

**Schedule 26**

**Concessionaire's Snow and Ice Control Services Proposals**

It is acknowledged by both Parties that notwithstanding that various provisions of the Concessionaire's Snow and Ice Control Services Proposals state that a Sub-Contractor of the Concessionaire will have certain responsibilities or will perform certain actions, for the purpose of the Concession Agreement and as between HPTE and the Concessionaire, all actions and responsibilities set out herein as actions and responsibilities of any Sub-Contractor to the Concessionaire are deemed to be actions and responsibilities of the Concessionaire.



### 4.3.A - Snow and Ice Control Services (in compliance with Schedule 25)

Plenary Roads Denver (PRD) and its Maintenance Subcontractor, Transfield Services, recognize that snow and ice control on Colorado's highways is imperative for the safety of all highway users. Effective and efficient winter operations provides access for emergency vehicles and maintains the commercial and business needs of the communities served by these highways. This snow and ice control plan incorporates our methods to provide these services on the I-25 Managed Lanes and the US 36 Phase 1 and Phase 2 Managed Lanes and General Purpose Lanes. This plan is based on incorporating the most efficient methods and technologies with least environmental impact.

#### i. Purpose

The goal of Transfield Services' snow and ice control operations is to provide for the safe movement of traffic on the project routes during periods of frozen precipitation. This will be achieved by applying anti-icing chemicals, de-icing materials and traction control material and providing the necessary spreading/plowing/removal operations throughout a snow/ice event to maintain safe traffic mobility without delay.

Transfield Services will make a constant, continued, and diligent effort to treat and remove any snow or frozen precipitation from the highway during the winter weather event. We will not obstruct other routes, connectors, gore areas, ramp access/egress or emergency crossovers as a result of our snow removal operations. The roads will be maintained in a manner so that all travel lanes will be kept free and clear of snow and ice so that traffic can proceed in a safe and orderly manner throughout the inclement weather occurrence.

#### ii. Introduction

Effective operations depend upon (a) detailed planning, (b) execution of the plan commencing as soon as a winter event is forecast, (c) immediate and widespread implementation of snow and ice control response procedures throughout the event, (d) the deployment of sufficient numbers of specialized snow/ice control equipment to meet the performance standards, And (e) optimal use of anti-icing, de-icing and traction control materials in order to meet the required service levels.

#### iii. Management and Administration

Transfield Services readiness responsibilities include checking and testing all equipment prior to the winter season and

upon the end of each winter event in preparation for the next forecasted event. Equipment readiness shall include trucks with plow/spreaders, motor graders, front end loaders, backhoes, and liquid anti-icing application trucks. This verification will provide the assurance that Transfield Services is prepared to meet the needs of the traveling public without delay. Transfield Services and its subcontractor forces will be prepared for the winter storm season by having conducted pre-season training in the classroom and the field and by maintaining adequate readiness levels of equipment and parts inventories. Trucks equipped with spreaders will be calibrated to ensure proper application rates of chemical or abrasives.

Using the 70th Street Maintenance yard and our US-36 Maintenance Yard, Transfield Services will stockpile and maintain sufficient salt, liquid brine and abrasives to respond to snow/ice events. These yards will be replenished as needed to maintain a minimum amount sufficient for at least two back-to-back winter events.

Transfield Services will provide the number of shift supervisors necessary to comply with technical requirements. The supervisors will have their drivers sign in, ensure the necessary equipment is available, have a clear understanding of their assigned routes, and see the operations are performed in accordance to the contract standards. The shift supervisor will patrol the assigned highways and be responsible for reporting the road conditions to the Operations Center. The shift supervisor will have full capability/means to communicate consistently, and will not serve as an operator while assigned duties as a supervisor. The Operations Center will be advised by Transfield Services' supervisor should a truck or other piece of equipment go out of service, so that a spare can be mobilized which Transfield will have as a percentage of the snow and ice control fleet.

#### iv. Safety Approach and Compliance with Safety Plan (per Schedule 6)

Transfield Services' approach is Safety First. This not only describes attitude but also describes our culture and the emphasis we apply to our safety systems. Safety for any operation commences with planning the operation, before any labor or equipment or materials are deployed into operational status. The Safety Plan and the Snow and Ice control Operations plan will be designed in the same manner, as follows:



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### Safety Planning and Operation: Snow and Ice Control

- Determine and annotate all activities within the scope of the operation.
- Perform a risks and hazards condition analysis, pertaining to all activities.
  - Risks to personnel (in-house, contracted, HPTE, or CDOT)
  - Risks to the environment
  - Risks to roadway users (traveling public)
  - Risks related to equipment
  - Risks related to materials
  - Risks to CDOT assets or facilities
  - Risks to adjacent property owners
- Identify all risk areas to be protected per OSHA, National Electric Safety Code, Americans with Disabilities Act, equipment manufacturer recommendations, Material Safety Data Sheets, and any other Federal and State requirements.
- Determine methods and procedures to mitigate each and every identified risk or hazard.
- Workers properly trained in the use of equipment, handling of materials and proper procedures are safer workers. Develop a training program that incorporates these fundamentals. This training program will cover both initial training and recurring training for all workers. We will invite HPTE and CDOT to attend these programs.
- Transfield Services has a corporate safety program that includes MANDATORY Safety Rules and our START card program. The START card program requires all workers to plan their work, recognize any hazards, and create a Job Hazard analysis before starting any work activity. These will be incorporated into the training and all operations plans.
- Prepare operational procedures and policies to conduct the activity in conformance with the above risk mitigating methods.

Figure i: Safety Rules



- Develop a written Snow and Ice Control Plan that incorporates all of the above. Train and distribute to all workers, Managers and the HPTE.
- We will then monitor all workers for compliance with all safety protocols. Non-compliance by a worker will require retraining or may result in dismissal.

### v. Quality Approach and Compliance with Quality Plan (per Schedule 6)

(Please note: our Quality Management Plan is more thoroughly expressed in the Technical Proposal. Described below is the Quality Approach as it relates specifically to Snow and Ice Operations.)

Our Quality Assurance (QA) Manager will have overall responsibility for all components of the Quality Assurance/Quality Control process. He will be responsible for the composition, analysis, and reporting of quality control data collected by the QA/QC Inspector. This process will address both timeliness and quality issues associated with deliverables. The QA Manager will, based on documented results in the review and analysis of QC data collection results and reporting processes, determine when corrective actions in either the structure or administration of the Quality Control plan or its components are required. QC results and findings will be communicated to all management and supervisory project staff and when appropriate, include recommendations for consideration relative to operational issues. As and when changes occur, prior to implementation, they will be communicated directly to PRD's Operations Manager and applicable HPTE/CDOT staff for comment.

The Transfield Services Quality Management Plan sets the management of this Snow and Ice Control Plan. All operations will follow strict procedures and protocols. Our shift supervisors will perform Quality Control checks of each operator's performance, the equipment status, operational effectiveness and resulting highway conditions. Our QA Manager and QC staff will perform Quality Assurance testing of the entire operation using a combination of field visits, roadway cameras, documentation reviews, public comments and analysis of driver reports.

Operational reporting will be made by the drivers and then verified for accuracy by the shift supervisors, prior to entering into the MMIS system.

The system is designed to be self-monitoring as each driver completes the designated routes during a work shift. Shift supervisors or Management staff may issue non-compliance

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notices to operators that violate the prescribed procedures or protocols. If a non-compliance notice results from an inconsistency in a procedure, a non-conformance report will be issued. This non-conformance triggers an immediate review of the operation and resolution by correcting the specific procedure and re-issuing a revised procedure to all project staff.

#### vi. Compliance with Concession Agreement

Transfield Services agrees to comply with the Concession Agreement including; assume access to the 70th Avenue Maintenance facility all in accordance with contract terms, return this Maintenance Facility in the same or better condition than received, accept payments for snow and ice control services per Schedule 15, provide all services and meet all performance requirements per Schedule 25, and to provide a snow and ice control plan and have same accepted at least 30 days prior to commencement of snow and ice control services or by August 1st of the initial year, whichever is sooner.

#### vii. Facilities That Will Be Used For Staging Including Locations

The CDOT 70th Avenue Maintenance Yard will be utilized for both I-25 and US-36 snow and ice control operations.

Transfield Services will lease property and construct a maintenance yard for US 36 routine maintenance, asset life cycle maintenance, and snow and ice control operations. This yard will be equipped with administrative and staff office space, garage space, laydown space for material storage, bulk salt storage, and liquid de-icing chemical and abrasive storage. We are currently looking at properties in the vicinity of the Phase 1 project nearby to an interchange for fast and easy access to the highway.

#### viii. Monitoring and Oversight Approach

All snow and ice control operations must and will be monitored to ensure compliance with the contract performance requirements and the approved snow and ice control plan. This will be accomplished through management and supervisory oversight. The tasks that will be monitored include:

- Chemical and abrasives; ordering, delivery, storage and handling
- Facility maintenance; garages, chemical, abrasives, brine storage, other maintenance buildings and laydown yard.
- Equipment maintenance; needs lists

#### ix. Weather Forecasting Systems, Processes and Procedures

Transfield Services will monitor weather forecasts current conditions from private weather forecasting services such as Meteorlogix, FleetWeather, Inc., or Scan-Cast, plus Internet services, any RWIS stations and local media during the winter months. We will provide supervisors and subcontractors with information about approaching winter weather conditions as soon as they are forecasted. We will require all drivers to conduct safety checks for lights, strobes, beacons, signage, and other equipment, prior to every work shift. During preparation for mobilization, liquid chemical trucks, pumps, and spray nozzles will be given a final check and all mechanical systems will be readied for use. Transfield Services will meet or exceed the contract requirements for anti-icing treatment of the roadways, bridges, and ramps prior to the anticipated event. Upon the order to proceed with anti-icing operations, each operator will follow planned routes. Follow vehicles will warn traffic of the wet surface ahead. The follow vehicles are in radio contact with the anti-icing spray vehicle to notify them of any malfunctions or gaps in the spray pattern. Vehicles are in phone and radio contact with the Transfield Services operations center.

#### x. Equipment, Number, Size and Type

##### Equipment types and size:

- A. Combination plow/spreader truck: 430 hp turbo diesel, 12' to 16' extending plow, right hand wing plow, salt/sand spreader with on-board saddle tanks for prewetting, computer controller for spreader, programmable for calibrations and different spread rates based on conditions.
  - Spreader types
    - Spreaders may be stainless U-body with dump capability, or
    - Spreaders may be stainless V body style.
  - Plow types
    - 12' to 16' extendable, used for lead truck plowing next to the median barrier
    - 12' reversing plows for mainline plowing
    - 12' one way plows for right shoulder plowing
    - Right hand wing plows for US 36
    - Right hand or left hand wing plows (quick attach/detach) for US 25, depending on directional flow of traffic.
    - 12' power reversing plows for ramps



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    - Right hand or left hand wing plows (quick attach/detach) for US 25, depending on directional flow of traffic.
    - 12' power reversing plows for ramps

- B. Plow only truck: 350 hp turbo diesel, 12' power reversing plow, right hand wing plow
- C. Tanker truck with 1,000 gallon tank, pump and spray attachment for direct liquid application (DLA)
- D. Tanker trailer: tandem axle trailer with 250 or 500 gallon tank, pump and spray attachment for DLA
- E. Motor Grader: 12' with one way plow and wing plow
- F. Wheel Loader: John Deere 524 or equivalent, 140 hp with 2.75 cy bucket
- G. Snow Loader with conveyor

Transfield Services will utilize and update equipment maintenance logs for all repairs, tests, calibrations, and refitting of wear parts. Trucks, spreaders, and plows will all be paired to assure proper system coordination. Equipment superintendents will verify this and all systems operations prior to each severe weather event. This information will be recorded on the equipment maintenance log. Upon completion of each severe weather event, the equipment will be checked and tested again. Repairs needed will be entered into the equipment log and repairs scheduled immediately to be ready for the next severe weather event.

Transfield Services will utilize a combination of in-house crews and subcontractors for the operation of various snow control equipment. This includes plow trucks with rear mounted tanks for anti-icing or de-icing operations, plow/spreader combination trucks for snow and ice control operations, front end loaders, graders, backhoes, haul trucks, TMAs, tankers, and snowblowers dedicated to anti-icing and de-icing operations. The combination trucks will be equipped with twelve (12) cy spreaders and will have twelve (12) foot to sixteen (16) foot wide plows mounted to fulfill our obligations and meet the technical requirements. These trucks will be available to be assembled as requested for a plow train(s) at a specified time and location. In addition, spare equipment will be scheduled to be available should an equipment failure arise during snow and ice or anti-icing operations.

## xi. Materials and Chemicals

Transfield Services' primary de-icing chemical will be salt, sodium chloride (NaCl). We will utilize pre-wetting with sodium chloride (NaCl) brine or calcium chloride (CaCl) brine or magnesium chloride (MgCl) brine or a mixture of these brines, based on temperatures expected. Anti-icing or de-icing direct liquid application will use the same brines or combination, depending on the temperature.

Sand and /or grit may be used as a traction aid either alone or mixed with salt.

### Use of technology to reduce chemical use:

The use of de-icing chemicals helps to provide a safe highway for users. However, overuse of these chemicals can have harmful effects on our environment, our infrastructure and possibly our health. Therefore, we will endeavor to provide the safety required on these highways while using the least amount of chemicals needed. Our modern technology can help in this manner:

- Use of Automatic Vehicle Location (AVL). This will enable us track all spreader trucks and verify that patrol routes have been followed correctly and not duplicated. This will also verify that the correct lanes have had chemical placed, also to avoid duplication. We want to use the minimum amount of chemical to achieve the proper results without overuse or misuse of chemical.
- Use of electronic spreader controllers to precisely meter the amount of chemical placed. All spreaders and controllers will be calibrated for use with these controllers.
- Infra-red pavement temperature devices mounted on each truck. This will allow the driver/operator to vary the chemical spread rate based on actual surface conditions. Certain controllers have this function built in and automatically control the spread rate.
- Speed sensors on each spreader truck will be connected to the electronic controller to control the spread rate. In addition, the controller will stop spreading when the truck stops. This eliminates the typical pile of salt that gets left at each intersection or stop bar.
- Use of liquid brines for anti-icing or de-icing or pre-wetting. We plan to mix our own salt brine and then enhance the lower temperature limit with the addition of CaCl or MgCl brine. This will provide better low temperature performance, reduce the overall amount of salt applied to the road and provide faster melting when used directly on the road or used to pre-wet salt as it is applied to the roadway.

## xii. Snow Routes

- A. Patrol #1, I-25, Managed Lanes, Northbound Flow, two trucks equipped with front plows and right hand wing plows, will enter the managed lanes from I-25 NB, south of 20th Street. All trucks will plow/spread while travelling northbound to the flyover ramp onto US 36 westbound. The trucks will operate in echelon formation pushing



- B. Plow only truck: 350 hp turbo diesel, 12' power reversing plow, right hand wing plow
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right onto the wide east side shoulder. All trucks will raise plows and cease spreading and then exit US 36 at Pecos Street, where they will u-turn and follow US 36 eastbound to I-25 southbound general purpose lanes. The trucks will exit at N. Speer Blvd where they will u-turn and commence their patrol again. Alternating cycles will enter from the 20th Ave ramps. Response time from departure loading point to treatment completion and return to loading point is 1.0 hour.

- B. Patrol #1, I-25, Managed Lanes, Southbound Flow, two trucks equipped with front plows and left hand wing plows, will enter the managed lanes from US 36 eastbound at Pecos Street. All trucks will plow/spread while travelling I-25 managed lanes southbound. The trucks will operate in echelon formation pushing left onto the wide east side shoulder. The trucks will continue south to end of the managed lanes where they merge with the I-25 General Purpose lanes. Alternating cycles will exit I-25 at the 20th Street off ramps. All trucks will raise plows and cease spreading at the end of the managed lanes and ramps. All trucks will u-turn and proceed north on the I-25 northbound General purpose lanes where they will u-turn at Pecos Street and commence their patrol again. Alternating cycles will enter from the I-25 General Purpose lanes, north of US-36. Response time from departure loading point to treatment completion and return to loading point is 1.0 hour.
- C. Patrol #2, US 36, Managed and General purpose lanes, A echelon formation of six trucks, consisting of three combination plow/spreaders and three plow only trucks, will enter US 36 westbound, from the I-25 managed lanes and from US 36 westbound east of I-25. This formation will plow all snow to the right. These mainline trucks will all be equipped with front plows and right wing plows. At the west terminus of the project at Foothills Parkway, the trucks will plow the ramps and then reform into echelon formation for plowing/spreading eastbound to I-25. At Interlocken Loop two trucks westbound trucks will drop back to assist the ramp/shoulder trucks. These two trucks will rejoin the formation as the formation travels eastbound past Interlocken Loop. There will be two combination plow/spreader trucks with front plows and right wing plows dedicated to ramps and shoulders. Response time from departure loading point to treatment completion and return to loading point is 1.4 hour. The use of 12 CY spreaders will enable the trucks to complete two full cycles before needing to return to the yard for

reloading. The Response time from departure loading point to treatment completion of two cycles and return to loading point is 2.25 hours.

- D. All trucks and patrol routes will be actively engaged throughout a winter event to maintain the roadway in Category 1 condition per the performance requirements.

### **xiii. Patrol Size and Philosophy of Plowing Including Shift and Shift Change Times**

After full O&M commencement, we intend to organize our snow plowing call-out as follows:

- All events will have an administrative component, to oversee the work, maintain contact with HPTE and the CDOT Traffic Center, record conditions including weather, precipitation, lane conditions, snow and ice response equipment location and status, chemical or abrasives use, stockpile quantities, and time records of staff and equipment.
- Patrol #1, I-25 ML, per 12 hour shift, 1 patrol supervisor, 2 drivers and trucks,
- Patrol #2, US 36 ML + GP lanes, per 12 hour shift, 1 patrol supervisor, 8 operators and 6 travel lane trucks plus 2 ramp trucks.
- 1 Spare Combination truck will be at the ready.

Ice only events will utilize spreader trucks and/or direct liquid application (DLA) spray trucks at a rate of one truck per each 2 lanes.

Shift start: Management staff will mobilize a minimum of 2 hours prior to the earliest expected commencement of precipitation. Operators will mobilize a minimum of one hour prior to the earliest expected commencement of precipitation. Shift start and change will typically be 7:00 am and 7:00 pm. Shifts will work 12 hours. Management will overlap their shift change with the operators by at least one hour to convey event information, including but not limited to trouble spots, equipment and staffing levels, etc., from one shift to the next. Operators will not be allowed to work more than 12 consecutive hours without having at least a six-hour break.

### **xiv. Call Out Procedures Including Personnel, Contact Lists**

Transfield Services will maintain a Snow and Ice event staffing shift chart. This document will designate all supervisors, operators and managers by assignment, shift, patrol number and piece of equipment. In addition, each person's call out



right onto the wide east side shoulder. All trucks will raise plows and cease spreading and then exit US 36 at Pecos Street, where they will u-turn and follow US 36 eastbound to I-25 southbound general purpose lanes. The trucks will exit at N. Speer Blvd where they will u-turn and commence their patrol again. Alternating cycles will enter from the 20th Ave ramps. Response time from departure loading point to treatment completion and return to loading point is 1.0 hour.

- B. Patrol #1, I-25, Managed Lanes, Southbound Flow, two trucks equipped with front plows and left hand wing plows, will enter the managed lanes from US 36 eastbound at Pecos Street. All trucks will plow/spread while travelling I-25 managed lanes southbound. The trucks will operate in echelon formation pushing left onto the wide east side shoulder. The trucks will continue south to end of the managed lanes where they merge with the I-25 General Purpose lanes. Alternating cycles will exit I-25 at the 20th Street off ramps. All trucks will raise plows and cease spreading at the end of the managed lanes and ramps. All trucks will u-turn and proceed north on the I-25 northbound General purpose lanes where they will u-turn at Pecos Street and commence their patrol again. Alternating cycles will enter from the I-25 General Purpose lanes, north of US-36. Response time from departure loading point to treatment completion and return to loading point is 1.0 hour.
- C. Patrol #2, US 36, Managed and General purpose lanes, A echelon formation of six trucks, consisting of three combination plow/spreaders and three plow only trucks, will enter US 36 westbound, from the I-25 managed lanes and from US 36 westbound east of I-25. This formation will plow all snow to the right. These mainline trucks will all be equipped with front plows and right wing plows. At the west terminus of the project at Foothills Parkway, the trucks will plow the ramps and then reform into echelon formation for plowing/spreading eastbound to I-25. At Interlocken Loop two trucks westbound trucks will drop back to assist the ramp/shoulder trucks. These two trucks will rejoin the formation as the formation travels eastbound past Interlocken Loop. There will be two combination plow/spreader trucks with front plows and right wing plows dedicated to ramps and shoulders. Response time from departure loading point to treatment completion and return to loading point is 1.4 hour. The use of 12 CY spreaders will enable the trucks to complete two full cycles before needing to return to the yard for

reloading. The Response time from departure loading point to treatment completion of two cycles and return to loading point is 2.25 hours.

- D. All trucks and patrol routes will be actively engaged throughout a winter event to maintain the roadway in Category 1 condition per the performance requirements.

### **xiii. Patrol Size and Philosophy of Plowing Including Shift and Shift Change Times**

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- Patrol #2, US 36 ML + GP lanes, per 12 hour shift, 1 patrol supervisor, 8 operators and 6 travel lane trucks plus 2 ramp trucks.
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Ice only events will utilize spreader trucks and/or direct liquid application (DLA) spray trucks at a rate of one truck per each 2 lanes.

Shift start: Management staff will mobilize a minimum of 2 hours prior to the earliest expected commencement of precipitation. Operators will mobilize a minimum of one hour prior to the earliest expected commencement of precipitation. Shift start and change will typically be 7:00 am and 7:00 pm. Shifts will work 12 hours. Management will overlap their shift change with the operators by at least one hour to convey event information, including but not limited to trouble spots, equipment and staffing levels, etc., from one shift to the next. Operators will not be allowed to work more than 12 consecutive hours without having at least a six-hour break.

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information will be listed. The document will include call out information for full time workers, seasonal workers and substitutes. Personnel will be called out and assigned at least 24 hours in advance of a planned event. In the case of unplanned events, Transfield will keep certain operators and supervisors in “on-call” mode during the winter season. These workers will be mobilized first to meet the required reaction times. Additional workers will be called up dependent on the storm and the need. All managers and supervisors will have updated copies of the winter call out list.

The operators, supervisors, mechanical personnel and Transfield Services management and administrative personnel will be engaged prior to commencement of the snow or ice event. Drivers will be assigned to specific spreading and plowing routes to ensure the desired level of service is achieved. It has been Transfield Services’ experience that efficiency and thoroughness is achieved when the drivers are consistently assigned to a specific spreader and plow route. This will help to provide better response and operations through familiarity gained with each of the routes. Operators and supervisors will be not be allowed to work more than twelve (12) consecutive hours without having at least a six (6) hour break.

The operators will have a valid Commercial Driver License as required. They will be fully capable of operating all the features of the equipment assigned during the snow and/or ice removal equipment, including but not limited to adjusting gates, turning the snow plow, and starting/stopping the spreader and/or liquid chemical spray tanks.

## xv. Details on how response times will be addressed

Personnel will be called out and assigned at least 24 hours in advance of a planned event. In the case of unplanned events, Transfield will keep certain operators and supervisors in “on-call” mode during the winter season. These workers will be mobilized first to meet the required reaction times. Additional workers will be called up dependent on the storm and the need.

Operators will be on the job at least 2 hours prior to the onset of precipitation to check and warm-up equipment, load material, mobilize to their designated route start points and to monitor and report weather conditions.

There are three response time requirements to be met, per Schedule 25:

### 3.3.1.1 For any predicted/forecasted Precipitation Event:

- a. *The required maximum response time (Response Time) to complete the manning and loading of spreading vehicles for an event is 0.5 hours from the time precipitation has started.*
- b. *The required maximum Response Time from departure loading point to treatment completion and return to loading point is 1.0 hour or such longer time as agreed in the Snow and Ice Control Operations Plan.*

### 4. *The maximum Response Time for snow and ice clearance vehicles to depart from base is 1.0 hour.*

#### 3.3.1.2 For any unpredicted/unforecast Precipitation Event:

- a. *Add 0.5 hours to the above times.*

Transfield Services will employ a multi-step program to ensure that these response times are consistently met:

1. Equipment maintenance and readiness – The Fleet Manager will be responsible for all equipment maintenance including record keeping, upfits, repairs, inspections, calibrations and general readiness. This includes all rolling stock, attachments and power equipment. Each operator will perform an operational and safety inspection and checklist of the equipment prior to use and at the end of each shift. Any necessary repairs or maintenance will be performed before releasing the equipment for the next shift.

Equipment maintenance is a year round effort that commences each summer. First, all equipment is checked, repaired and readied for the upcoming winter season. During the winter season, spare parts are kept on hand for immediate use as needed to minimize any down time. This includes wear parts, electrical components and major items such as hydraulic cylinders, motors, lights, solenoids and spare controllers. Post season, the equipment is washed, cleaned, lubricated, worn components are replaced or repaired and the units are stored securely to be ready for the next season.

2. Trained and competent operators and supervisors. Training and attitude are the most important components of the staff. Training commences in the summer with maintenance of the equipment. All operators and supervisors must understand the equipment including its capabilities, limitations and the results of misuse or overuse. In the fall, training consists of equipment

information will be listed. The document will include call out information for full time workers, seasonal workers and substitutes. Personnel will be called out and assigned at least 24 hours in advance of a planned event. In the case of unplanned events, Transfield will keep certain operators and supervisors in “on-call” mode during the winter season. These workers will be mobilized first to meet the required reaction times. Additional workers will be called up dependent on the storm and the need. All managers and supervisors will have updated copies of the winter call out list.

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The operators will have a valid Commercial Driver License as required. They will be fully capable of operating all the features of the equipment assigned during the snow and/or ice removal equipment, including but not limited to adjusting gates, turning the snow plow, and starting/stopping the spreader and/or liquid chemical spray tanks.

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- b. *The required maximum Response Time from departure loading point to treatment completion and return to loading point is 1.0 hour or such longer time as agreed in the Snow and Ice Control Operations Plan.*

### *4. The maximum Response Time for snow and ice clearance vehicles to depart from base is 1.0 hour.*

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operation, snow and ice response, safety, de-icing chemicals and abrasives, and snow response methods including: gang plowing, spreading, special need locations (uphills and on-ramps) and safe operations around other motorists. We expect all of our workers to “take ownership” of their assigned areas. This attitude is what makes our workers and their performance above average.

3. Management and planning. Although each weather event is slightly different, the responses are planned, consistent and programmed to fit the storms parameters. Numerous scenarios are run to prepare for each type of weather event. A chart of storm parameters and responses is prepared and taught to all operators and supervisors. (see attached TK) . All managers have snow experience. Weather is monitored several times daily throughout the winter season. Snow and ice control is planned and organized, not “caught off guard” and hap-hazard. Management and staff readiness will match the equipment readiness.
4. Constant innovation and improvements. Each storm is an opportunity to learn and improve ourselves and our operation. Each after-storm debriefing meeting is an opportunity to identify areas that can be improved. Each discrepancy that is found is analyzed and the root causes corrected, such that this discrepancy will not be repeated. The staff is constantly asked for suggestions and innovations to help improve our performance. This is for productivity, efficiency and safety.

## xvi. Application Procedures for Traction Devices Including Tire Chains

Trucks assigned to routes with steep grades, and trucks used during icing conditions will be equipped with driver activated deployable automatic rear snow chains. These under frame mounted units allow use as needed and can be retracted when bare pavement is achieved thereby eliminating damage to the pavement surface and striping.

## xvii. Application Procedures for Liquid and/or Solid De-icers

### Liquid De-icers

Anti-icing direct liquid application (DLA) will commence 24 to 72 hours prior to an event that is forecast to begin as frozen precipitation. Depending on the expected ground and air temperatures the DLA may utilize NaCl brine or CaCl brine

or MgCl brine. Each spray truck or trailer will be shadowed by a truck with a rear facing warning sign.

DLA may be used for de-icing purposes to help to immediately unbond any ice or hardpack that has become adhered to the pavement surface.

### Solid de-icers

Transfield services will calibrate all trucks for two distribution rates of salt spreading:

- 250 lbs per lane mile for standard de-icing.
- 350 lbs per lane mile for steep grades and uphill on-ramps.

Spreading operations will commence as soon as there is a coating of snow and within the performance standards timeliness requirements. Spreading will continue through the event to prevent ice or hard pack from adhering to the pavement surface.

Other specialty de-icing chemicals will be spread per the manufacturers recommendations.

## xviii. Application of Traction Sand/Grit

Traction sand or grit (Abrasives) will be used to provide added traction on ice or hardpack only when:

- Ice or hardpack exists on the pavement surface, especially on steep grades or uphill on-ramps and shaded areas.
- Ground and air temperatures are too cold for de-icing chemicals to be effective.

This will reduce the use of abrasives and thereby prevent drains and culverts from becoming clogged. In addition, this will reduce air quality problems and the need for post-event sweeping.

Application rate will be 500 lbs per lane mile. Salt will be mixed with the abrasives to prevent them from freezing and to accelerate melting as soon as temperatures rise.

## xix. Calibration of Spreaders and Liquid De-icer Equipment

Each fall calibrations will be performed to prepare equipment for the upcoming winter season.

Every individual spreader will be calibrated to distribute the correct amount of material per lane mile. A record will be kept for each truck, both at the operations office and in the



operation, snow and ice response, safety, de-icing chemicals and abrasives, and snow response methods including: gang plowing, spreading, special need locations (uphills and on-ramps) and safe operations around other motorists. We expect all of our workers to “take ownership” of their assigned areas. This attitude is what makes our workers and their performance above average.

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truck. This record will indicate date of calibration, inspector performing the calibration, gate level, conveyor speed, spreader number, and spreader control computer settings.

Every spray truck or trailer will also be calibrated for correct spray rates. Records will be kept indicating date of calibration, inspector performing the calibration, nozzle size, number of nozzles on spray bar, pump pressure, type of brine this calibration pertains to, sprayer number, and any control settings. During the winter, based on our standard application rates and miles serviced, we will complete an ongoing analysis of the application rates of each unit, evaluate the results, and then make adjustments as required.

## xx. Training Plan

Transfield Services' staff will attend a comprehensive snow and ice control training program, prior to September 15th of each year. The classroom sessions will introduce operators to the fundamentals of snow and ice control. This includes safety, plowing and spreading techniques, plow trains, chemical use (including effects of temperature, humidity or precipitation), safety data sheets for these chemicals, and safe equipment operation. In addition, spreaders will be calibrated and equipment checked for proper operation. Transfield Services will provide PRD and HPTE a letter certifying that our drivers/operators/supervisors have been properly trained to perform the assigned duties.

Route Training: Each fall the operators will participate in a "Dry Run" to become familiar with the equipment, the route, (including turn around points and alternates) and their trucks placement in the plowing/spreading echelon. This will help ensure better organization and efficiency during actual events.

## xxi. Precipitation Event Reporting and Documentation

Operators will record roadway treatments, outcome measurements and event time and date data. This information will be recorded; within the first 2 hours of precipitation, during the event and at the end of each 12-hour shift, and upon achievement of bare pavement. Each operator will complete a Snow Removal Survey form summarizing each truck and each shift worked. Shift supervisors and managers will then compile this information into a single Precipitation Event Report. Within two (2) business days of the end of the winter weather event and demobilization, PRD, Transfield Services and HPTE will meet to summarize and verify the final report and equipment hours.

## xxii. Post-Storm Clean-Up Work

Following each storm the shift supervisors will compile a list of clean-up needed. Operators and equipment will not be released until all clean-up operations are complete. This includes final clearing of snow from gores, ramps and shoulders, clearing snow from drains, preparing for snow melt and run off, sweeping of sand, and replowing of any snow drift areas.

## xxiii. Sweeping

Transfield Services will utilize sweepers with brooms and water mist (temperature permitting), to collect excess and remaining sand and grit following a snow or ice event. The combination of vacuum and water mist will reduce airborne dust and particulates. Filters will be cleaned or replaced prior to every work shift. Collected material will be disposed of in accordance with pre-approved environmental disposal procedures.

## xxiv. Meeting Denver Regional Council of Governments Air Quality Requirements After Precipitation Events

Transfield Services will comply with air quality requirements by following a four-part program:

1. Minimize the use of sand and grit by reserving these traction aids for instances where de-icing chemicals (solid and liquid) are not effective due to extreme cold.
2. Have sweepers ready to remove excess and remaining sand and grit as soon as possible following the end of the event.
3. Use vacuum sweepers with brooms and water mist to reduce airborne dust caused by the sweeping operation.
4. Clean or replace air filters prior to each work shift.

## xxv. Reporting Including Service Levels and Response Times

Transfield Services will maintain timesheets for each piece of equipment through the duration of each winter storm event. Operators will record roadway treatments, times, outcome measurements and event time and date data. This information will be recorded; within the first 2 hours of precipitation, during the event and at the end of each 12-hour shift, and upon achievement of bare pavement. Each operator will complete a Snow Removal Survey form summarizing each



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truck and each shift worked. Within two business days of the cessation of the winter weather event and demobilization, PRD, Transfield Services and HPTE will meet to summarize and verify the final equipment hours.

### xxvi. Pre- and Post-Event Meetings

Transfield Services will conduct pre-event meetings with staff as soon as an event is forecast. There will be follow up meetings 24 hours and 12 hours prior to commencement of operations. These meetings will serve to finalize the operations plan as latest weather information becomes available. The operational plan also defines which operators are being called for first shift and second shift.

All events will have a debriefing meeting within 3 days of the completion of the event. This will serve to bring forward any deficiencies in; the plan, the actual operation, staffing, equipment, or materials. Corrections will then be made to improve the system and future results. A revised snow and ice control plan will be issued if changes are made to process or procedures.

#### *4.3.B - Schedule and Process for delivering a Snow and Ice Control Services Plan for approval*

Transfield Services has reviewed the Snow and Ice Control Services performance requirements, the existing I-25 lane configurations, ramps and terminus points, the proposed US-36 Phase 1 and Phase 2 lane configurations, ramps and terminus points, the 70th Avenue Maintenance Yard facility and location and the Denver Maintenance Yard facility and

location. Based on this information, Transfield Services has prepared this initial Snow and Ice Control plan along with the attachments listed below. Our intent is to provide the users of these roadways with a safe and passable thoroughfare during times of inclement weather. Our proposal schedule to obtain a fully approved Snow and Ice Control plan is as follows:

- March 1, 2013 - Initial Snow and Ice Control Plan submittal with technical proposal.
- April 5, 2013 – Award selection
- May 6, 2013 (Suggested Date) - Meeting with HPTE and CDOT to review issues and solutions, prior to resubmittal.
- June 6, 2013 – Resubmittal of Snow and Ice Control Plan.
- July 5, 2013 – Receive final comments from HPTE and CDOT.
- July 15, 2013 – Final submittal of Snow and Ice Control Plan.
- August 1, 2013 – Approval of Snow and Ice Control Plan from HPTE and CDOT.

#### *Attachments:*

1. Snow Event Management Matrix
2. Flow chart of winter operations
3. Snow equipment and truck matrix
4. Snow Plow Routes



truck and each shift worked. Within two business days of the cessation of the winter weather event and demobilization, PRD, Transfield Services and HPTE will meet to summarize and verify the final equipment hours.

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Figure ii: Snow Event Management Matrix

SNOW EVENT MANAGEMENT MATRIX												
ENVIRONMENTAL CONDITIONS						ACTIONS						
PRE-EVENT FORECAST			DURING EVENT			Notes: Sunshine will raise temperatures and reduce salt need. The Snow Manager must prepare for falling temperatures as night approaches.						
Precipitation	Temperature		Accumulation	Wind/ Drifting	Precipitation	Actual Temperature		Anti-icing DLA	Plowing Only	Spreading Only		Snow Removal
	F	C				F	C			Sand	Salt (including Pre-wetting)	
Rain	> 32°F	> 0°C						NO		X		NO
Sleet	> 32°F	> 0°C						NO		X		NO
Slush	> 32°F	> 0°C	X					NO		X	Plowing as accumulation increases	NO
Slush	< 32°F	< 0°C						YES			X Plowing as accumulation increases	NO
Freezing Rain	28°F : +35°F	-7°C : +2°C						YES		X		NO
Snow	> 32°F	> 0°C						YES			X	
Snow	18°F : 32°F	-8°C : 0°C						YES				
					Sleet	28°F : +35°F	-2°C : +2°C			X		NO
					Slush	28°F : +35°F	-2°C : +2°C			X		NO
					Freezing Rain	28°F : +35°F	-2°C : +2°C			X		NO
					Snow	28°F : +35°F	-2°C : +2°C				X	If Needed
					Freezing Rain	18°F : 32°F	-8°C : 0°C			X		NO
					Snow	18°F : 32°F	-8°C : 0°C				X	If Needed
					Snow	< 18°F	< -8°C				X	NO
					Ice	< 18°F	< -8°C			X		NO
					Slippery Conditions	< 18°F	< -8°C				X	NO
				Drifting								As Needed
			Accumulation against barrier walls						X			As Needed
			Bridges Parapets						X			As Needed

Figure ii: Snow Event Management Matrix

SNOW EVENT MANAGEMENT MATRIX															
ENVIRONMENTAL CONDITIONS						ACTIONS									
PRE-EVENT FORECAST			DURING EVENT			Notes: Sunshine will raise temperatures and reduce salt need. The Snow Manager must prepare for falling temperatures as night approaches.									
Precipitation	Temperature		Accumulation	Wind/ Drifting	Precipitation	Actual Temperature		Plowing Only	Spreading Only	Sand	Salt (including Pre-wetting)	Sand	Salt (including Pre-wetting)	De-Icing DLA	Snow Removal
	F	C				F	C								
Rain	> 32°F	> 0°C							X					NO	
Sleet	> 32°F	> 0°C							X					NO	
Slush	> 32°F	> 0°C	X						X				X Plowing as accumulation increases	NO	
Slush	< 32°F	< 0°C											X Plowing as accumulation increases	NO	
Freezing Rain	28°F : +35°F	-2°C : +2°C												NO	
Snow	> 32°F	> 0°C											X	NO	
Snow	18°F : 32°F	-8°C : 0°C												NO	
					Sleet	28°F : +35°F	-2°C : +2°C							NO	
					Slush	28°F : +35°F	-2°C : +2°C							NO	
					Freezing Rain	28°F : +35°F	-2°C : +2°C							NO	
					Snow	28°F : +35°F	-2°C : +2°C						X	If Needed	
					Freezing Rain	18°F : 32°F	-8°C : 0°C							NO	
					Snow	18°F : 32°F	-8°C : 0°C						X	If Needed	
					Snow	< 18°F	< -8°C					X		NO	
					Ice	< 18°F	< -8°C				X			NO	
					Slippery Conditions	< 18°F	< -8°C				X			NO	
				Drifting										As Needed	
			Accumulation against barrier walls											As Needed	
			Bridges Parapets											As Needed	

Figure iii: Flow Chart of Winter Operations



Figure iii: Flow Chart of Winter Operations



Figure iii: Flow Chart of Winter Operations, Cont.





Figure iii: Flow Chart of Winter Operations, Cont.

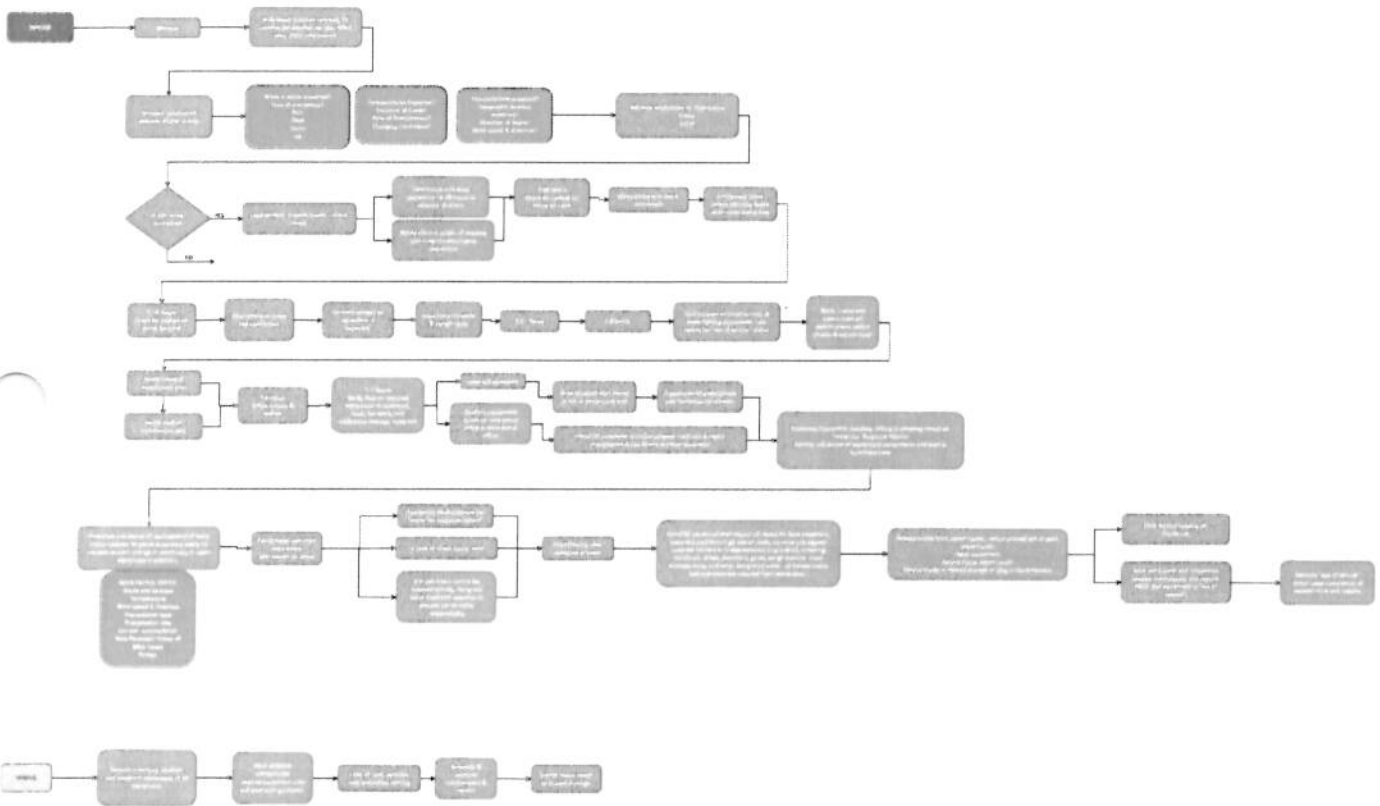


Figure 14: Snow Equipment and Truck Matrix  
 Colorado US 36 / I-25  
 Snow and Ice Equipment Needs

DEPOT	EQUIPMENT TYPE	TRUCK		SPREADERS		PLOWS						TANKERS		LOADERS			QUANTITY		
		Single Rear Axle Dump Truck	Tandem Rear Axle Dump Truck	Slide-In	V-Body	12 One-Way	12 Manual Reversible	14 Reversible	12 Power Reversing	12' - 16' Left Extendable	12' Right Wing, Quick Attach / Detach	12' Left Wing, Quick Attach / Detach	1,000 Gal Truck or Trailer Mounted	250 - 500 Gal Trailer Mounted		Total Pieces of Equipment	Patrol #1 I-25	Patrol #2 US 36	
70th Street / I-25 Patrol #1	Wain-Lane Pucks - Combus		1		1		1									5	5		
	Wain-Lane Pucks - Pave-Dry															0	0		
	Rump / Spreader Truck															0	0		
	Load Truck - Combus - Right/Left of Snow Lane		1		1					1	1					5	5		
	9 A Forklift											1	1			2	2		
	Hubber Tractor													1		1	1		
	77' engine driven, two-stage, snow blower for hubber tractor													1		1	1		
	2nd floor loader															0	0		
US 36 Patrol #2	Wain-Lane Pucks - Combus		2	2			2				2					0	0	0	
	Wain-Lane Pucks - Pave-Dry		3				3				3					9	9	9	
	Rump / Spreader Truck		2		2		2									0	0	0	
	Load Truck - Combus - Right/Left of Snow Lane		1		1					1	1					4	4	4	
	9 A Forklift												1			1	1	1	
	Hubber Tractor													1		1	1	1	
	77' engine driven, two-stage, snow blower for hubber tractor													1		1	1	1	
	2nd floor loader															0	0	0	
I-25			1	1					1		1					5	5	5	
																0	0	0	
<b>Total</b>		0	11	3	5	0	0	0	9	2	11		3	1	2	4	51	19	32

Colorado Truck Requirements Timetable

DEPOT	PATROL ROUTE	NEED FOR FALL 2013			NEED FOR FALL 2014		
		Combus	Single Axle	Tandem	Combus	Single Axle	Tandem
70th Street / I-25	1	2		2			
US 36	2				0		0
SPARES		1		1	0		0
<b>TOTAL</b>		3	0	3	0	0	0

Figure IV: Snow Equipment and Truck Matrix  
Colorado US 36 / I-25

Snow and Ice Equipment Needs

DEPOT	EQUIPMENT TYPE	TRUCK		SPREADERS		PLOWS						TANKERS		LOADERS	QUANTITY			
		Single Rear Axle Dump Truck	Tandem Rear Axle Dump Truck	Slide-in	V Body	12' One-Way	12' Manual Reversible	14' Reversible	12' Power Reversing	12' 16' Left Extendable	12' Right Wing, Quick Attach / Detach	12' Left Wing, Quick Attach / Detach	1,000 Gal Truck or Trailer Mounted		250 - 500 Gal Trailer Mounted	Total Pieces of Equipment	Patrol #1 I-25	Patrol #2 US 36
70th Street / I-25 Patrol #1	Main Lines Truck - Combo		1		1		1								5	5		
	Main Lines Truck - Plow Only														0	0		
	Combo / Shoulder Truck														0	0		
	Lead Truck - Combo - Right Side of Shoulder		1		1					1	1	1			5	5		
	30-A Tanker												1	1	2	2		
	Regulator - loader													1	1	1	1	
	77' single drum two-stage snow blower for tandem rear axle													1	1	1	1	
	54' steel loader														0	0		
US 36 Patrol #2	Main Lines Truck - Combo		2	2			2								8	8		
	Main Lines Truck - Plow Only		1				3								9	9		
	Combo / Shoulder Truck		2		2		2				2				8	8		
	Lead Truck - Combo - Right Side of Shoulder		1		1					1	1				4	4		
	30-A Tanker												1		1	1		
	Regulator - loader													1	1	1	1	
	77' single drum two-stage snow blower for tandem rear axle													1	1	1	1	
	54' steel loader														0	0		
SPARES			1	1						1		1			5	5		
															0	0		
<b>Total</b>		0	11	3	5	0	0	0	9	2	11	3	1	2	4	51	19	32

Colorado Truck Requirements Timetable

DEPOT	PATROL ROUTE	NEED FOR FALL 2013			NEED FOR FALL 2014		
		Combo	Single Axle	Tandem	Combo	Single Axle	Tandem
70th Street / I-25	1	2		1			
US 36	2				8		8
SPARES		1		1	0		0
<b>TOTAL</b>		3	0	3	8	0	8

Figure v. Snow Plow Routes  
Colorado US 36

	Interchange	MP	Section Length	Managed Lanes	ML Ln Miles	ML Notes	General Purpose Lanes	GP Notes	Auxiliary Lanes	GP + Aux Ln Miles	Total Ramps
I-25 and Connection to US 36	I-25	57.1									4
			0.2	2	0.4	Rev Lane Width varies, includes Slides	5.32	includes 12' Right Shoulder and 4' buffer	0	1.066	
	Broadway	56.7									0
				2	2	Includes 12' left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	5.33	
	Pocah Street	55.9									8
			1.1	2	2.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	1	4.763	
	Federal Blvd	54.8									8
			2.3	2	4.6	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	1	9.559	
	Shelden Blvd	52.5									8
			2.1	2	4.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	6.993	
Phase 1	Cruth Ranch/39th Ave	50.4									8
				2	2.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	3.665	
	Wadsworth Pkwy	49.1									7
			3.5	2	7	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	1	15.55	
	Perfection Loop	45.8									8
			2.6	2	5.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	8.658	
	89th Street										
	McCain Blvd	41.2									2
			1.4	2	6.8	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	13.22	
	South Boulder Cross	39.8									0
		0.5	0	0		5	includes right and left shoulders	0	4		
Foothills Pkwy	39									7	
			CL Miles		ML Ln Miles					GP Ln Miles	Ramps
<b>Total</b>			<b>18.1</b>		<b>69.2</b>					<b>141.818</b>	<b>67</b>

US 36 Lane miles for snow plowing, (Phase 1 plus Phase 2); All lane plowing data is one direction only; Ramps include all ramps (slip ramps included) at an interchange

Figure V: Snow Plow Routes  
Colorado US 36

Interchange	MP	Section Length	Managed Lanes	ML Ln Miles	ML Notes	General Purpose Lanes	GP Notes	Auxiliary Lanes	GP + Aux Ln Miles	Total Ramps
I-25 and Connection to US-36 Phase 1	1.25	57.1								4
		0.2	2	0.4	Rv Lane Width varies, includes SBds	3.33	includes 12' Right Shoulder and 4' buffer	0	1.066	
	Pinelawn	56.9								0
				2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	5.33	
	Pecos Street	55.9								8
		1.1	2	2.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	1	4.763	
	Federal Blvd	54.8								8
		2.3	2	4.6	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	1	9.959	
	Snodden Blvd	52.5								8
		2.3	2	4.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	6.993	
	Crutchman/SHR Ave	50.4								8
		1.1	2	2.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	3.663	
	Madison Parkway	49.3								7
		3.5	2	7	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	1	10.65	
Providence Lane	45.8								8	
	2.6	2	5.2	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	8.658		
US 36, Phase 2	85th Street									
	McCaslin Blvd	41.2								9
		1.4	2	4.8	Includes 12' Left Shoulder	3.33	includes 12' Right Shoulder and 4' buffer	0	11.322	
	South Boulder Creek	35.8								0
		0.8	0	0		5	includes right and left shoulders	0	4	
Leaville Pkwy	39								7	
		CL Miles	ML Ln Miles					GP Ln Miles		Ramps
Total		16.1	69.2					141.818		67

US 36 lane miles for snow plowing, Phase 1 plus Phase 2; All lane plowing data is one direction only; Ramps include all ramps (slip ramps included) at an interchange