminary schedule including the need to have utility work substantially complete within a clearing segment prior to commencing construction, the need to have right of way acquired prior to commencement of the work and the importance of consensus construction documents. On any project of similar size and complexity, it is expected that unexpected conditions will be encountered that could not have been known or reasonably anticipated during design and the team will be challenged to resolve these problems in a constructive and cost-effective manner. Delays that occur after the Notice to Proceed due to issues that were known but not agreed upon during the design phase have the potential to cause discord and delays to the project. There are numerous other issues that will continue to be refined as the schedule development proceeds such as: seasonal work requirements, local and regional traffic considerations, noise ordinances and final permits that will require adjustment to the schedules. Meetings continue to be held between the RTD and DTCG to identify these potential impacts and to determine a way to mitigate their cost and schedule impact.

Sequence of Structures-Related Work

RTD has recognized the benefit to advance the construction or procurement of certain elements of the project into an early work phase that will precede the primary Notice to Proceed. Due to the volatility of commodity pricing, four items have been identified to mitigate the risk of inflation between the current date and the date when materials would otherwise be ordered. These include steel rail and rail ties. RTD has solicited bids for this work and will procure the materials separately from the CM/GC contract. The two other major commodities include copper-based wire and steel for five of the bridge superstructures. DTCG will secure these materials through a Change Order to the Pre-construction Contract.

To minimize traffic and pedestrian disruption once the NTP has been issued, RTD and DTCG have identified 6 bridges that can be constructed as part of an early work schedule. A Letter of No Prejudice (LONP) has been negotiated with the FTA and RTD's Board has approved a Change Order to DTCG's contract for this early work. Consistent with this directive, and with the understanding that the construction of bridges, tunnels and the parking garage will be the primary schedule driver, it is planned that the West Corridor bridges and structures will be constructed in the following manner:

Early Work

- ◆ Kipling Street
- ◆ Dry Gulch East and Dry Gulch West
- ◆ Dry Gulch Pedestrian Bridges

After NTP

Phase 1 (concurrent construction on multiple bridges/tunnels)

- Indiana Street
- 6th Avenue
- Colfax Boulevard
- Sheridan Boulevard
- Platte River
- Consolidated Mainline Railroad
- Interstate 70 Tunnel
- Jefferson County Justice Center Parking Garage

Phase 2 (concurrent construction of bridges, but potential for delay due to ROW, utility conflicts or other predecessor work)

- Wadsworth Boulevard
- Knox Court
- Federal Boulevard
- Decatur Street
- East of Howard Place
- Union Boulevard/Simms Tunnel

These work locations are critical to the planning of the project. Flexibility is limited due to factors such as: utility relocations, right of way acquisition, phasing requirements, seasonal no-work periods, no-work periods during special events, work hour restrictions and linking of work among adjacent segments with successor activities. Additionally, as the third-party (municipal, state and federal) requirements, unforeseen utility or environmental issues, environmental clearances on acquired property and methods of handling traffic (MHT's) are determined, the sequence of these activities may have to be modified.

Both of the proposed tunnels are flanked by bridges and the estimated schedule duration for their construction is less than the adjacent structures in that segment. Unless the start of this work is delayed by unforeseen causes, they will not be on the project's critical path. The plan is to begin construction of the I-70 Tunnel first followed by commencement of work on the Simms/Union Underpass as soon as the alignment is cleared through the Cold Springs Park-n-Ride.

The construction of walls, earthwork, duct banks, track and systems will follow completion of the structures as work areas become available for access. Due to the planned completion of the Kipling Bridge and the Gulch Bridges as early work, two significant areas are made available upon receipt of the NTP. The section of the corridor from the Denver Federal Center east to Wadsworth corridor becomes available more quickly due to the completion of the Kipling Structure. The Sheridan Boulevard to Federal Boulevard segment also benefits from early completion of the Gulch LRT and Pedestrian Bridges.

5. CONSTRUCTION STAGING, WORK ASSEMBLY & FIELD OFFICES

It is expected that the structures-related work will initially dictate the sequence of work by segment as well as the critical path of the schedule. The probable areas necessary for lay down, material storage and office/assemblage areas will coincide with structures laydown locations and, in most locations, require that the structures be complete in preparation for walls, stations, track, systems and other follow-on work. The areas required or those that need additional discussion are included on **Attachment 2 – Work Site Areas**. The priority listing of staging areas required by segment/location, the priority within each segment and the size of the areas are as follows:

1a) Overall – Quail St. RTD Site – Large system wide property for rail welding, parking, main yard and assembly point.

Early Work

- 3a)** Kipling Street Bridge – medium in ROW and on RTD property @ NE corner
- 5a)** Dry Gulch Bridges (2) small in ROW
- 5b)** Denver Open Space & Park Pedestrian Bridges (3) small in ROW

After NTP

- 1a)** Colfax Avenue – medium in ROW
- 1b)** I-70 Tunnel – medium in ROW
- 2a)** Indiana Street bridge – medium in 6th Avenue ROW (gores) and private land
- 2b)** Union Boulevard-Simms Street Tunnel – medium @ Cold Springs Lot and on west end of tunnel
- 2c)** Red Rocks Community College – large on private land
- 3a)** 6th Avenue Bridge – large on Federal Center and small along 6th Ave. ROW
- 4a)** Wadsworth – large in ROW and on land acquired by RTD @ NE corner of bridge
- 4b)** Knox Court – small along ROW
- 5a)** Sheridan Boulevard – large in RTD property adjacent to west side of structure
- 5b)** Federal Boulevard Bridge – medium @ station location
- 5c)** Decatur Street Bridge – small in ROW and on street
- 5d)** East of Howard Place Bridge – small in ROW & street
- 6a)** Platte River – medium in ROW & @ Xcel yard
- 6b)** CML – small in ROW

The areas are defined by acreage: large (greater than 5 acres), medium (2-5 acres), and small (less than 2 acres). The sizes are subject to be modified by location and timing. For example should a work site area be only used for one function such as a bridge, it will be smaller then needed to combine, bridge/walls/track and systems. It should be noted that these are probable locations as of the current stage of project planning. As the site is surveyed and right of way limits are better defined, it is possible that the need, the location and the size may be revised.

Work Site Areas

See attached aerial photos with “laydown areas” noted: