

Evaluation of a Snow Miller/Paver



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Snow Paver Evaluation

Objectives:

- *Ship, assemble, modify and train operators on snow paver use*
- *Use in as many applications as appropriate*
- *Evaluate effectiveness for use on snow roads*

Snow Paver Evaluation

Outline:

- 1. Background*
- 2. Test sections*
- 3. Monitoring test sections*
- 4. Trafficking tests*
- 5. Other miller/paver uses*
- 6. Pros & cons: options for consideration*
- 7. Where are we going?*

1. Snow Paver Background

Ice shelf crew has limited equipment for surface compaction and no equipment that can mill old or clumped, sintered, or wind blown snow into fine particles for sintering.

Currently at McMurdo

- ❖ Limited surface compaction tools (delta rolling)*
- ❖ No milling capacity*

Advantages:

The snow paver uses a cutting, leveling, milling, and vibratory compaction process all in one implement.

Tasks

1. *Arrival, assembly and adjustments of paver controls (vibration, tow speed, down pressure, gate height, etc.)*
2. *Create test sections on road and fresh snow*
3. *Train ice shelf operators on snow paver use*
4. *Operators use paver on as many applications as possible*
5. *Documents use and results*

The Snow Paver Arrives....

- 1. The paver arrived at McMurdo 6 Nov 2011*
- 2. Russ Alger from KRC was present to assemble and train staff on the use*
- 3. Major issue : Where's the PTO?*

No vehicle with PTO available so on-the-fly modifications were needed.



Major Components



- 1. Leveler blades*
- 2. Miller drum*
- 3. Hydraulic reservoir*
- 4. Vibrating pan*
- 5. Lift gate at rear*
- 6. Lift wheels*

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- 6. Lift wheels for over road operations*

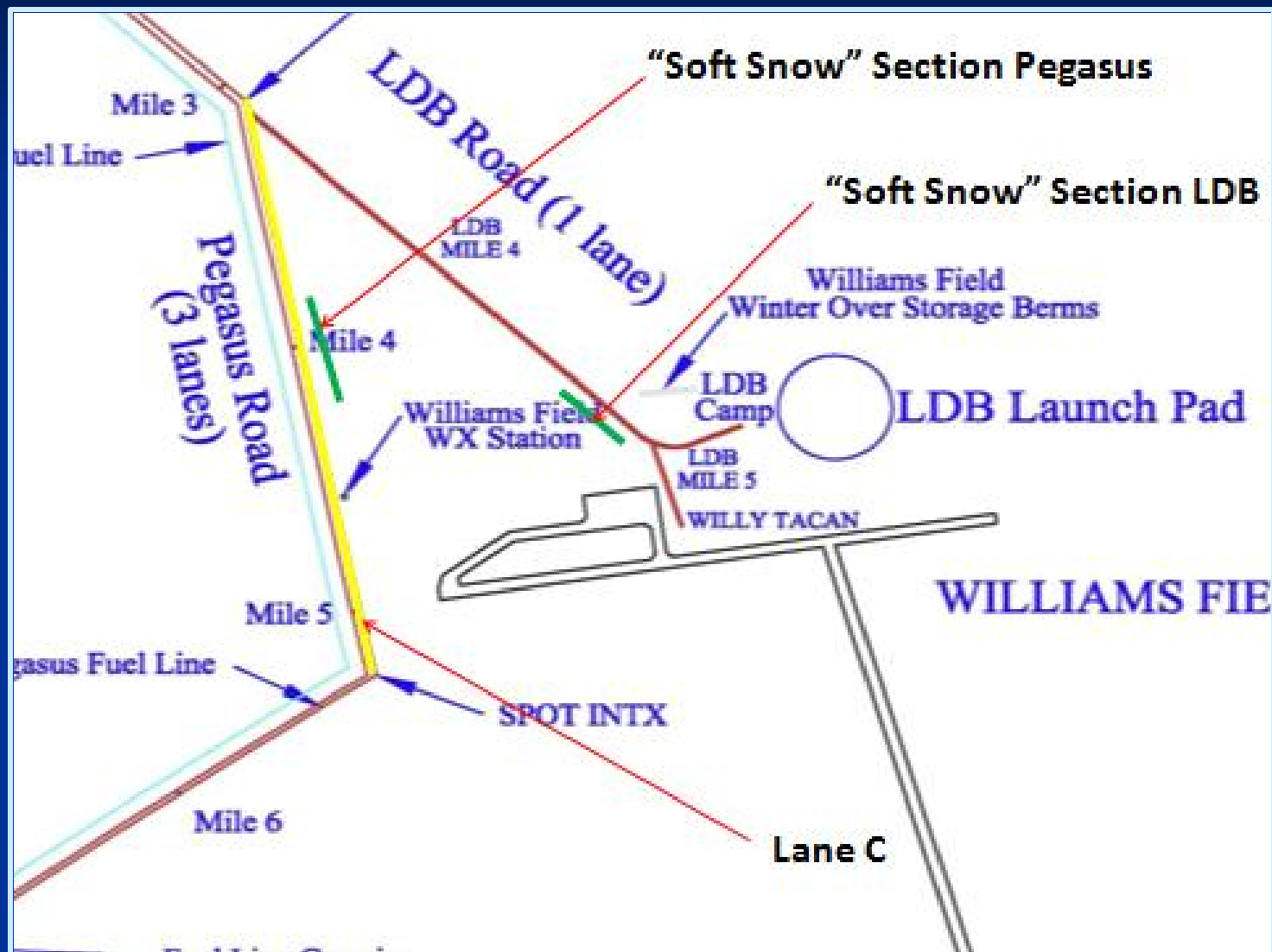
2. Test Sections

Three tests sections constructed in November 2010:



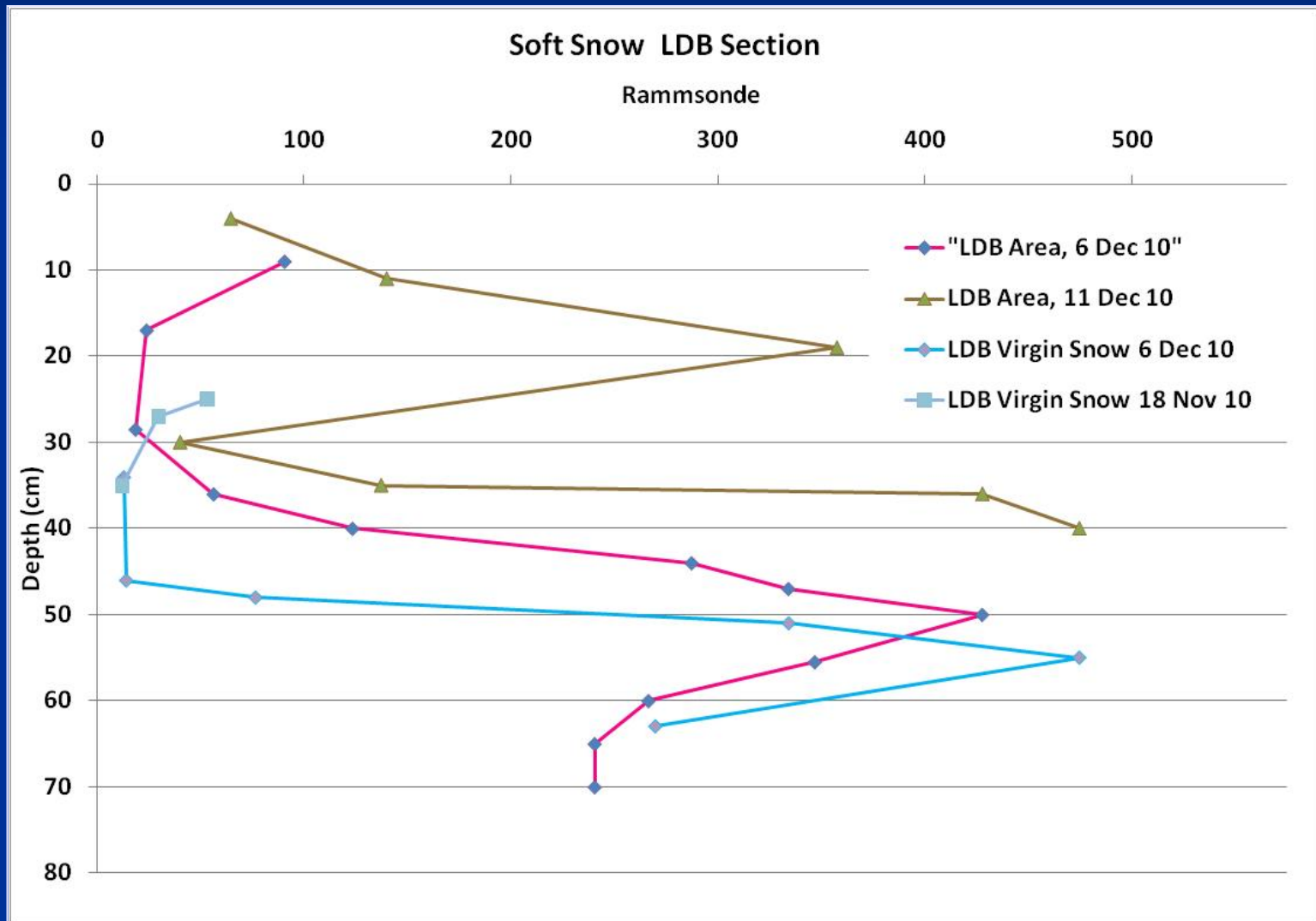
- 1. Pegasus Rd test lane
(maintenance)*
- 2. Fresh snow test
section along LDB Rd
near Williams Field
(construction)*
- 3. Fresh snow test
section along
Pegasus Rd near Mile
Post 4 (construction)*

Test Section Locations



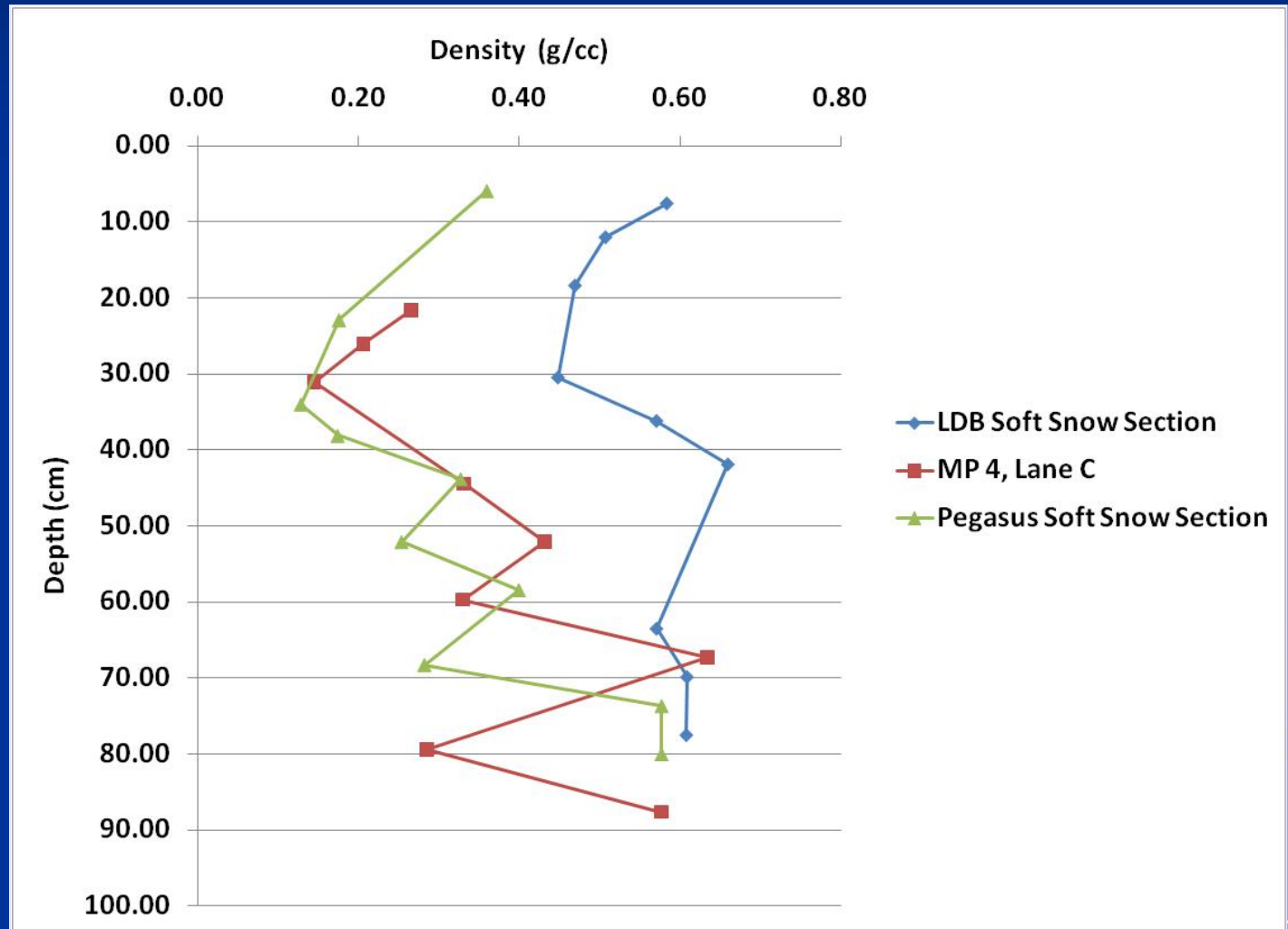
Strength Gain from Construction

Test section (red and green) constructed on virgin snow (in blue)



Increased Density in Paver Sections

Especially for the soft snow section along LDB Rd



Initial Observations



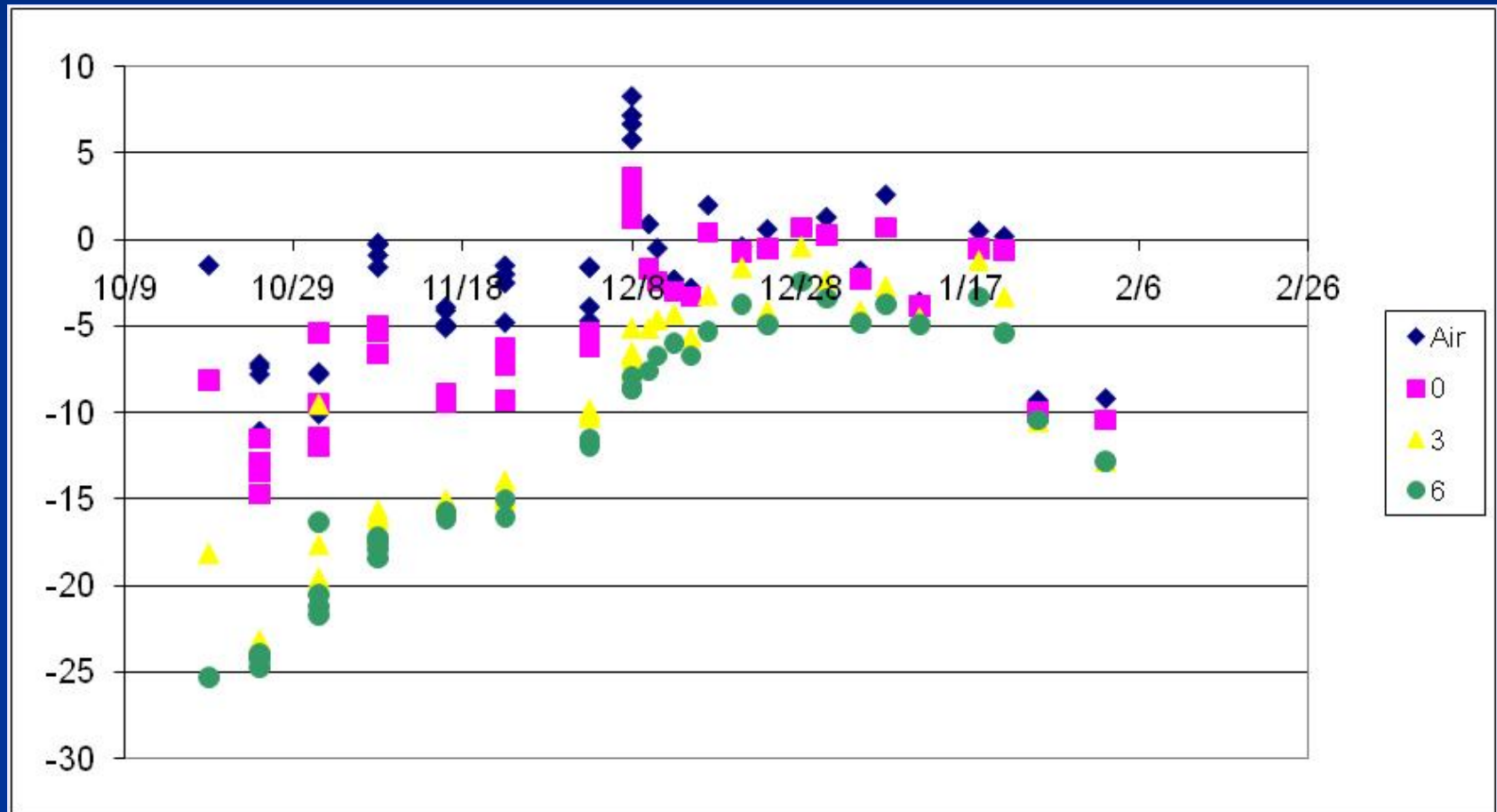
New test road supports a Challenger during tests 10 days after construction

3. Test Section Monitoring

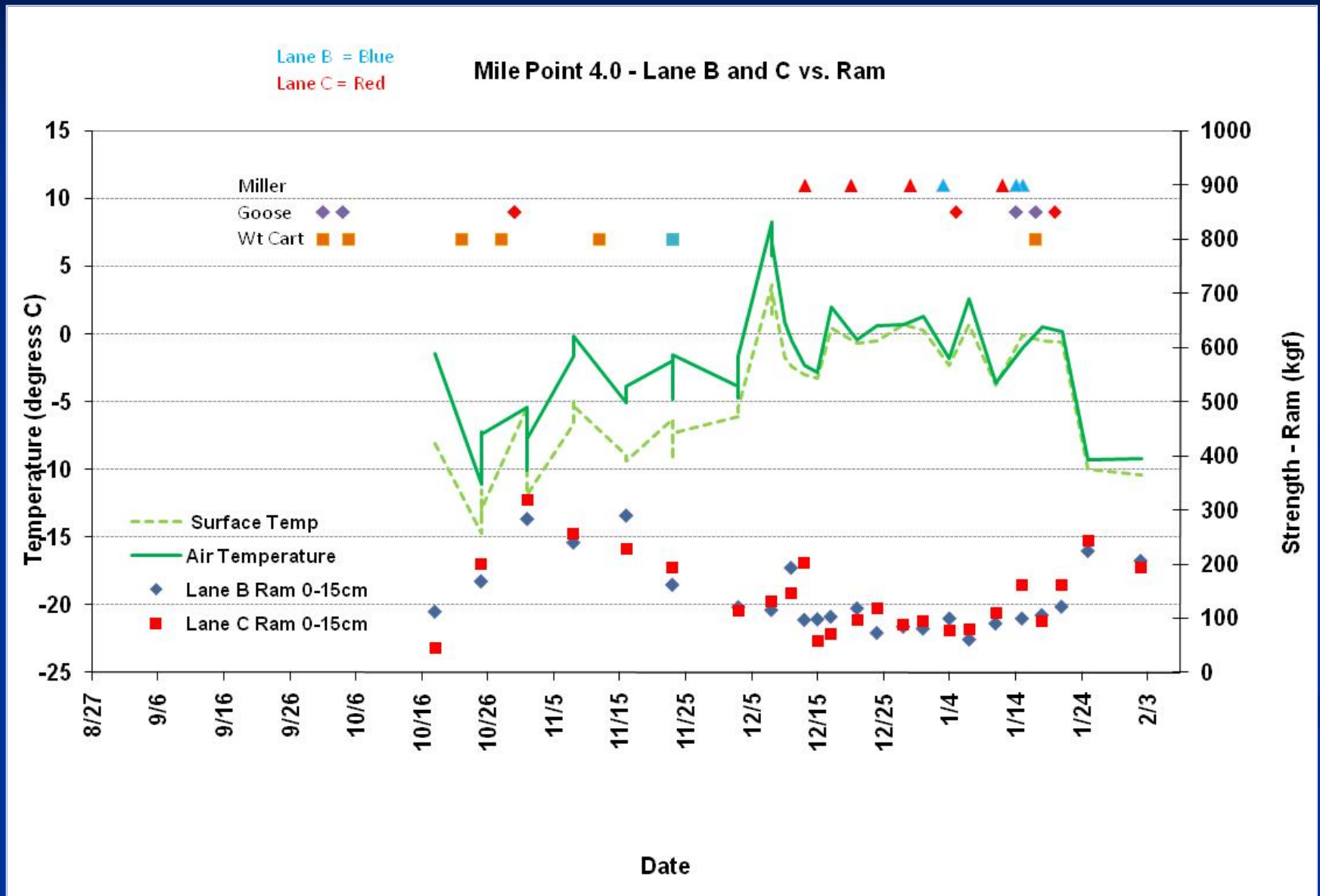
- 1. Initial Rammsondes immediately after construction*
- 2. Periodic Rammsonde, temperature, clegg and maintenance tracking throughout the season*
- 3. Coring for density*
- 4. Vehicle traffic impact study in Dec*

Road Tests Section Monitoring

Temperatures at Mile Post 4, Degrees C



Road Tests Section Monitoring



4. Trafficking Tests

December 2010

- 1. Fresh Construction Test Section*
 - 1. For LDB Rd*
 - 2. For Pegasus Rd*
- 2. Pegasus Rd Test Lane C (lanes A, B, and Track Lane comparison)*

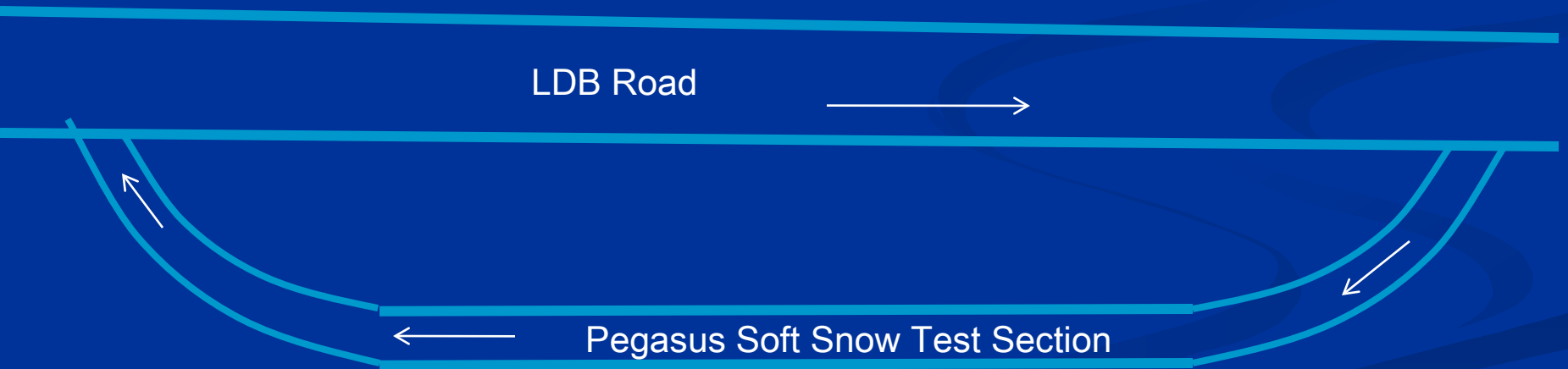
Intent to repeat during warm weather not successful



Test Driver and measurement assistance provided by Matt Myhre . Van graciously provide by Scott Battion, LDB Camp Manager

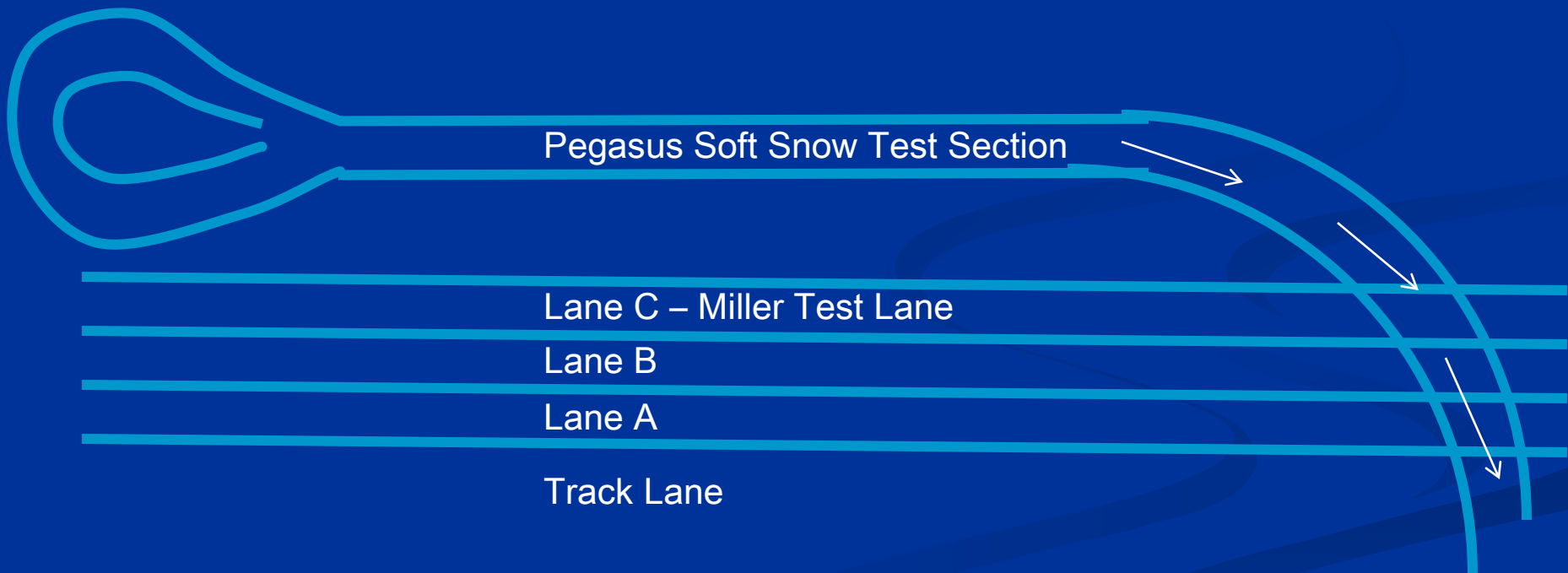
Trafficking Tests

New Construction along LDB Rd, 14 Dec 2010



Trafficking Tests

Trafficking Tests on Pegasus Sections
(Soft Snow and MP 4 Test Lane), 15 Dec 2010



Trafficking Results

LDB Fresh Snow Test Section

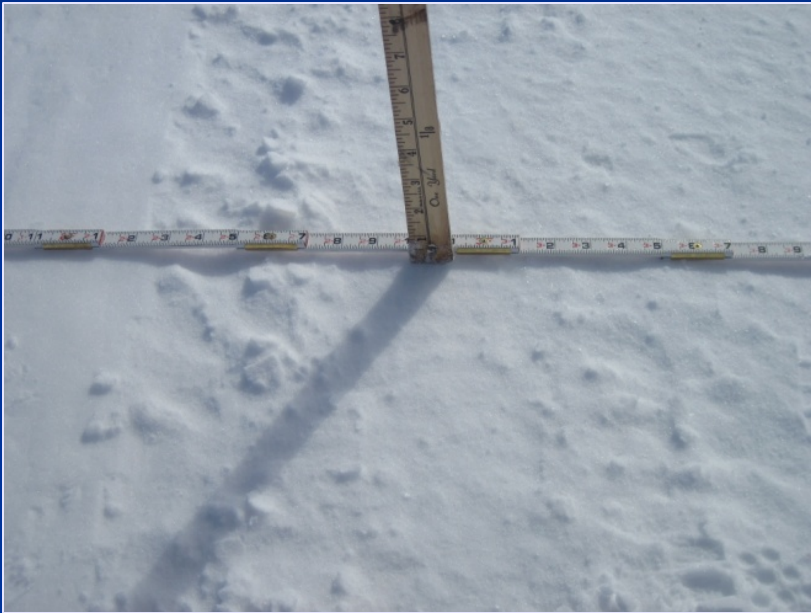


*After 4 passes at 15 mph shows
no appreciable rut depth, only track imprint*

Therefore, all remaining passes were at 25 mph

Trafficking Results

LDB Fresh Snow Test Section



*Left and Right ruts after 15 passes
still no appreciable rut depth, only track imprint
(25 mph)*

Trafficking Results

LDB Fresh Snow Test Section



*Left and Right tracks in area where vehicle bounces
after 15 passes at 25 mph*

Trafficking Results

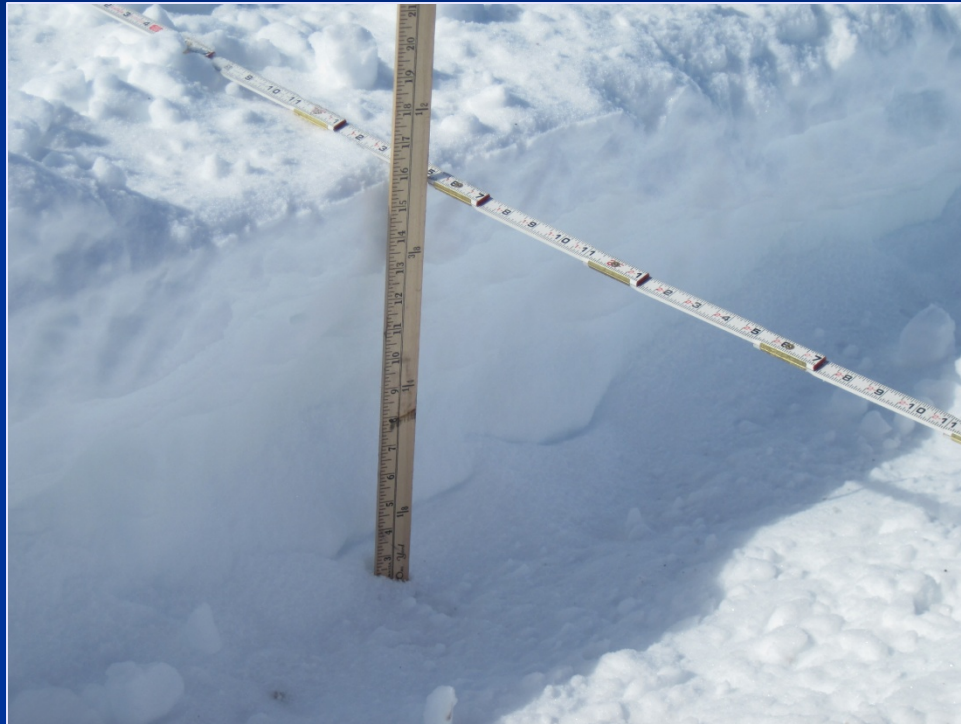
LDB Fresh Snow Test Section



The curve at the north exit ramp shows very little impact even at 25 mph and the increased shear from turning

Trafficking Results

LDB Fresh Snow Test Section



However, a 16 inch rut with shear vertical walls formed in a bad spot (15 passes, 25 mph)

Trafficking Observations



5. *Other Snow Paver Applications*

➤ *Repairing blowouts on the LDB launch pad*

1. *Push weight cart out*

3. *Track pack*

2. *Fill hole with fresh snow*

4. *Miller smooth and compact*



Other Snow Paver Applications

Working Scott Base Transition Area During Warm Spells

- 1. Back up paver so blades are biting into the snow to fill the holes (feathers the snow going backwards).*
- 2. Stop and lift the 3-pt hitch to drop the snow into the low spots or holes*
- 3. Proceed forward very slowly letting the vibratory compactor sit at problem areas*



Snow Paver at Scott Base Transition (continued)

*Leave the compactor
sitting over the weak
spots.*

*This leaves a smooth trail
and compacts the
holes very well, even
for warm, wet snow.*

*Vans can drive over it
immediately*



6. *End of Season Assessment*

➤ *Pros*

- *Nothing like this at McMurdo (no miller, no surface compaction)*
- *Variety of uses (blowout repair, normal maintenance, new snow sections, Scott Base Transition repairs during melt season, repair on Pegasus (runway, town and apron))*
- *Device is mostly operational , even w/o PTO, w/ minor repairs/breakdowns*
- *Hydraulic motor option proposed for full power to all component*

End of FY10 Season Assessment

➤ *Cons*

- *Device is currently underpowered*
- *Dimensions not ideal for snow roads (longer and wider desired)*
- *Still need to goose after storms (paver not long enough)*
- *Welds should be reinforced*
- *Vibrator motor had some issues during the season*
- *Research equipment, needs an owner*

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Fleet Operations Response

- *I think the miller paver is the way of the future, I wish we had a tractor with a PTO so we could achieve the true results the machine is capable of producing.*
- *If possible the machine should go on a flat bed trailer somewhere where it wont catch snow only to have someone tear up the hydraulic lines trying to clear winter harden snow from it*
- *Parts should be stored by the parts people at the VMF in their MAPCON tracking system*

Status

- *Operation manuals and initial assessments delivered*
- *Equipment maintenance transferred to contractor*
- *KRC motor upgrade nearly complete and will ship this summer*
- *Continuing testing and analysis for next season*
 - *Additional training for ice shelf fleet operations*
 - *New test sections milling old snow, layered pavements, warm season construction*
 - *Clegg and rammsonde strength with temperature*
 - *Strength monitoring*
 - *Trafficking tests*

Thank you!

We worked closely with many folks at NSF and Raytheon on all aspects of this project:

- *George Blaisdell, Jen Mercer, Lynette Barna, Renee Melendy*
- *Marty, Kent, Gary, Jean*
- *Ice Shelf Crew: Carlie, Jules, Christy, Matt, Guy, Juan, Dustin, Steve, Rob, Jeff, Brent, Jim*
- *Brett Allen, of course!*
- *And so many more.....*



