

*WorkShare:*  
**An Engineering-Based  
Work Unit Model for  
Maintenance Cost Allocation**



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# Work Unit Model is a Resource Allocation Model

- Used to Allocate Resources Between Supervisor Territories
  - Track Supervisor/Roadmaster
  - Division Engineer
- Work Unit Indices Based on
  - Track Condition and Type
  - Traffic Levels
  - Local Conditions
- Focus is to Balance Level of Resources Required Between Different Territories

# Work Unit Concept

- Work units designed to represent “level of effort” required to maintain a segment of track
  - Focus is on level of effort required by local forces
- Used to allocate maintenance budget across Track Supervisor’s territories
- Work units calculated per track segment as function of track and traffic characteristics:
  - Mileage: Main Line, Sidings, Branch Line, Yard
  - Miles of Curves; by Severity
  - Traffic: Annual MGT and Trains/Day
    - Freight
    - Passenger
  - Train speed ( by type of train)
  - Number of Turnouts, Diamonds, Road Crossings
  - Infrastructure (Miles of Concrete Ties, CWR)
  - Defects/Condition ( Rail Defects/Mile, TQI -Condition)
  - Accessibility ( Road crossings/mile )
  - Climate ( rain, snow, heat, cold)
  - Tunnels/Platforms (Passenger)

# Work Unit Concept (Cont.)

- Track Supervisor's total work units calculated by adding up work units for each segment of track in his territory.
- Common range for calculated work units: 400 - 1800 with average of 1000
- Work units can be calculated for larger units such as Division, Service Region, etc. by combining work units of Track Supervisors in that larger territory.
- Average cost per work unit calculated based on total required/available resources
- Budget calculated per territory
  - Roadmaster/Track Supervisor
  - Division
  - Region

# Work Unit Sensitivity

- Miles of track
- Traffic
  - Annual Tonnage (MGT)
  - Trains/Day
  - Speed
- Track Feature
  - Curvature
  - Turnouts
  - Crossings
  - Yards/Sidings
- Key Components
  - % CWR
  - % Concrete Ties
- Territory Characteristics
  - Climate
  - Accessibility
  - Condition
- Tunnels/Platforms
- Other factors

# Example Summary

<b>Work Unit Category</b>	<b>No of Segments</b>	<b>Total Miles</b>	<b>Work Units</b>
Main Line	1	221.9	547
Branch Line	1	28.4	53
Siding	11	15.4	32
Yards	2	15.3	11
Totals	15	281	643

# Top 20 Track Supervisor Work Units & Rankings

<b>NEW</b>	<b>NEW</b>	
<b>Ranks</b>	<b>Work Unit</b>	<b>Roadmaster</b>
1	1676	KITCH, C.E.
2	1632	M
3	1576	Roadmaster
4	1520	C1
5	1514	A
6	1502	C2
7	1486	M2
8	1485	Y
9	1465	G2
10	1434	B3
11	1433	J
12	1432	G2
13	1424	K2
14	1407	T3
15	1406	M3
16	1373	M4
17	1339	D4
18	1333	W2
19	1330	B5
20	1317	B7

# Resource Allocation Example

<u>Sub</u> <u>Division</u>	<u>Length</u>	<u>WUs</u>	Mile Based <u>Budget</u>	WU Based <u>Budget</u>
A	203	4006	\$3,789,238	\$2,633,894
B	152	5494	\$2,836,323	\$3,612,333
C	27	1578	\$504,484	\$1,037,619
D	110	2440	\$2,062,780	\$1,604,561
E	143	1207	\$2,679,372	\$793,798
F	74	671	\$1,378,924	\$441,481
G	50	1835	\$930,493	\$1,206,873
H	104	5863	\$1,950,673	\$3,854,970
I	113	2395	\$2,118,834	\$1,574,971
J	94	4927	\$1,748,879	\$3,239,501
Totals	1070	30416	\$20,000,000	\$20,000,000

Example for \$20M Budget for Mile versus WU basis



# Summary

- Work unit model calculates “level of effort” required to maintain a segment of track
- Validated based on field audits and comparison to other related models
- Used to allocate maintenance budget between Track Supervisor (or larger) territories
- Sensitive to key track and traffic parameters
- Budget per Work Unit varies as function of railway operations and costs covered.
  - One recent Midwest study calculated a cost/work unit of between \$3000 and \$5500.