



Maintenance of a Heavy Haul Corridor

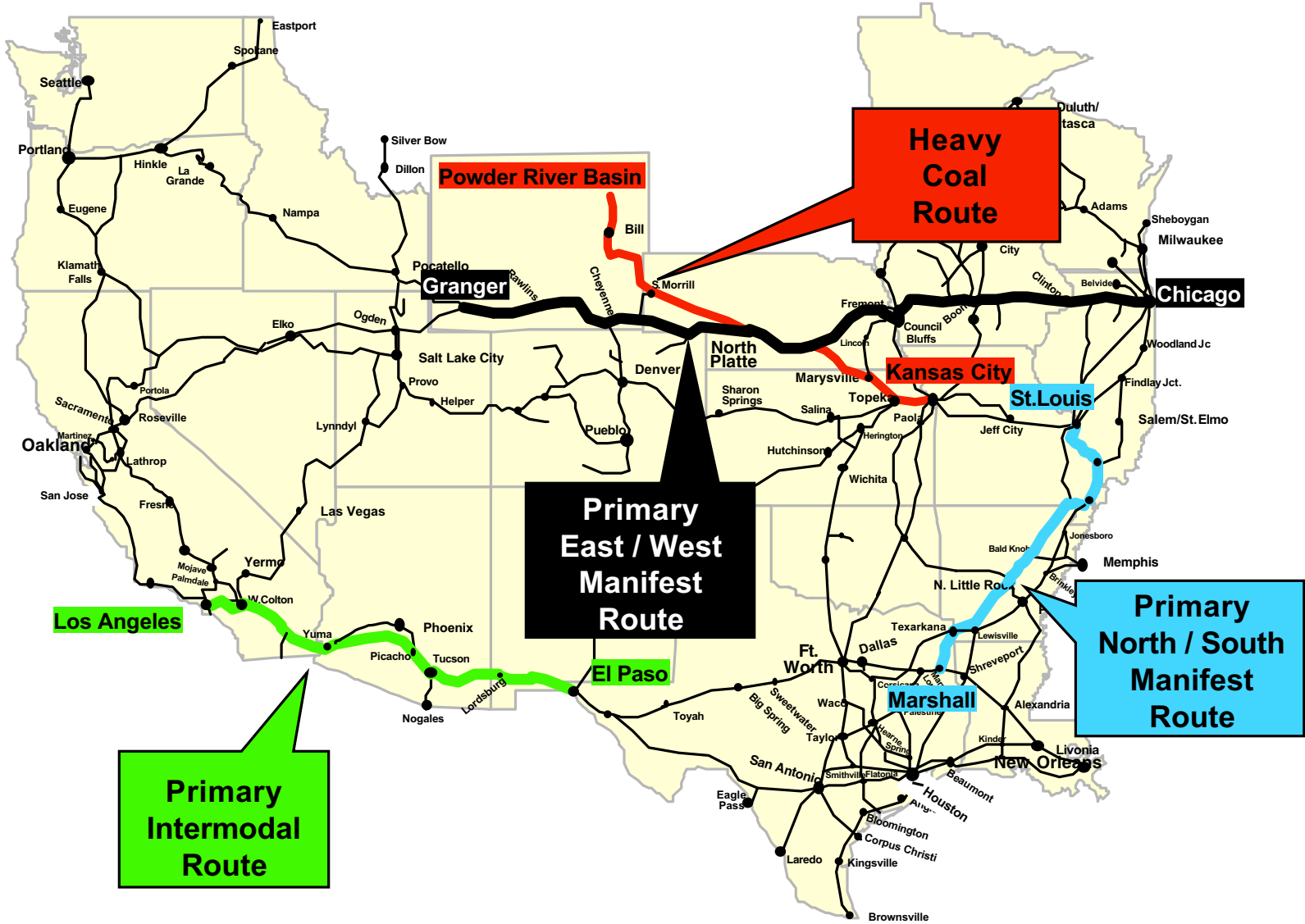
Gene Reilly

Chief Engineer, Maintenance of Way, Northern Region

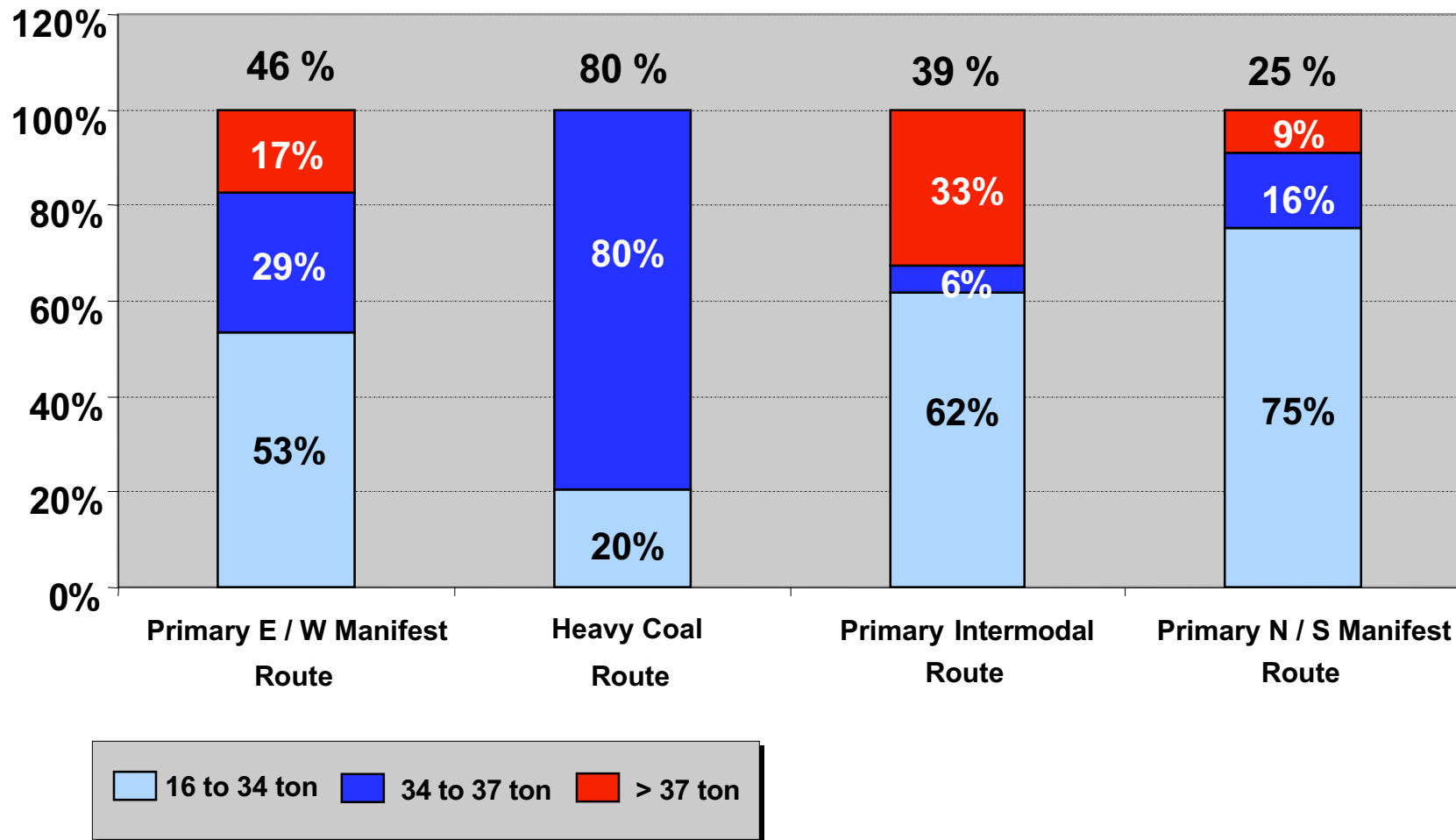
Maintenance of a Heavy Haul Corridor

- **Overview of Union Pacific Heavy Haul Corridors**
- **Contribution & Benefits of HAL Operation**
- **Maintenance Problems**
- **Heavy Axle Load Coal Territory**
- **Standard Track Section**
- **Maintenance Strategy**
- **Improved Detection Methods**

HAL Growth on UP Primary Corridors



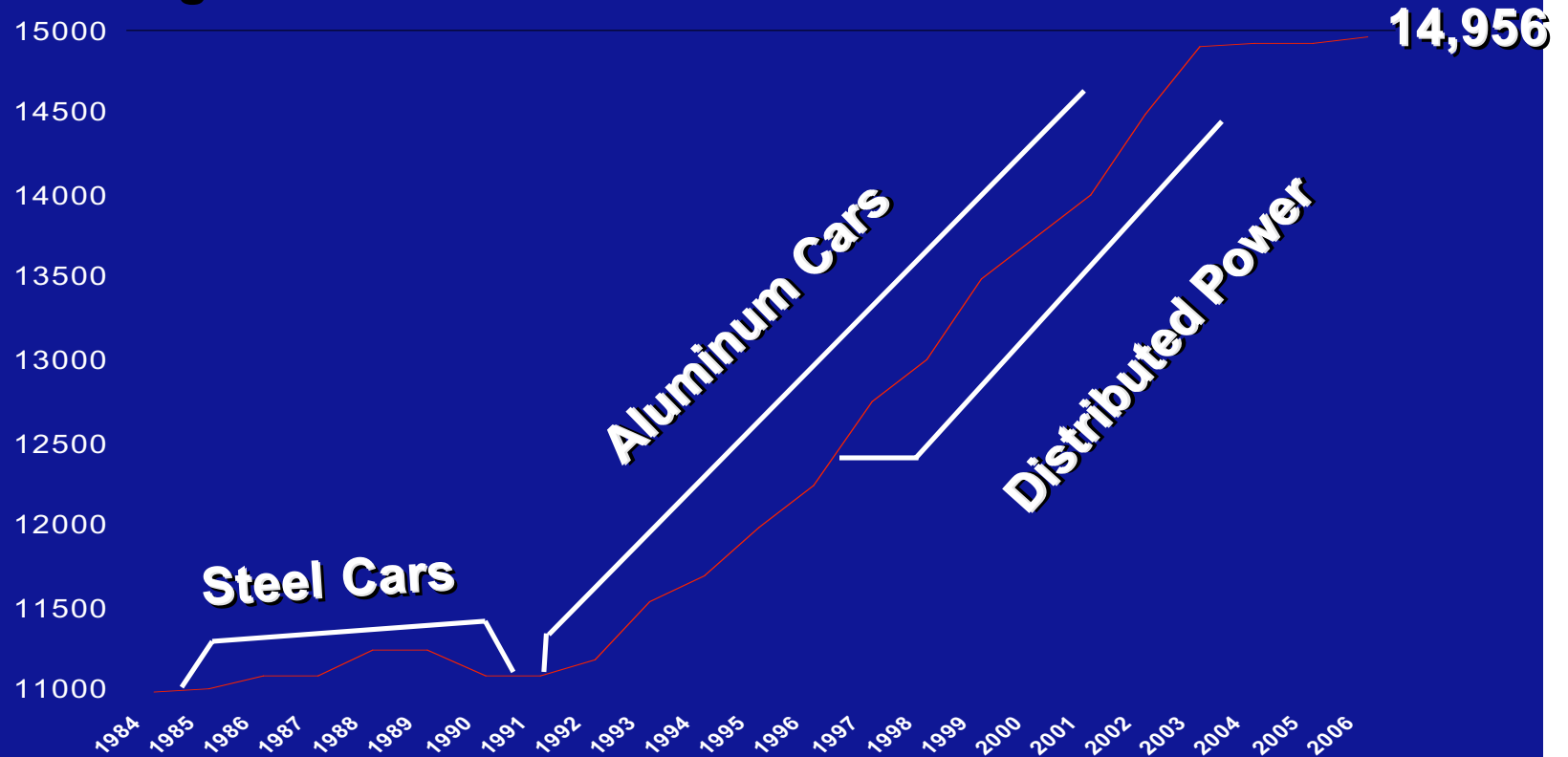
Current HAL Traffic on UP by Corridor Type



Union Pacific Productivity Initiatives

Southern Powder River Basin Coal

Avg. Tons Per Train



90% of SPRB loaded trains depart with Distributed Power Units
56% of SPRB loaded trains continue east of So. Morrill with DPU

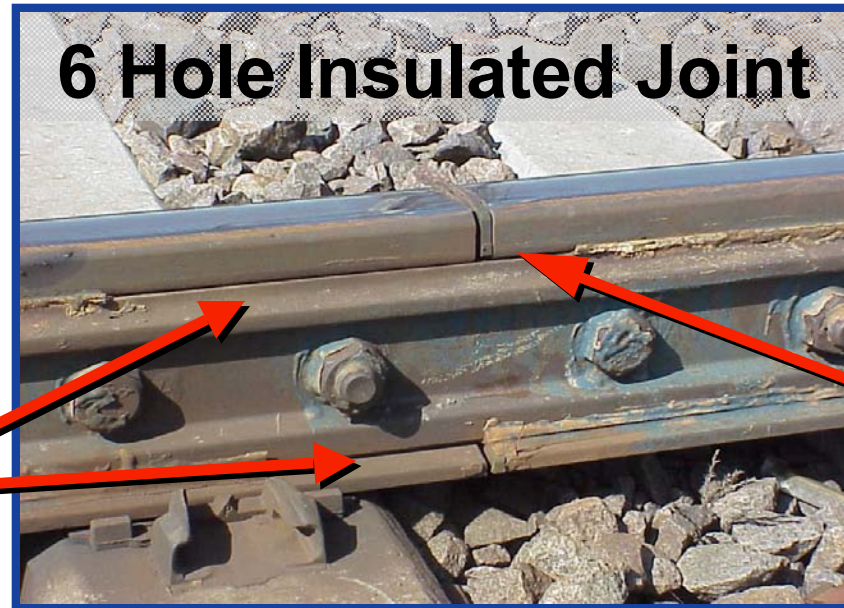
HAL Increases Maintenance

- **More Frequent Track Inspections**
- **Increased Rail Detection**
- **Preventative Rail Grinding**
- **Shorter Surface and Lining Cycles**
- **Track and Structural Components**
- **Drainage**

Heavy Axle Load Maintenance Challenge

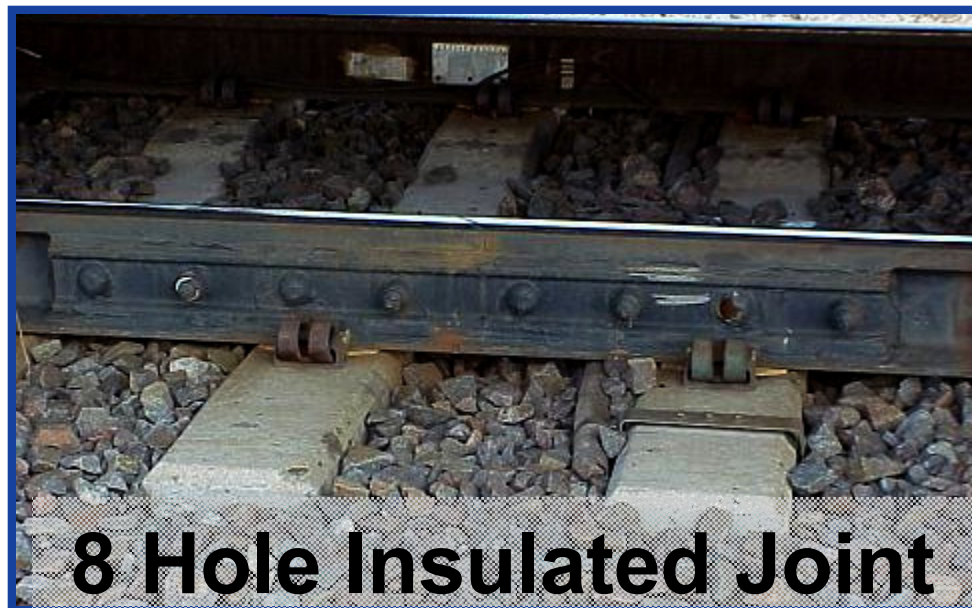
- **Insulated Joints**
- **Concrete Tie Pads**
- **Concrete Ties on Bridges**
- **Rail Spalling**

Typical Failure of Glued Bonded Joint



**Broken
Insulation**

Glue Failure



Second Generation Tie Plate



**Second generation
tie plates - FEA
shows 25% less
stress on plate**



**UHMWPE sheet
bonded to top of plate
for insulation**

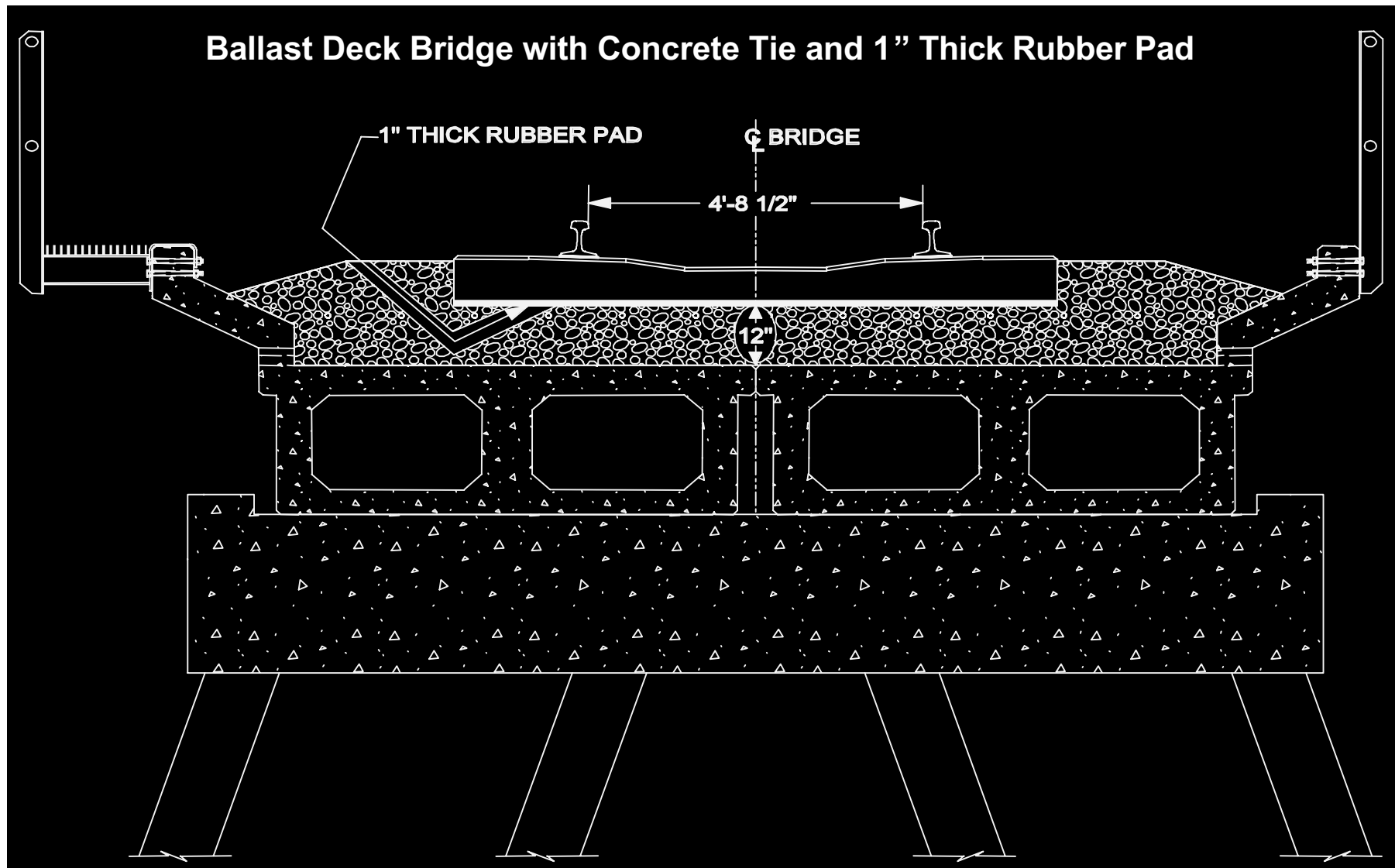
Rubber Pads



Concrete Ties on Concrete Bridge HAL Line



2 Test Bridges Installed with Rubber Underlayment Pads



Spalling on New Premium Rails

Spalling

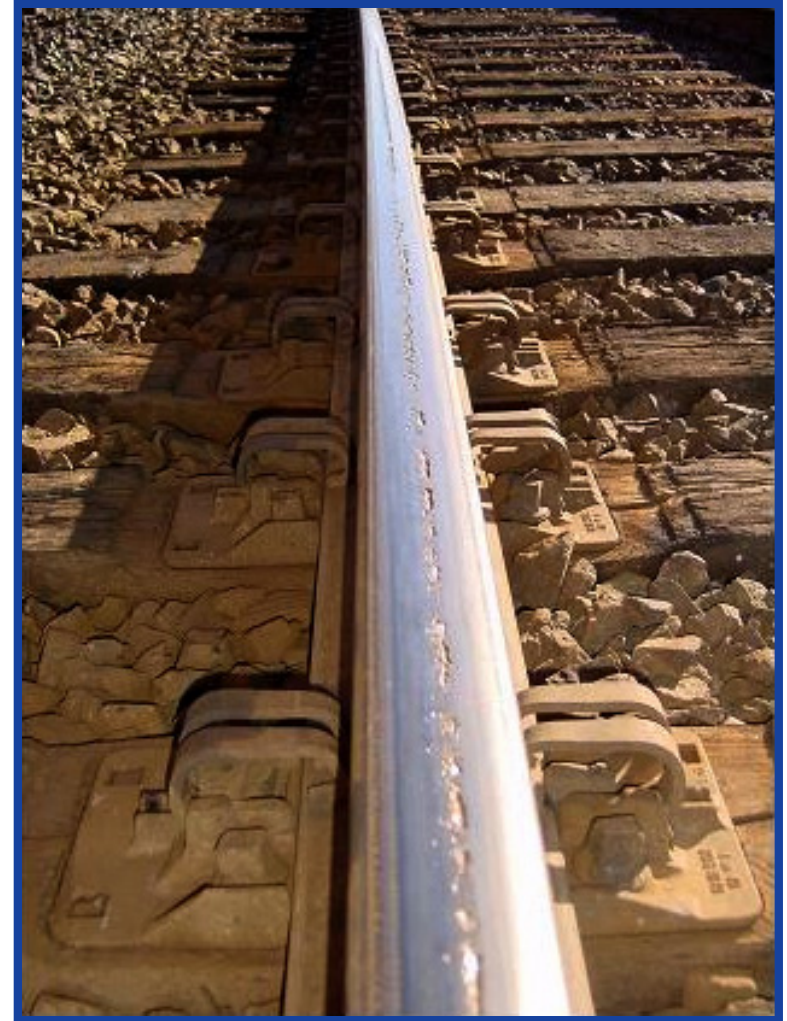
Low Rail on Curves

Rail

Premium Quality Steel

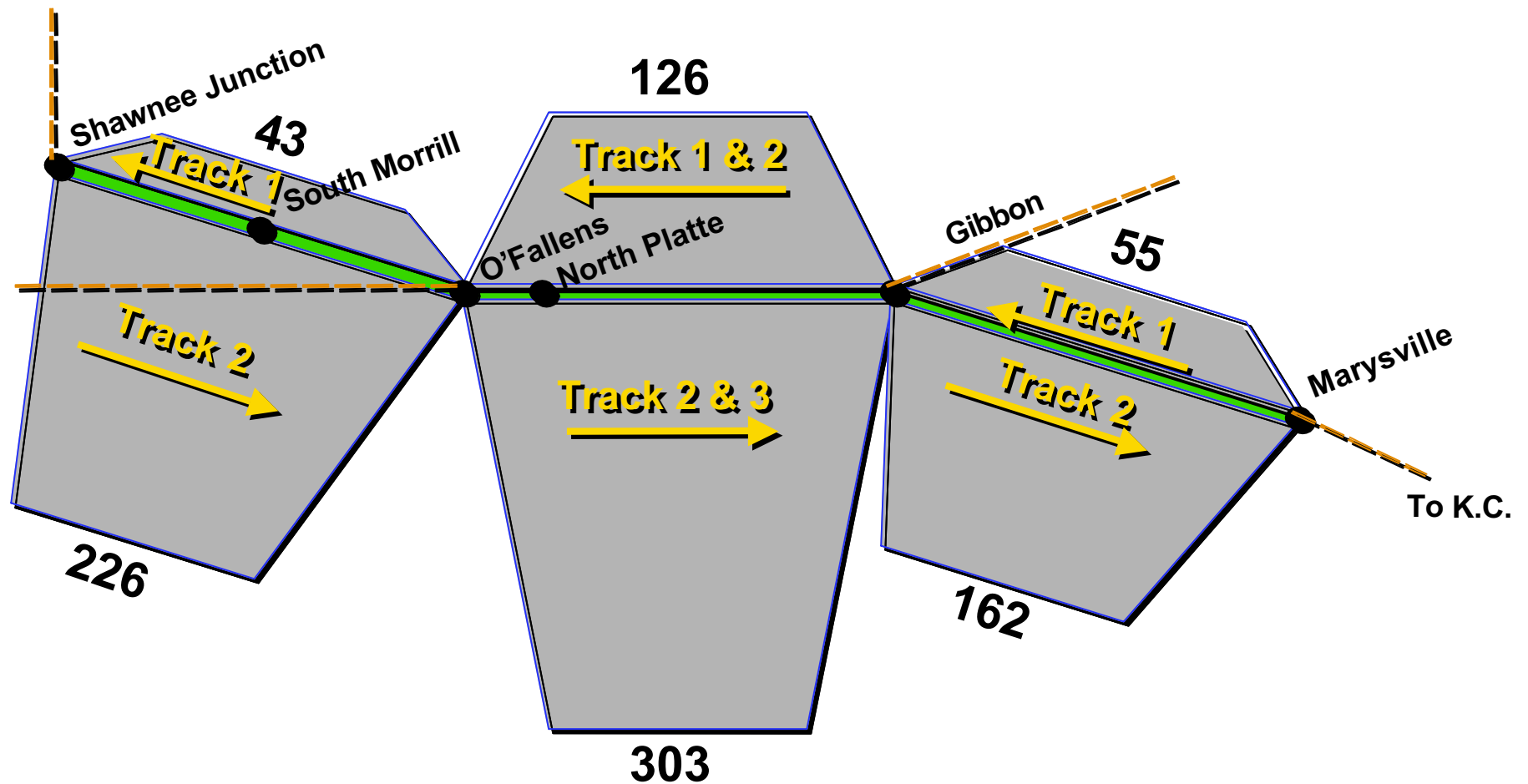
Superior Wear

Characteristics



2005 Tonnage

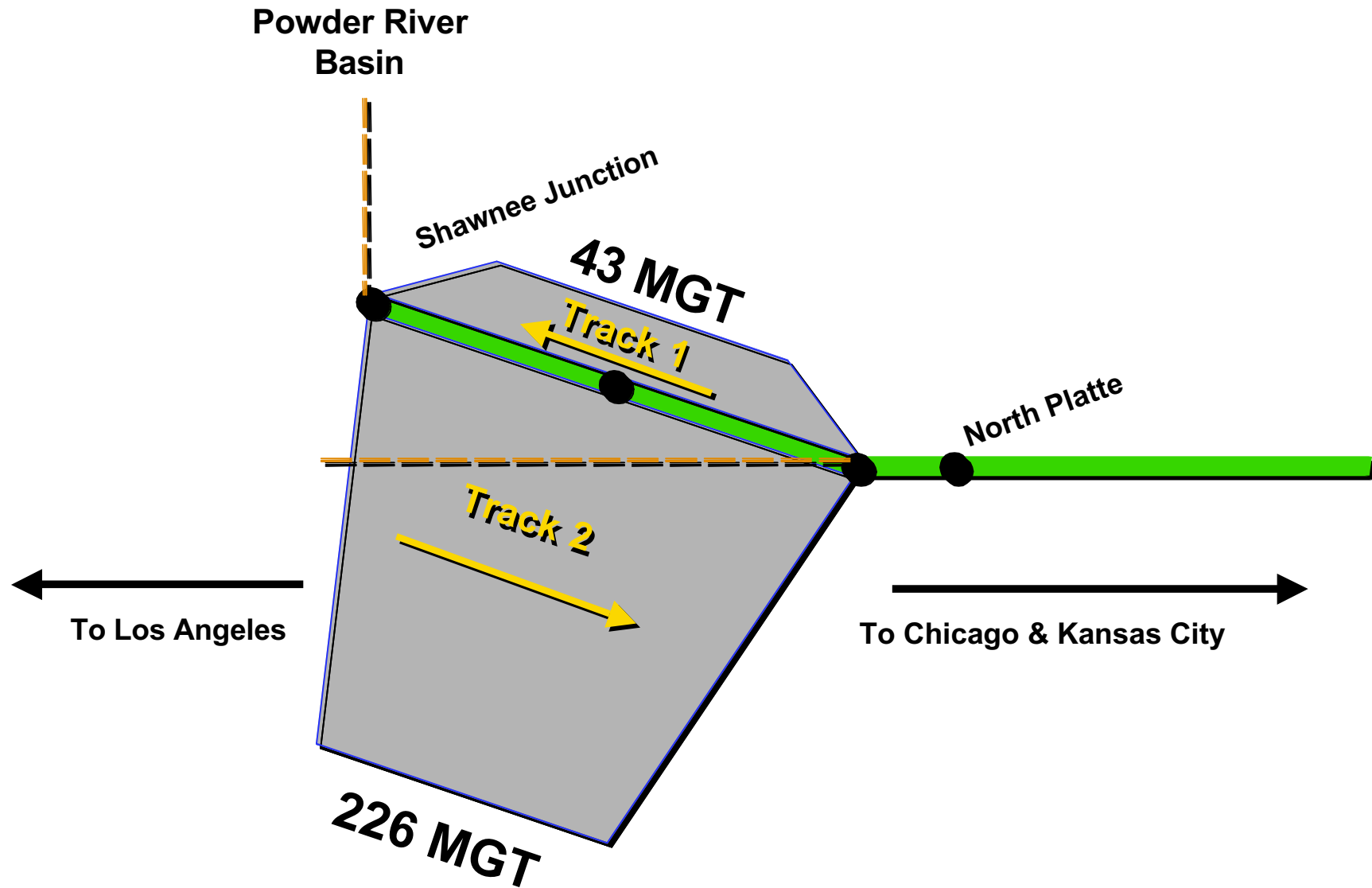
Powder River
Basin



Note: Avg. 6.1 Million Cycles/Year on South Morrill

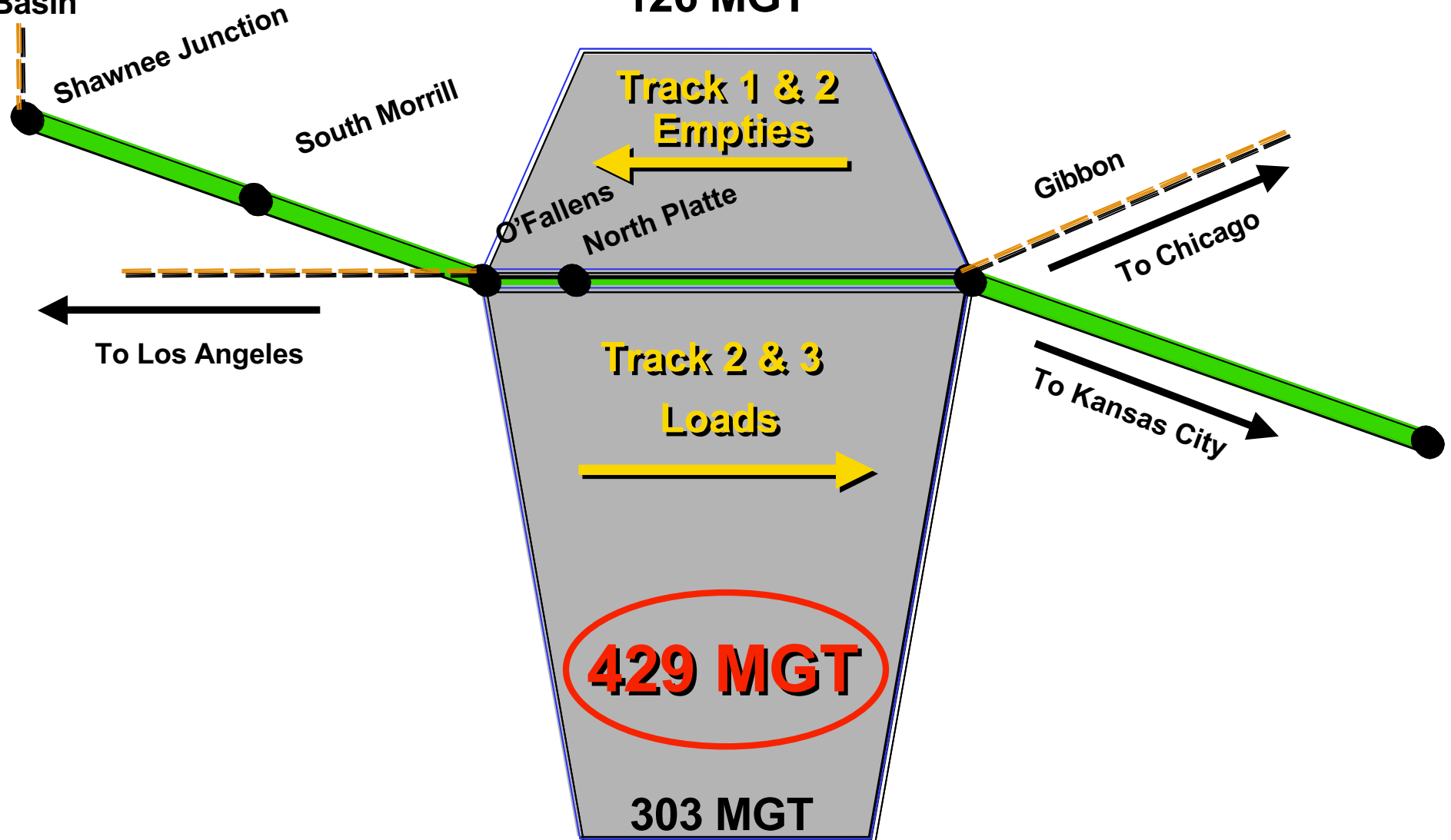
Tonnage reflected in Million Gross Tons

2005 Tonnage

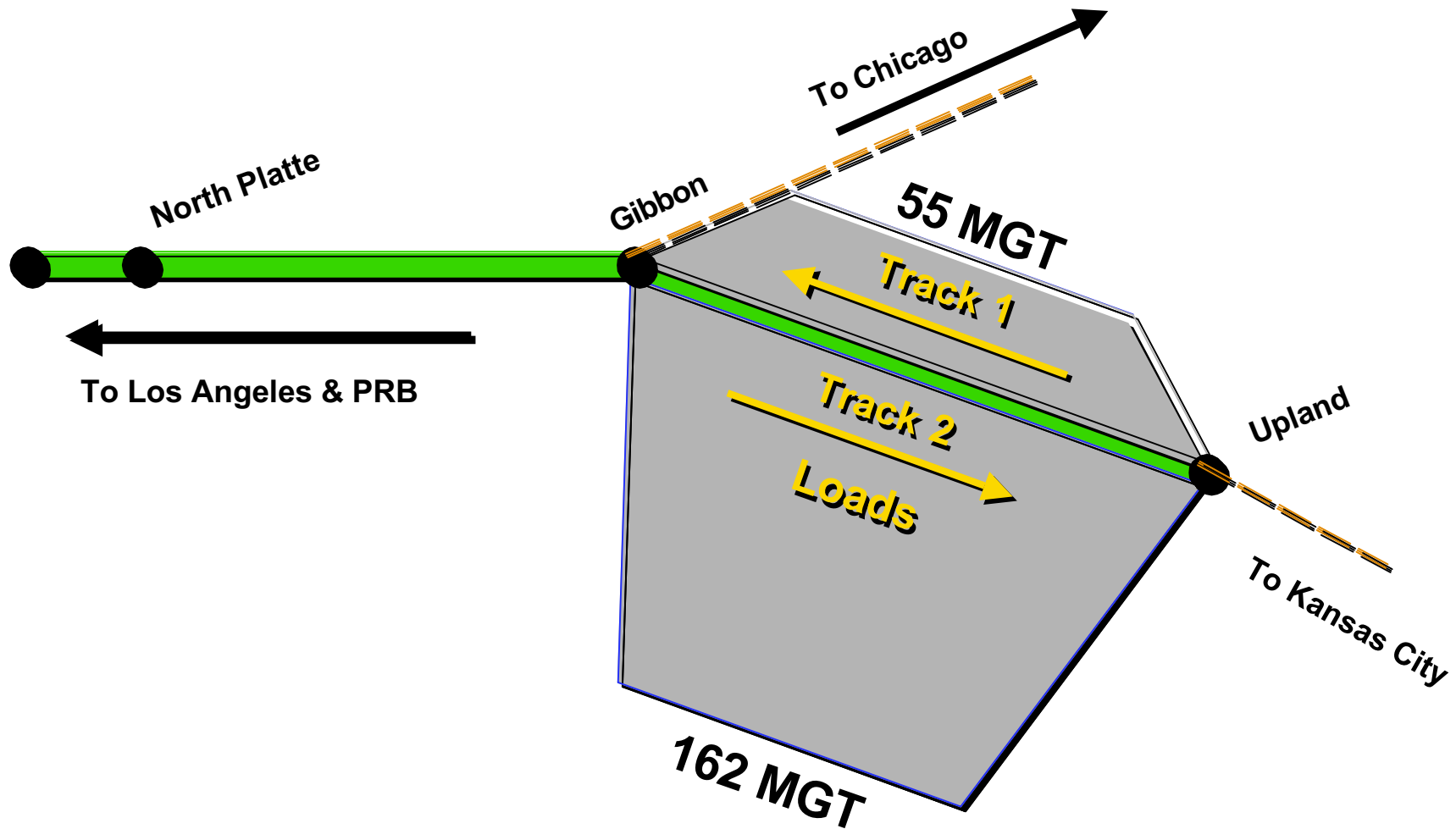


2005 Tonnage

Powder River
Basin



2005 Tonnage



UPRR HAL Standard Track Section

- **141# Rail Section**
- **Concrete Ties**
- **12" Ballast under Concrete Ties**
- **18" Shoulder Ballast**
- **Concrete Bridges**
- **Concrete Crossings**
- **Concrete Turnouts**
- **Moveable Point Frogs**

Plasser 09-3X Tamper



Benefits of Surfacing Track

- **Correct Track Alignment Profile and Crosslevel**
- **Distributes the Wheel Load Uniformly to the Subgrade**

Track Finishing Machine



Plasser RM80 Undercutter



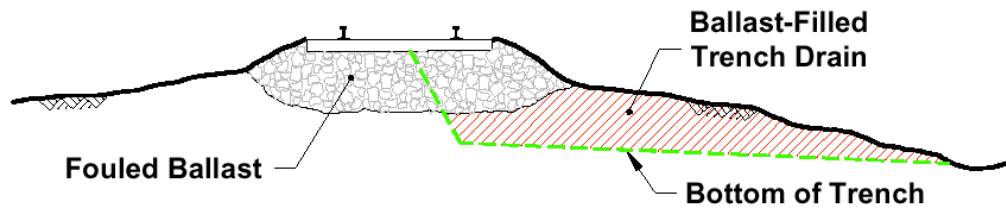
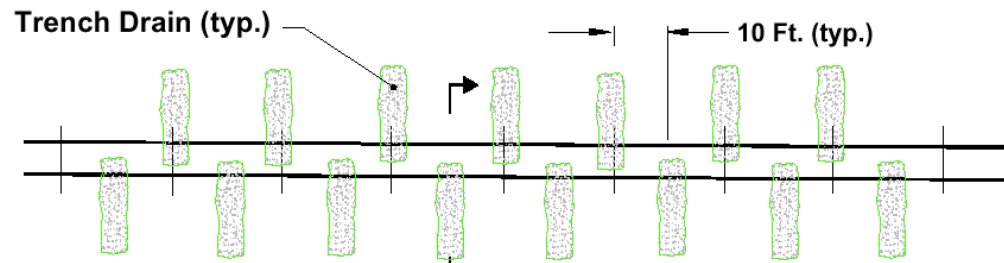
Benefits of Undercutting

- **Cleans Ballast Section**
- **Improves Drainage**
- **Prolongs Life of Concrete Ties**

Plasser RM80 Undercutter



Trench Drains



Trench Drains Benefits

- **Removes Water From Subgrade**
- **Opportunity to Observe Subgrade**
- **Minimal Interruptions to Train Operation**
- **No Special Equipment Required**

Loram Rail Grinder



Harsco Switch Grinder



Harsco Switch Grinder



Benefits of Rail Grinding

- **Prolong the Life of the Rail**
- **Improve the Life of Switch Components**
- **Reduces Rail Corrugation**
- **Extends the Length Between Surfacing Cycles**
- **Reduces the Fatigue Defects in the Rail**
- **Increase the Effectiveness of our Rail Detectors**

Ultrasonic Detection

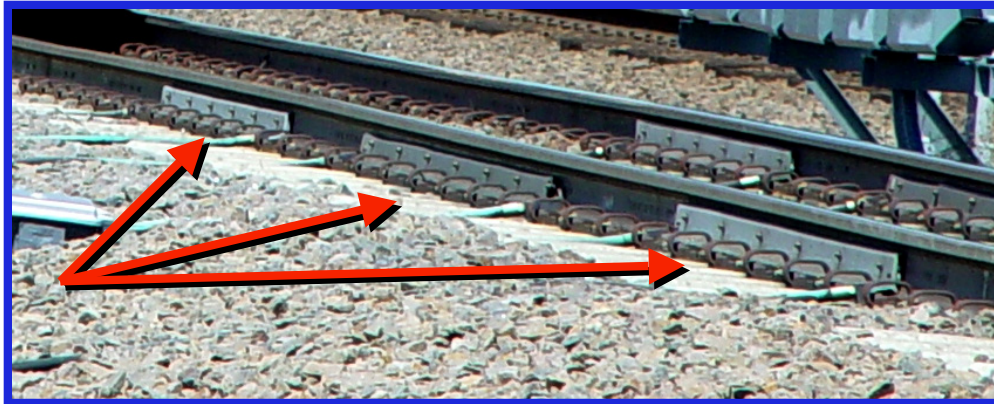
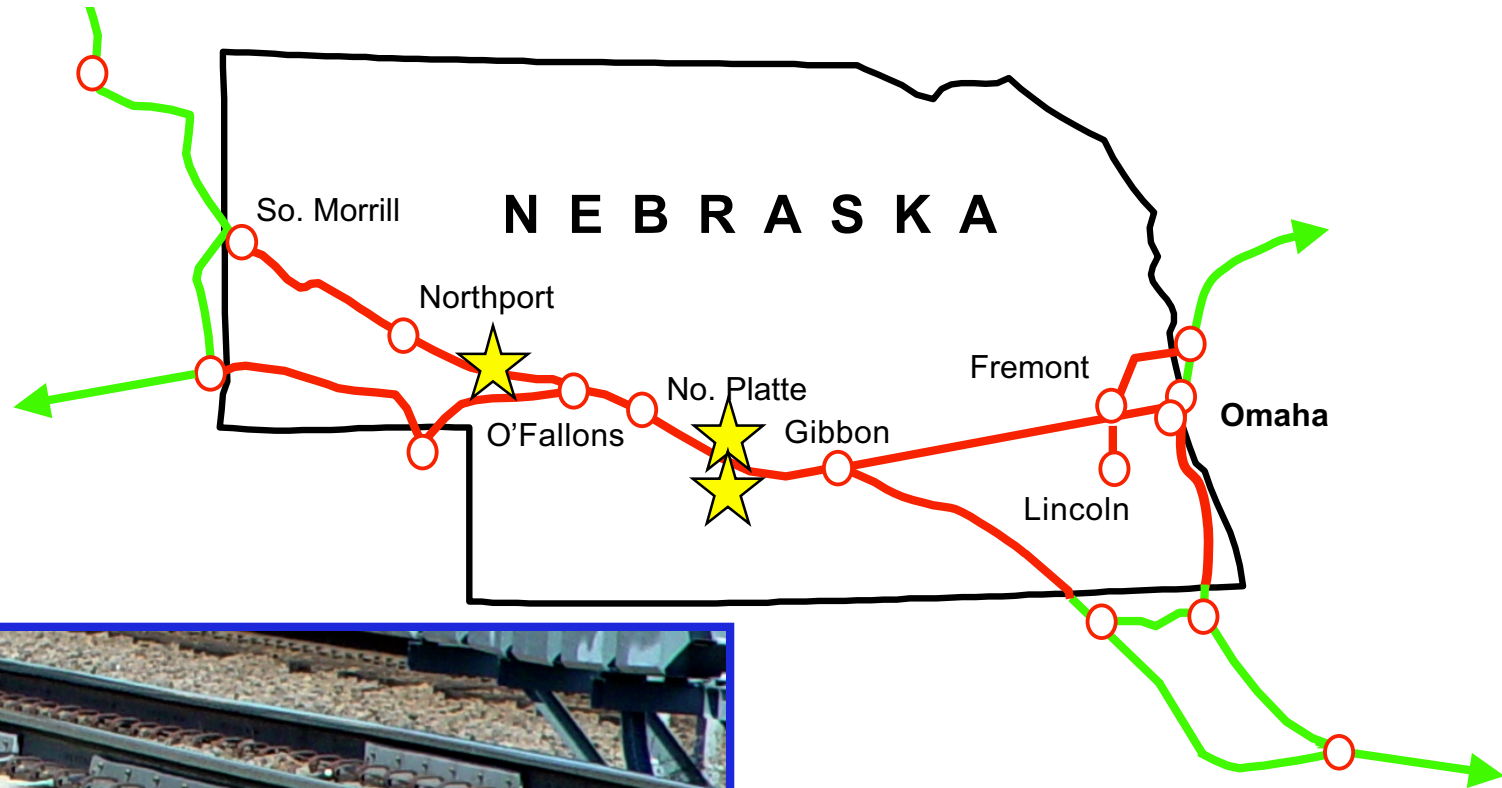


Ultrasonic Inspection



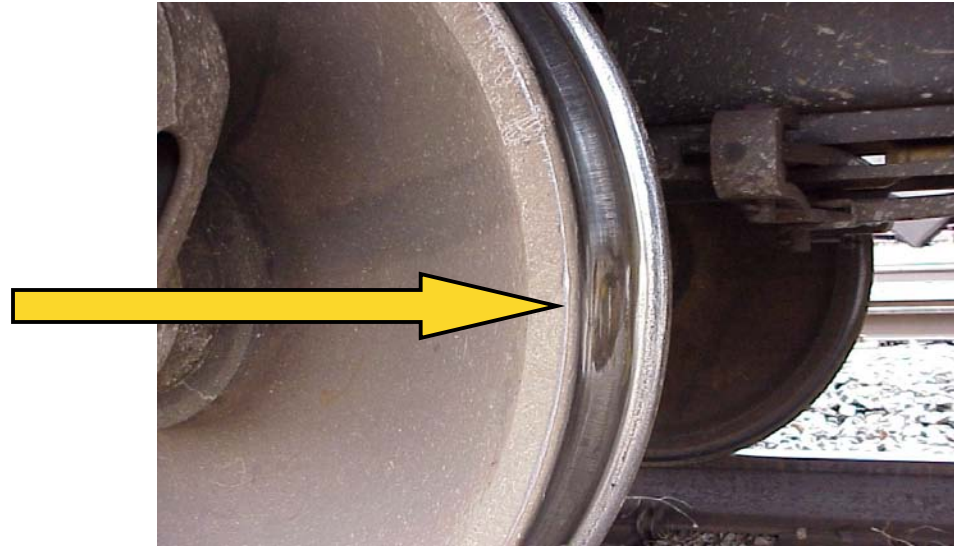
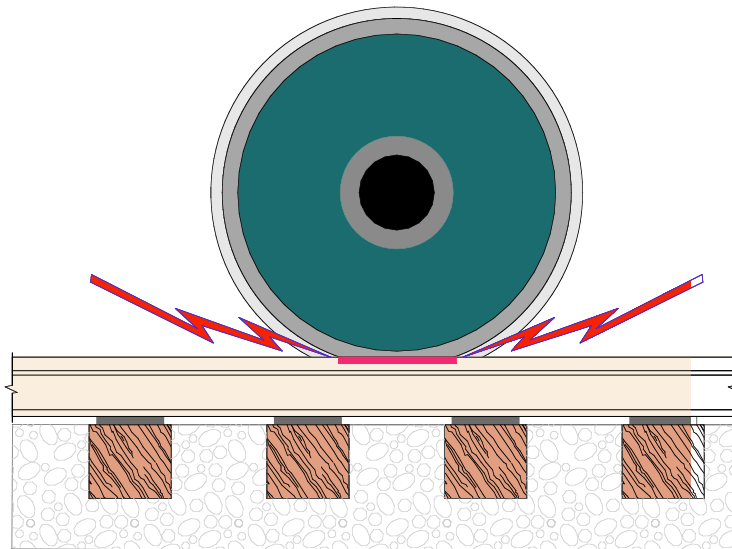
Rail Detection

Coal Line W.I.L.D. Detectors



Removal of High Impact Wheels

**Typical out-of round
wheel detected by
WILD**



**A 100 KIP impact wheel can
increase the contact stress
on the rail head by as much
as 200% depending on the
shape of the wheel tread
anomaly.**