PUBLIC WORKS BIKE FACILITIES WINTER MAINTENANCE

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ON-STREET BIKE LANE WINTER MAINTENANCE

PLOWS

How plows work on the road

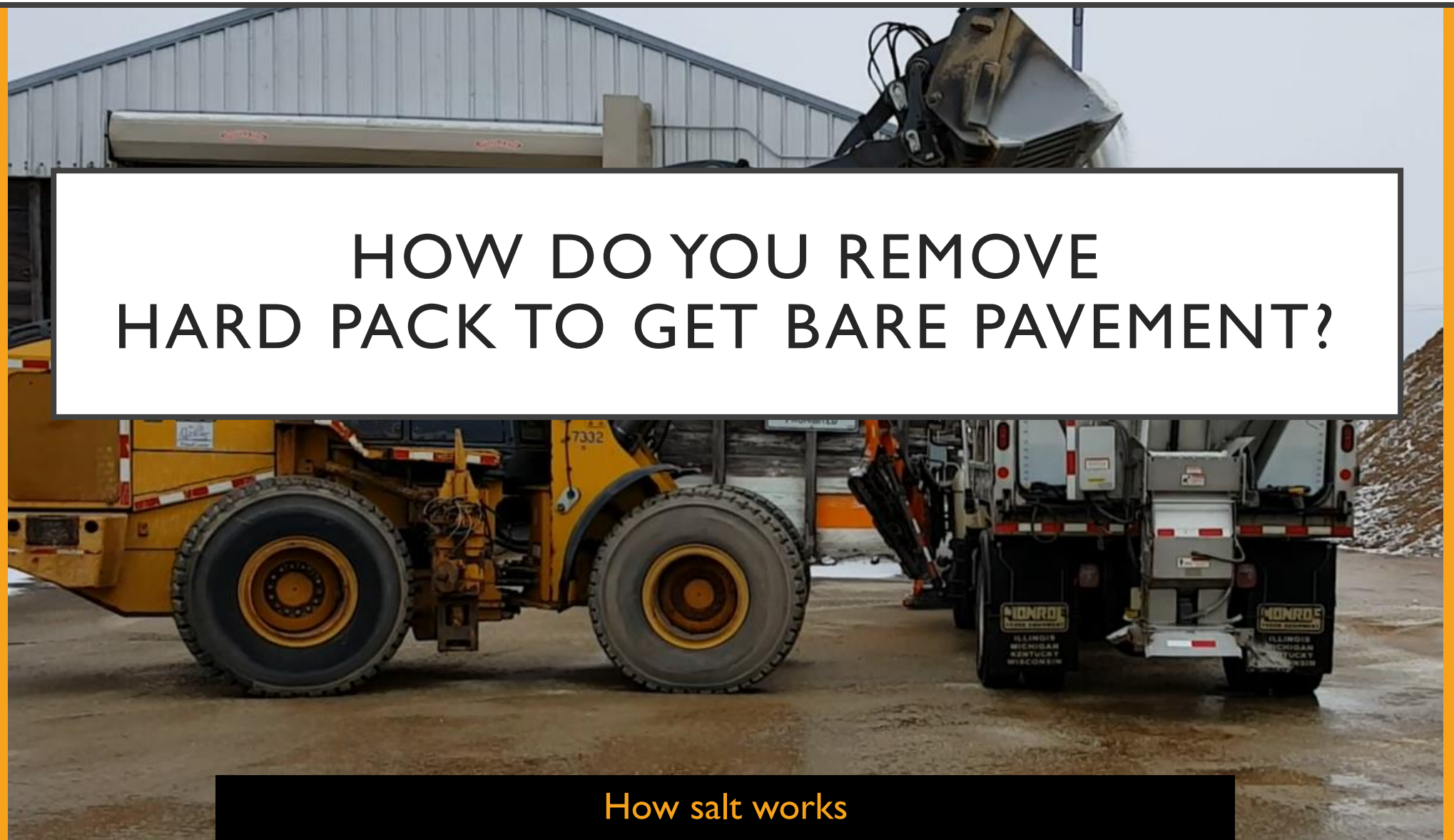
HOW PLOWS WORK ON THE ROAD

- Plows do not press down to the road surface
- Plows push the snow forward and to the side
- Plows "float" over the road surface

HOW PLOWS WORK ON THE ROADS

- Plows are flat. Roads are not. Creates gap between plow & road.
- Floating plow + crowned/bumpy roads = hard pack.
- Hard pack is normal.

SALT



HOW DO YOU REMOVE HARD PACK TO GET BARE PAVEMENT?

How salt works

HOW SALT WORKS IN THE ROADS

- Snow/ice absorbs salt to create the saltwater solution that triggers the melting process
- Vehicle tires crush/disperse salt & the saltwater solution – meaning it becomes spread over more roadway surface.
- Friction from vehicle tires & exhaust from vehicles also warm the traffic lanes to expedite melting.
- Still need time for snow/ice to absorb salt

THE PROBLEM:

HOW CAN WE MAKE THE BIKE LANES SNOW-FREE LIKE THE TRAFFIC LANES ON SALT ROUTES AT ROUGHLY THE SAME TIME?

BIKE LANE PILOT

NOTE:

Weather conditions dictate how paths can be maintained.

Temperature, snow depth, wind, timing of event, and many other factors play a role.

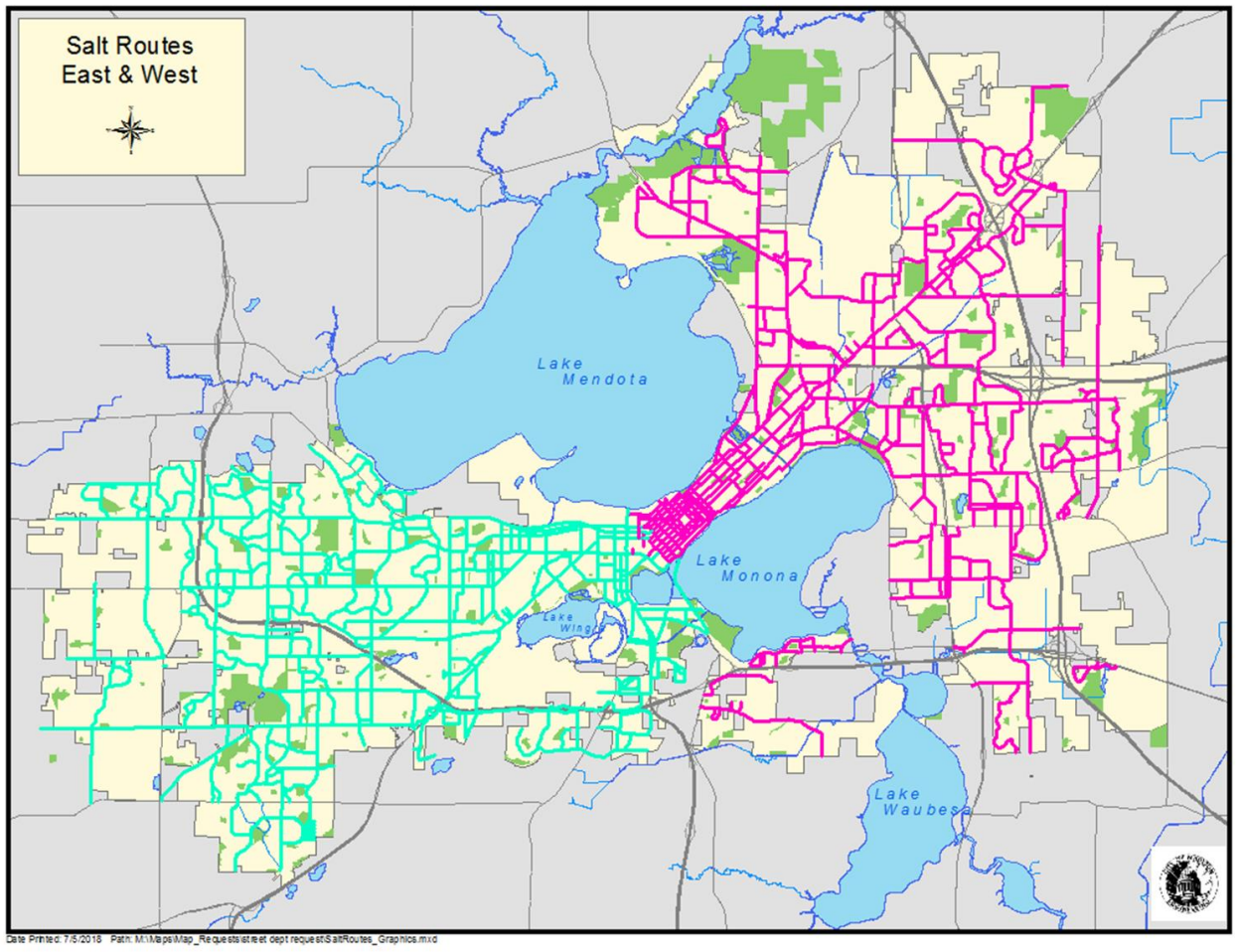
TRIAL ONE: ANTI-ICE BRINING

- On 12/11, prior to the winter event, OUTBOUND (South Park toward John Nolen Drive) bike lane was brined

- Traffic lanes and INBOUND (John Nolen Drive toward S. Park) bike lane received standard salt route operations.

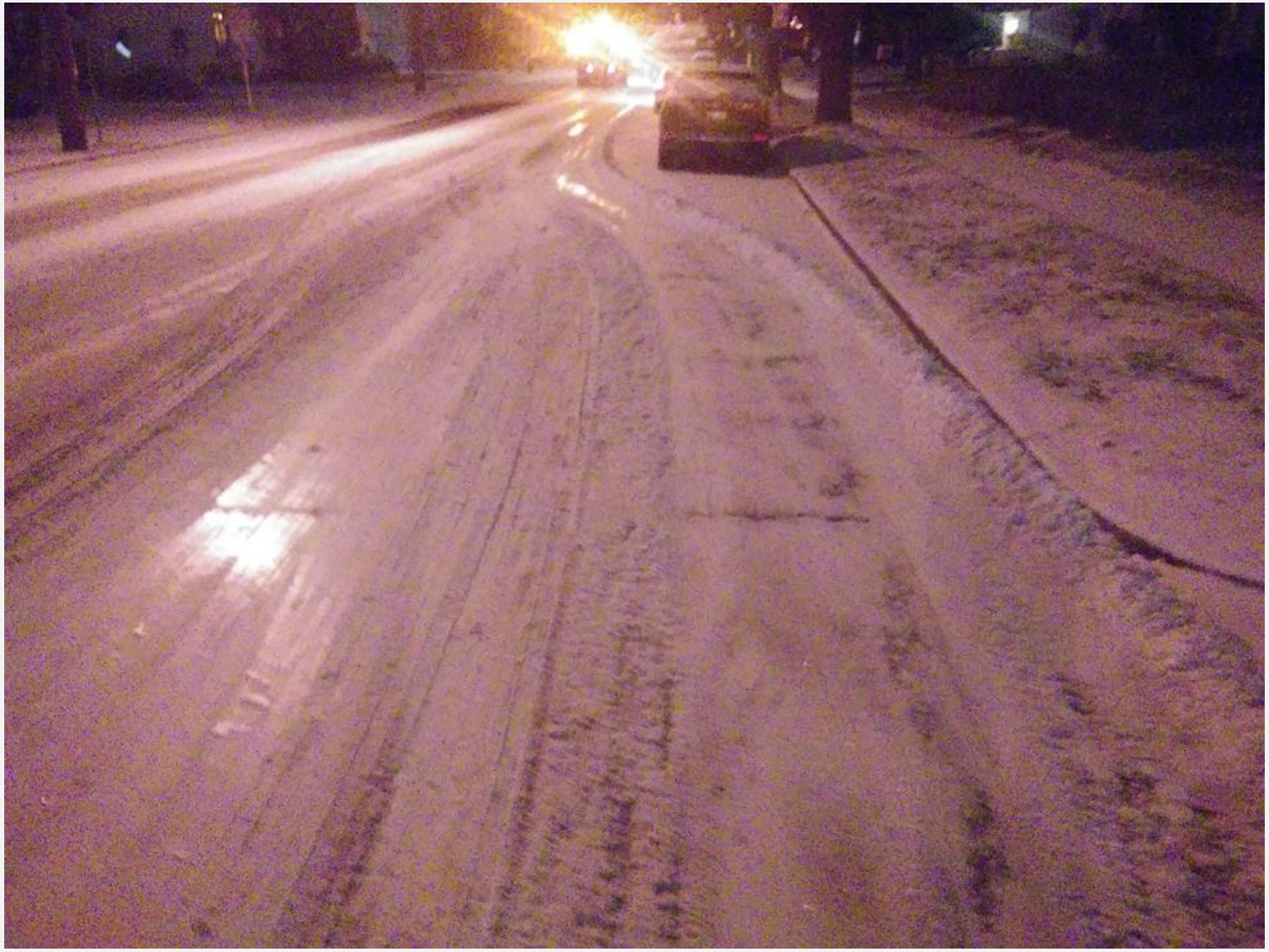
- Brine is a saltwater mixture that is 23.3% salt.
  - Used to prevent binding of snow/ice to pavement.
  - Brining only used when road temps are above 23, pavement is already bare, and forecasted storm does not begin as a rain.

WHAT ARE "STANDARD SALT ROUTE OPERATIONS"?



- When snowfall enough to leave tracks in the roadway, plow trucks are deployed to salt routes.
- Plow trucks work from the centers to the curb, pushing snow out of the traffic lanes toward the curb.
- While plowing, trucks on salt routes deploy salt to the traffic lanes at a maximum rate of 300 pounds per lane.
- 32 salt trucks deployed to cover city-maintained streets.
  - Each salt route approximately 30 miles long
  - Takes approximately 2 hours to complete one complete lap of the salt route

TRIAL ONE:
SNOW BEGINS & PLOWING/SALTING BEGINS



- During the early morning hours on December 12, normal plowing and traffic lane salting operations begin.
- Traffic lanes plowed and salted. Salt routes plowed to the curb where possible.
- Notice the pack of snow left on the road surface.

TRIAL ONE:
INITIAL RESULTS

INBOUND – S.O.P

OUTBOUND - BRINED

TRIAL ONE:
AFTER PLOW BACK

INBOUND – S.O.P

OUTBOUND – BRINED SIDE

TRIAL ONE OBSERVATIONS

- Brining did not remove all snow from bike lane like traffic lane after plowing
  - Still left hard pack
- Brining requires additional salt to be used
  - Brining uses less salt than standard salt application, but it still means more salt on the roads which means more salt in our waters.
- Salting may not help

TRIAL ONE OBSERVATION: VEHICLE TRAFFIC MAKES BARE PAVEMENT ON SALT ROUTES

BIKE LANE W/CAR TRAFFIC BEFORE FINAL CURB CUT

BIKE LANE W/O CAR TRAFFIC BEFORE FINAL CURB CUT

TRIAL ONE OBSERVATION: SALT WORKS SLOW IN ON-STREET BIKE LANES

- Insufficient traffic to create churn to disperse salt
- No pavement warming from tire friction.
- No heat/exhaust to warm the pavement.
- Crown on roads drains snow melt from traffic lane across bike lanes to gutter
- With no traffic, only relying on time to melt hard pack after plowing

TRIAL ONE OBSERVATION: PARKED CARS ALWAYS AN ISSUE

- Cars parked along Olin in front of CDA property on INBOUND (S.O.P) side of Olin.
  - This photo taken around 12pm on December 12.
  - Only area along Olin with noticeable snow in bike lane.
- Plows cannot get back to curb or too close to parked cars.

TRIAL TWO: BROOMING

Trial Two: January 2, 2019 in the afternoon.

Outbound bike lane broomed after plowing to remove slush and snow from the January 2 snow event.

Inbound bike lane received standard salt route procedure

TRIAL TWO:
BROOMING THE BIKE LANE W/O PARKED CARS (VIDEO)

TRIAL TWO:
BROOMING THE BIKE LANE W/PARKED CARS (VIDEO)

TRIAL TWO: BROOMING OBSERVATIONS

- **Results in clean, mostly bare pavement**
  - Cannot remove frozen hard pack (see photo)
- **Requires another piece of equipment on salt routes**
- **Process will be incredibly slow**
  - Brooms work at 1 to 2 MPH
  - Broom width may not cover whole lane
- **Traffic is a hazard**
  - For both the operator and passing cars
- **Throws snow & slush**
  - Can be angled away from the traffic lane, will slop onto sidewalks & parked cars
  - Will fling rocks and other road debris, too
- **Parked cars still an issue for curb access**

ANOTHER OPTION
SNOW REMOVAL

- Will reclaim bike lane space lost to parked cars
- Hard pack of snow will remain in lane
- Takes multiple days to perform
  - Must post no parking notices 48 hours in advance of snow removal operations
  - Ticket and tow scofflaws also takes time
- Very slow and takes multiple operators & vehicles
  - One loader, plus multiple haul trucks.
  - Difficult to gauge time estimate to clear all bike lanes that are obstructed with parking

CONSIDER THE SIZE OF THE NETWORK

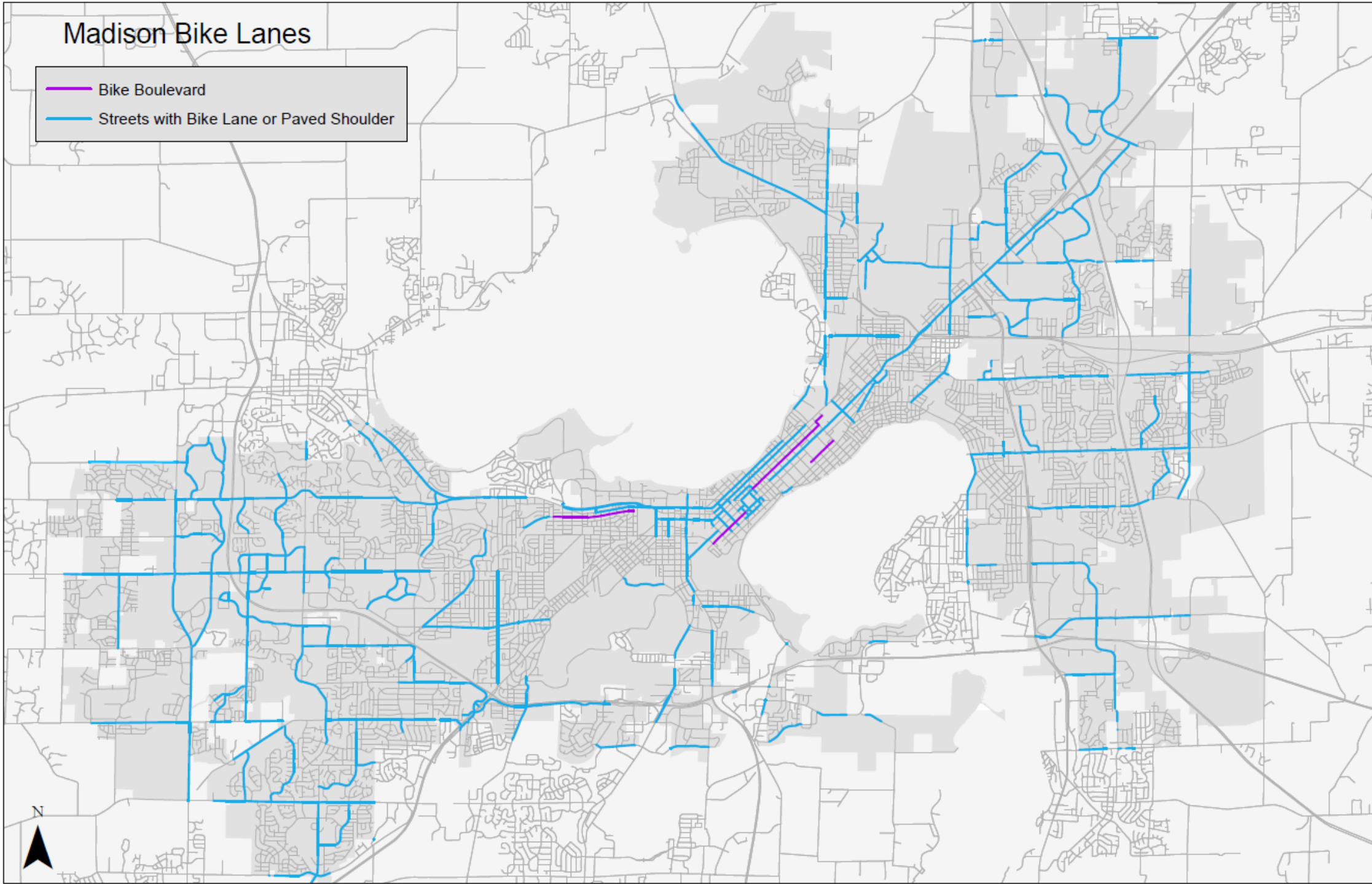
Approximately 185 miles* of street with bike lanes

Mileage above is "center-line miles" only.

Does not account for streets with bike lanes on both sides of the road – like Olin.

Number above may underestimate the mileage that needs to be cleared.

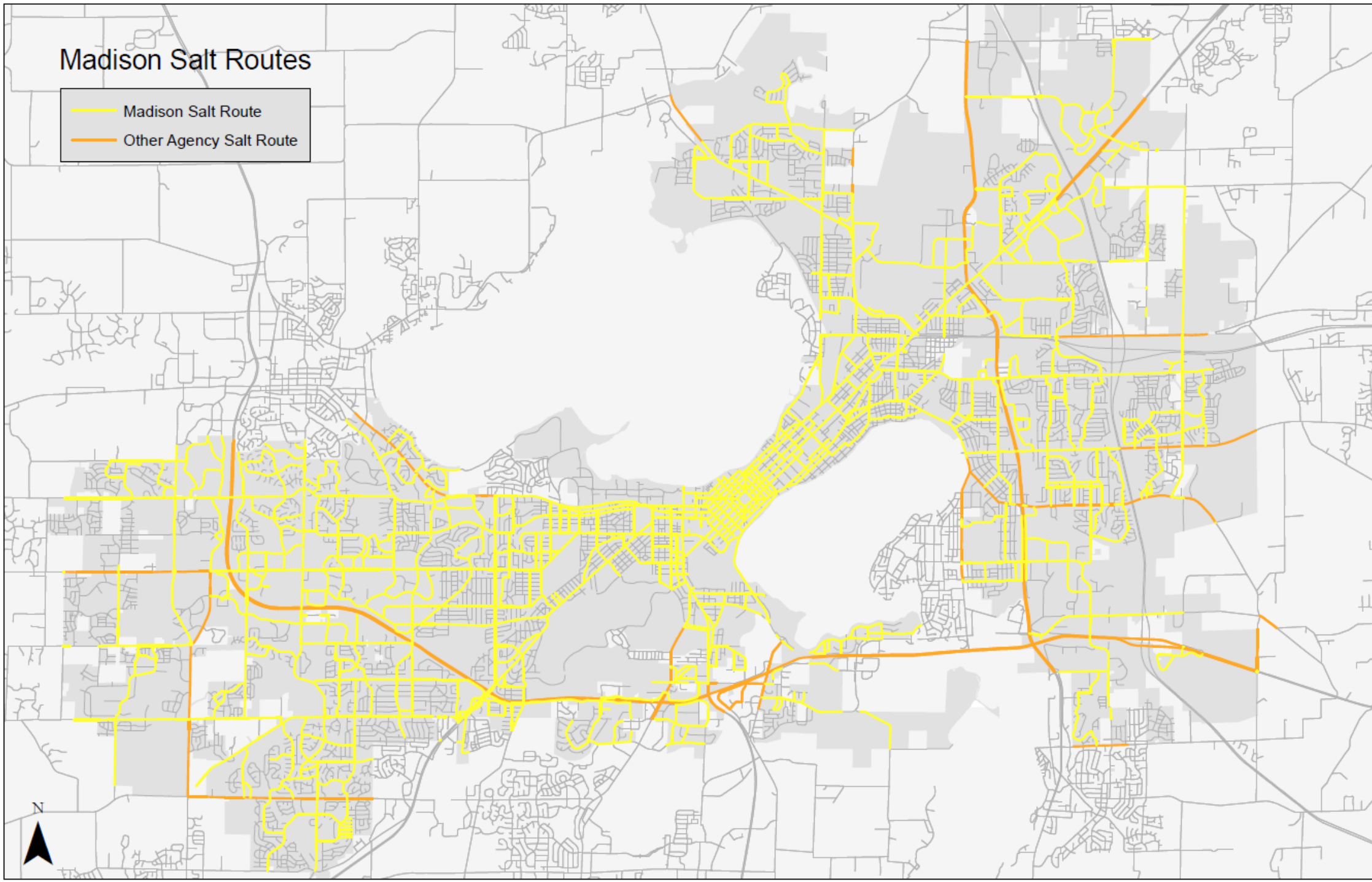
*Bike lane mileage from Traffic Engineering. The number includes mileage not shown on this map because it lies outside city limits, such as bike lanes on the UW Campus



STREETS DIVISION SALT ROUTES

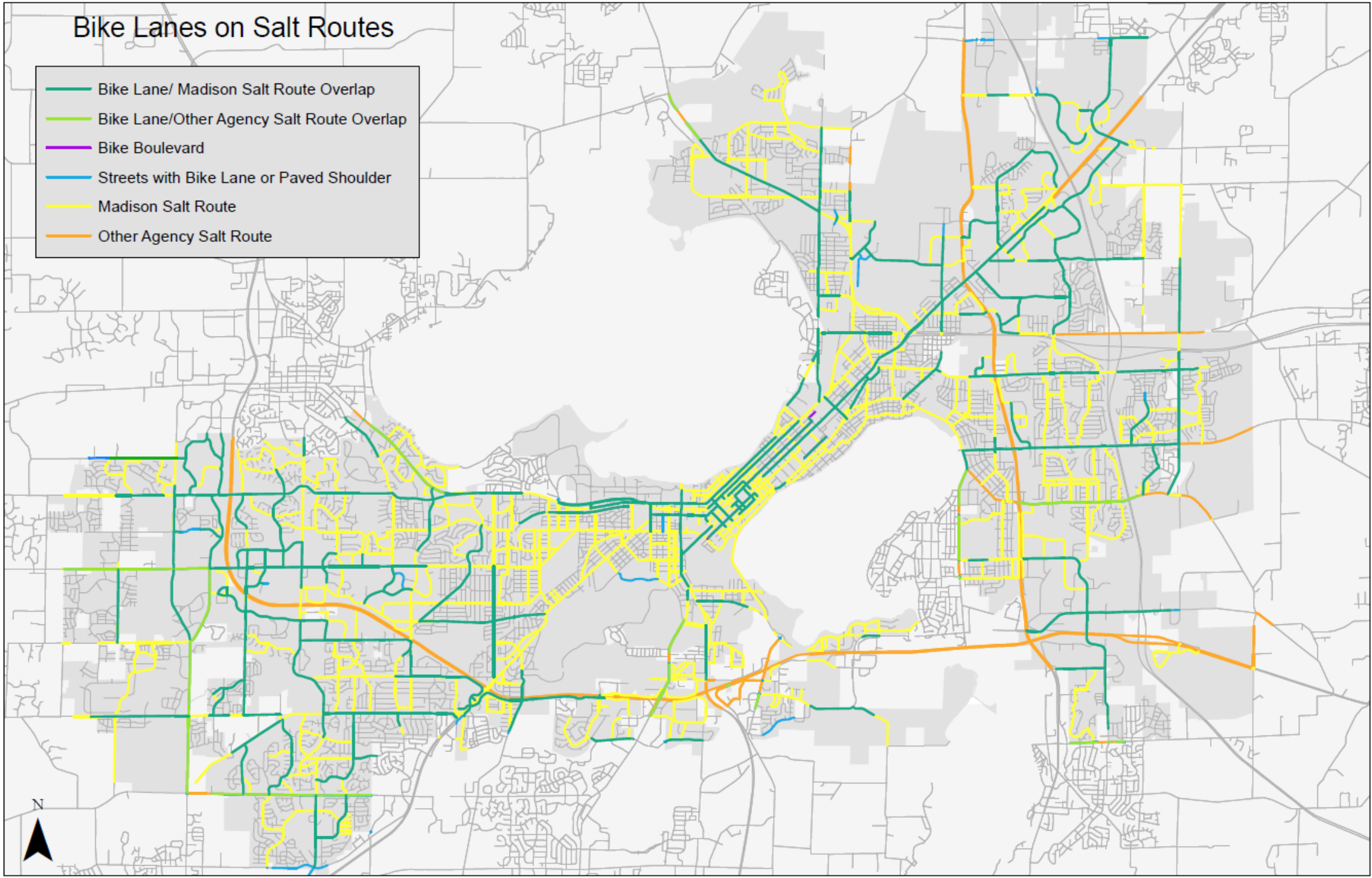
Streets Division covers 900 lane miles on salt routes.

Some on-street bike facilities exist on county-salted lanes (i.e. Monona Drive)



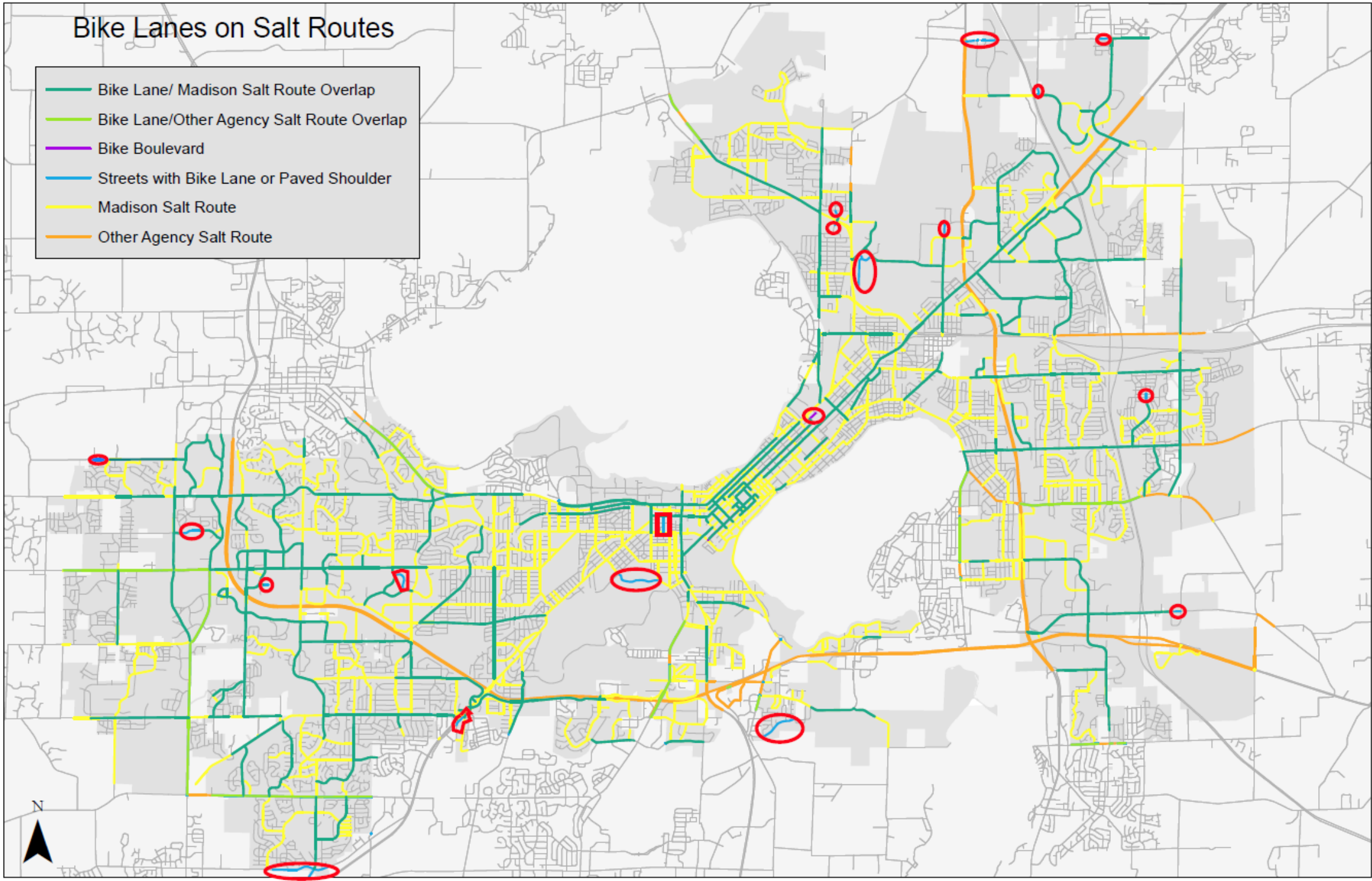
BIKE LANE/SALT ROUTE OVERLAP

Substantial overlap between salt route network and existing on-street bike lanes



BIKE LANE GAPS

Red circles are the areas of on-street or paved shoulder bike lane not covered by city or other agency salt routes.



SHARED USED PATH WINTER MAINTENANCE

SHARED USED PATHS

Arterial

- High volume paths (e.g. SW Commuter Path, Cap City Trail).
- Goal - Plowed by 7:00 AM, Monday through Friday, excluding holidays) to facilitate users commute to work and school.

Secondary

- Incorporated into the City's snow plow routes for bus stops and sidewalks that abut City-owned parcels and bridges.
- Goal - no later than 4:30pm the day after the snow has stopped falling or ice accumulation.

SALT AND SAND USAGE

- Goal is to minimize use of salt on shared paths.
- Use 95% sand and 5% salt mixture.
- Ongoing pilot pretreating with brine on SW Bikepath.

WINDROW REMOVAL

- Windrows form at points where a shared use path crosses a city street.
- Plowing operations can last for multiple days after a snow event and recreate windrows multiple times.
- Crews revisit these intersections daily during plowing operations to clear the windrows.

EQUIPMENT

ONE TONS & JEEPS

- Equipped only with blades.
- Function same as large trucks with blades used on streets.
- Blade does not ride directly on pavement.
- Equipped with shoes to set blade up off pavement.
- Does not completely remove snow; leave hard pack.

ARTICULATING TRACTORS & TOOLCATS

BROOMS

- Ideal for dry and minimal snow conditions (3” or less)
- Removes snow to surface if not hardpacked
- Works well after pretreating with brine which prevents snow from bonding to pavement

BLADES

- Used for heavier, wet snow falls
- Function same as large trucks with blades used on streets.
- Blade does not ride directly on pavement.
- Equipped with shoes to set blade up off pavement.
- Does not completely remove snow; leave hard pack.

BLOWERS

- Used for heavy accumulations

BICYCLE FACILITY MAINTENANCE WORKGROUP RECOMMENDATIONS

STANDARDIZATION

Recommendation

- Focus on standardizing practice and protocols for path maintenance (Research and adopt best practice regarding use of brine, salt, sand and equipment (brush vs blade) across all departments that maintain bike facilities.

Actions

- Created inter-agency staff team composed of supervisors and operators to discuss opportunities for implementing best practices across agencies to develop more standardized procedures.
- Continue to research and pilot best practices to determine their effectiveness in Madison.
- Share pilot results across Divisions with the focus on implementation system-wide as applicable.
- Developing cost estimates for equipment required to standardize services across agencies.

INCREASE LEVEL OF SERVICE

Recommendations

- Provide weekend and holiday snow removal from arterial paths.
- Windrows at path crossings are cleared quickly after they're formed,
- Sand is only applied to icy areas on paths and sand accumulations are removed as soon as conditions permit.

Actions

- Cost to provide weekend and holiday snow removal from arterials paths could be included in 2020 operating budget request if Mayor and Common Council are able to fund.
- Pilot in progress to clear area of street upstream from the path to provide space for plow to shed snow prior to arriving at path crossing. If effective in minimizing windrows will provide cost-estimate to implement city-wide.
- Sand and sand usage - agencies are working to standardize practice.
- Based on brine pilot results Engineering and Parks will consider expanding to portions of the Capital City Trail for the 2019-2020 winter.

PUBLIC INFORMATION

Recommendation

- Up-to-date winter bikeway maintenance service-level standards are published on city's webpage.

Action

- Current Public Works Bikeway Facilities Maintenance Program Manual posted on city's webpage.
- GPS is being implemented for Public Works fleet. Project includes sensors to track when a plow is up or down and when brine, salt and/or sand is being applied. Data will be made available on a public facing map to provide citizens with information as to when streets and paths have been plowed. We anticipate this going live the winter of 2019/2020.

DISCUSSION:

CITYWIDE PLOWING
DECEMBER 31 – JANUARY 1

Photos to follow were taken at 11:00a.m. on January 1.

This would be 11 hours after the start of the citywide plowing operation.

PAVEMENT BARE WHERE THERE IS SALT AND FREQUENT VEHICLE TRAVEL

NOTICE THE TIRE TRACKS THROUGH THE SLUSH

VEHICLE TRAFFIC MAKES A SIGNIFICANT DIFFERENCE

PARKED CARS PREVENT CLEARER BIKE LANES

CAN TAKE MULTIPLE DAYS TO CORRECT – IF WEATHER ALLOWS

NEED 2 SIMULTANEOUS THINGS TO PLOW/CLEAR A BIKE LANE:

1. PERSONNEL
2. ACCESS

EVEN WITH PERSONNEL AND ACCESS

STILL NEED SALT, TIME, TEMPERATURES, AND VEHICLE TRAFFIC FOR BARE PAVEMENT

SOUTHWEST COMMUTER PATH

December 31st through January 4th

MONDAY DECEMBER 31

- Path not pretreated with brine.
- High of 34 degrees; dipped to 19 degrees overnight.
- Started freezing rain about 5pm.
- Turned into snow about 6pm
- Total of about 3 ½" ending near midnight.

TUESDAY JANUARY 1

- Crew started at 12:30 AM and worked until 3 PM.
- Snow too heavy and wet for broom so used blades,
- High of 28 degrees; low of 19 degrees overnight.

WEDNESDAY JANUARY 2

- High of 27 degrees and dipped to 21 degrees overnight.
- Crew worked 7:30am to 8:00pm using brooms.

THURSDAY JANUARY 3

- Plowed and applied 4 cubic years of salt to path
- High temperature 37 degrees; low of 34 degrees.

FRIDAY JANUARY 4

- Crew plowed again.
- Salt and warm temperatures facilitated removal of remaining snow from path.

QUESTIONS?