FIVE COMMON
Bottlenecks in Grain Facilities

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GEAPS
Grain Elevator and Processing Society

GRAIN JOURNAL

Today's takeaways

- Alleviating site traffic issues
- Hiccups in grain receiving and material handling
- Finding the balance of labor and automation
- Effective use of outside storage
- Maximizing rail receiving / loadout for shuttle trains

Movement matters

Bottleneck 1: Alleviating site traffic issues

1. Alleviate site traffic issues

- Staging areas
- Routing
- Scale &
  probe locations


SW 93rd St
DISPLAY BOARD
RFID
RFID
INBOUND SCALE
OFFICE & PROBE
ALTERNATE RFID & DISPLAY
RFID
TRUCK STAGING
OUTBOUND SCALE
GRAIN ELEVATOR
RFID & TICKET PRINTER
FERTILIZER BUILDING
GROUND PILE
GROUND PILE

Grain on the go

Bottleneck 2: Hiccups in receiving & material handling

2. Hiccups in receiving & handling

- Size of receiving pit
  - Grate
  - Hopper

2. Hiccups in receiving & handling

- Have someone to open truck hoppers
  (limit distractions if truckers remain in their trucks)
- Receiving equipment sized appropriately
- Consistent pits for varying commodities

It’s about balance

Bottleneck 3: Finding balance between automation & labor

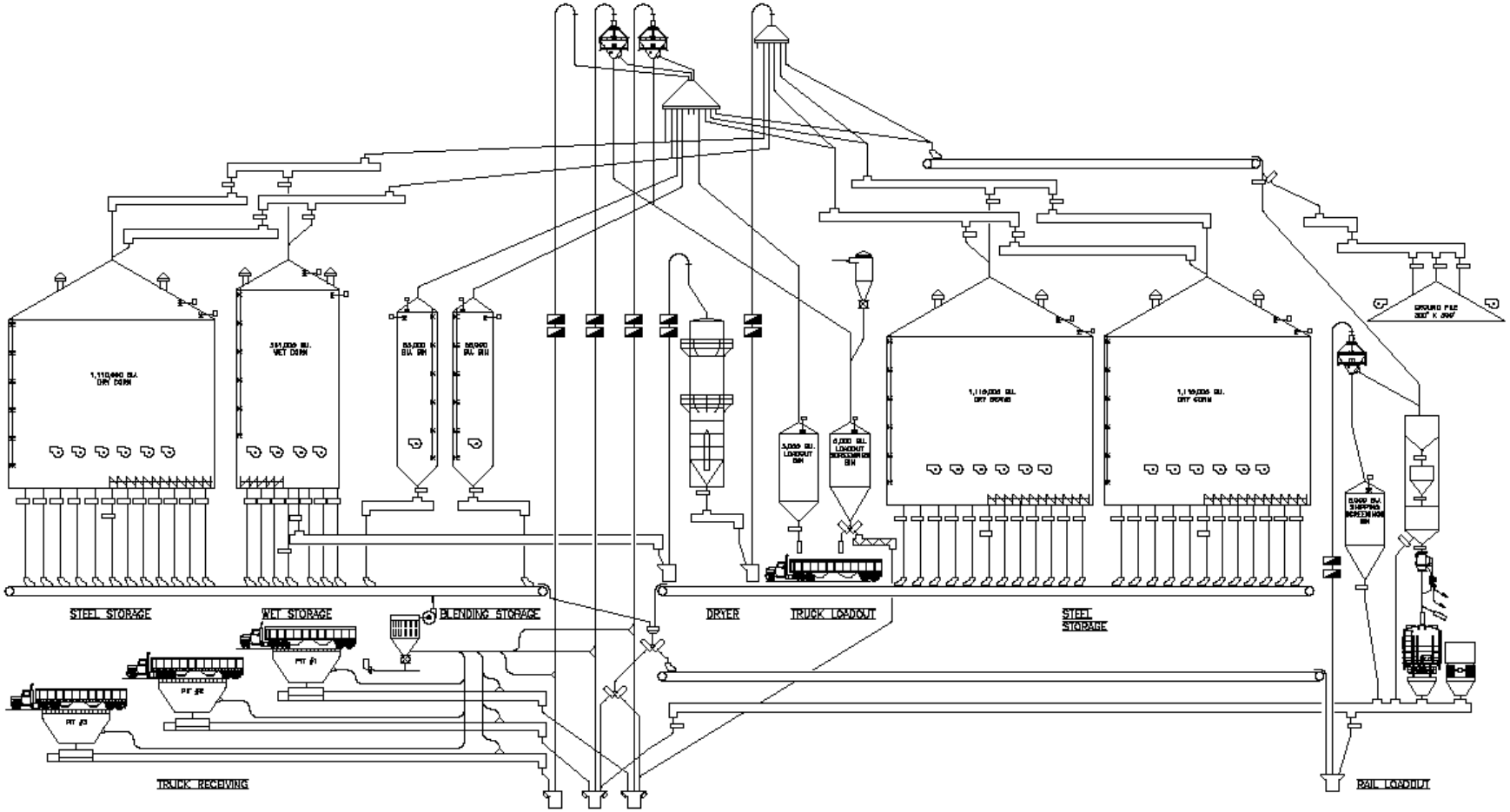
3. Balance automation & labor

- Labor is becoming harder to find and retain
- Consider automation
  - Why is it good?
  - What degrees of automation are available?

3. Balance automation & labor

Example of partial automation

- PLC
- Safety devices
- Bin inventory system
- Tied into accounting software


STEEL STORAGE
WET STORAGE
BLENDING STORAGE
DRYER
TRUCK LOADOUT
STEEL STORAGE
TRUCK RECEIVING
RAIL LOADOUT

3. Balance automation & labor

Example of full automation

- RFID system
- Limits employee numbers
- Keeps truckers in their trucks
- Helps mitigate product placement errors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GROUND PILE

Grain stash

Bottleneck 4: Effective use of outside storage

4. Ground piles vs. Bunkers vs. Buildings

4. Ground pile

Labor intensive, higher product damage risk

- Dumped on prepared earth surface
- Fill with portable conveyors
- No aeration
- May or may not be tarped
- Pile reclaim equipment
- Short-term storage

4. Bunker

Time consuming to tarp & reclaim

- Hard surface or prepared earth
- Fill system tied to receiving
- Aeration
- Bunker walls
- Tarping system
- Reclaim system and/or pile reclaim equipment

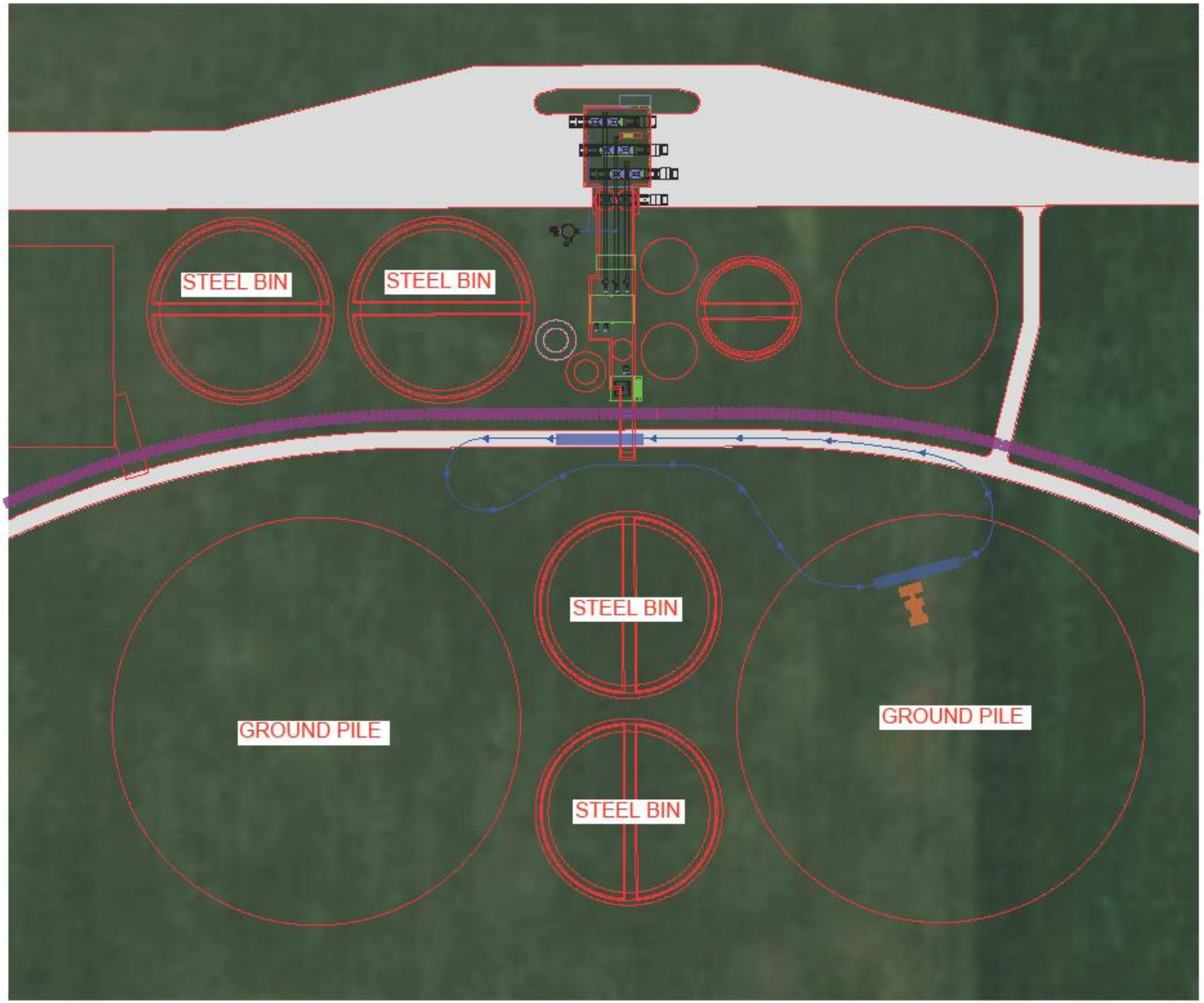
4. Flat storage building

More time consuming to reclaim vs. upright storage

- Concrete floor
- Fill system tied to receiving
- Aeration
- Side walls
- Roof structure
- Reclaim system
- Maximize storage space

4. Storage reclaim

- No trucks required to reclaim
- Varying projection into storage
- Shallow trench or full tunnel


STEEL BIN
STEEL BIN
STEEL BIN
GROUND PILE
STEEL BIN
GROUND PILE

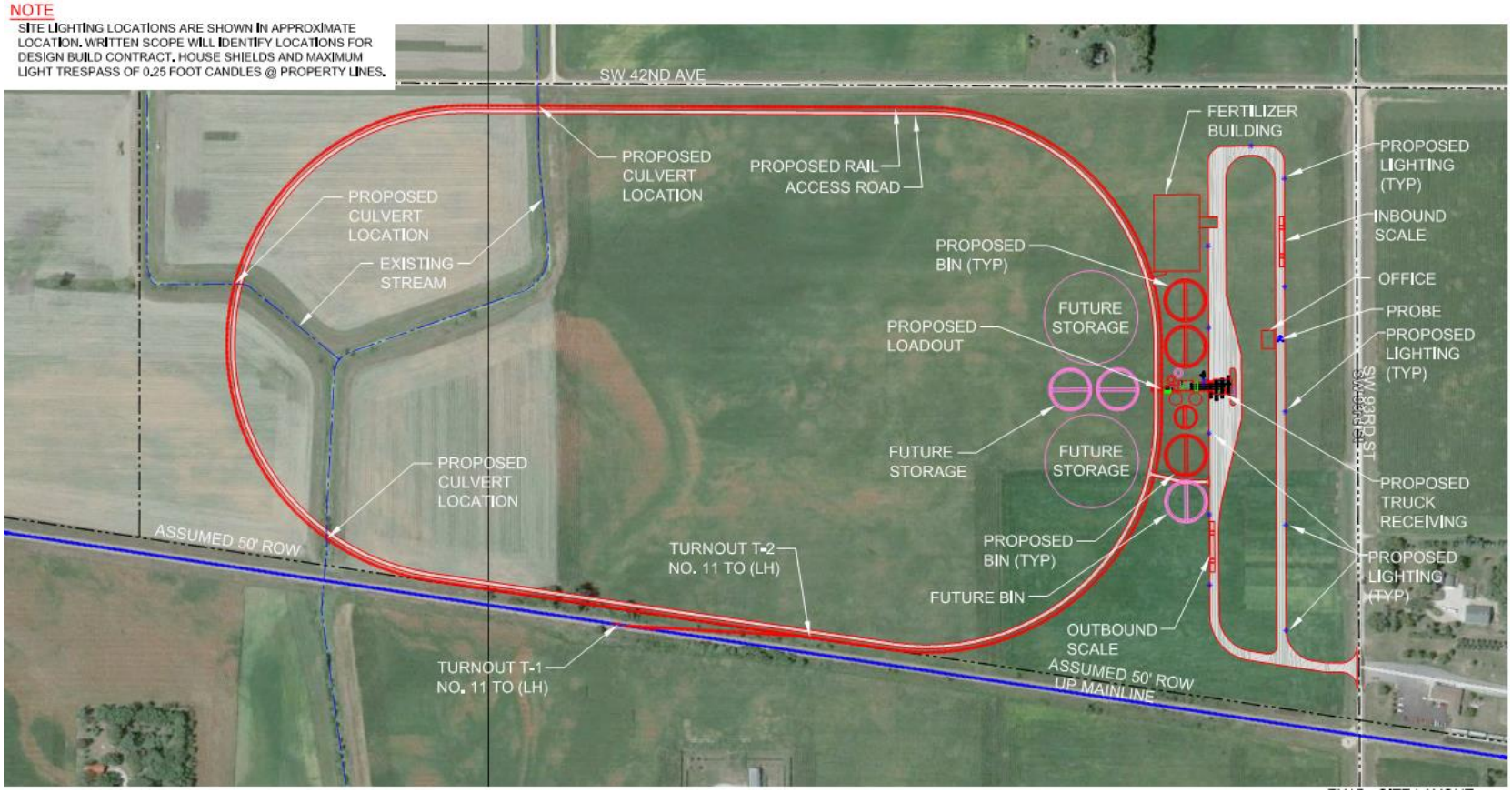
Making rail work

Bottleneck 5: Maximize rail receiving / loadout for shuttle trains

5. Maximize rail receiving / loadout

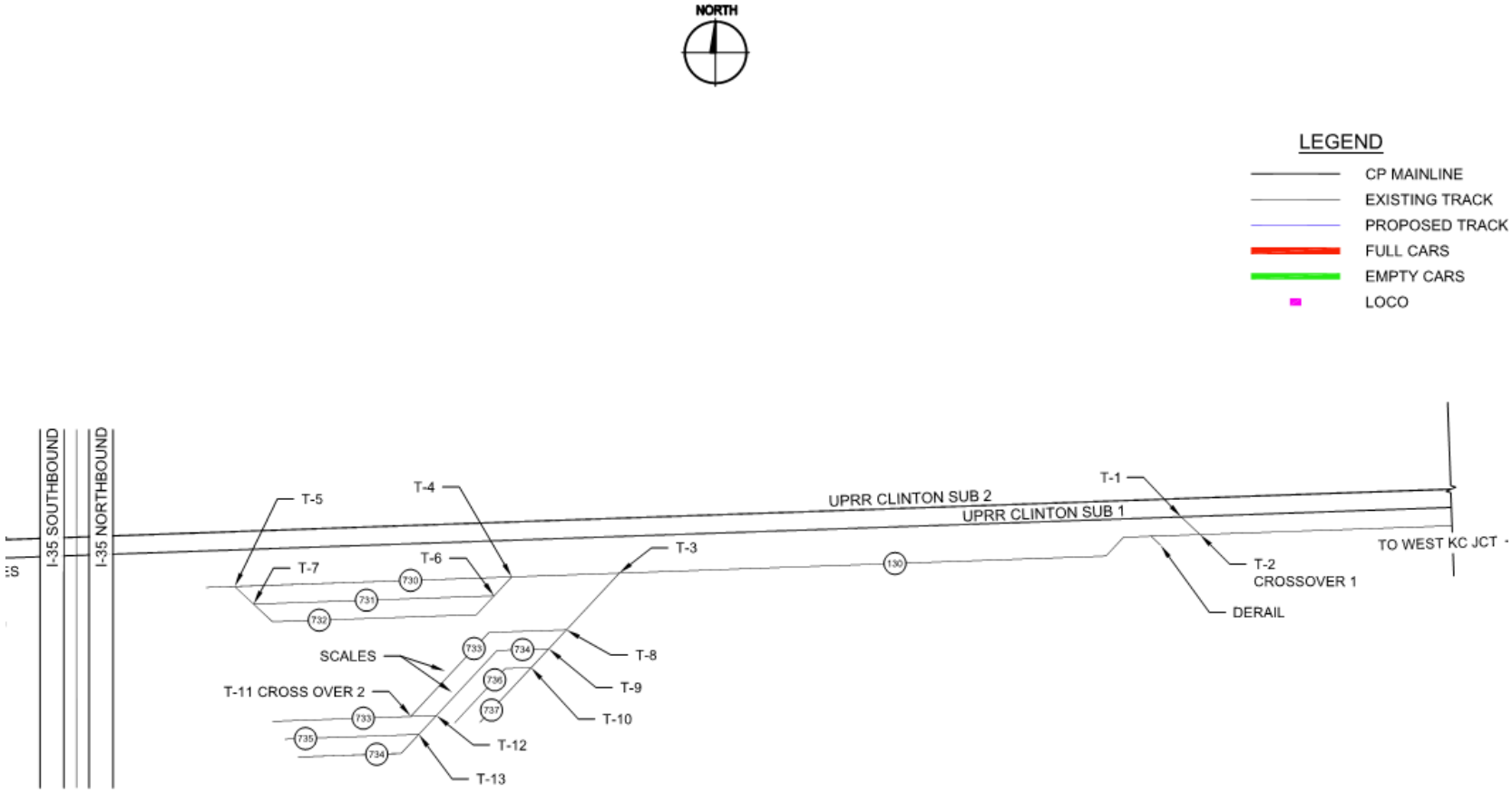
- What speed do you want to load at?
  - How many cars do you have to load?
  - How fast do you need to load the train?
  - What type of track layout is available?
- Operations
  - Track studies
  - Track layout

5. Master Planning

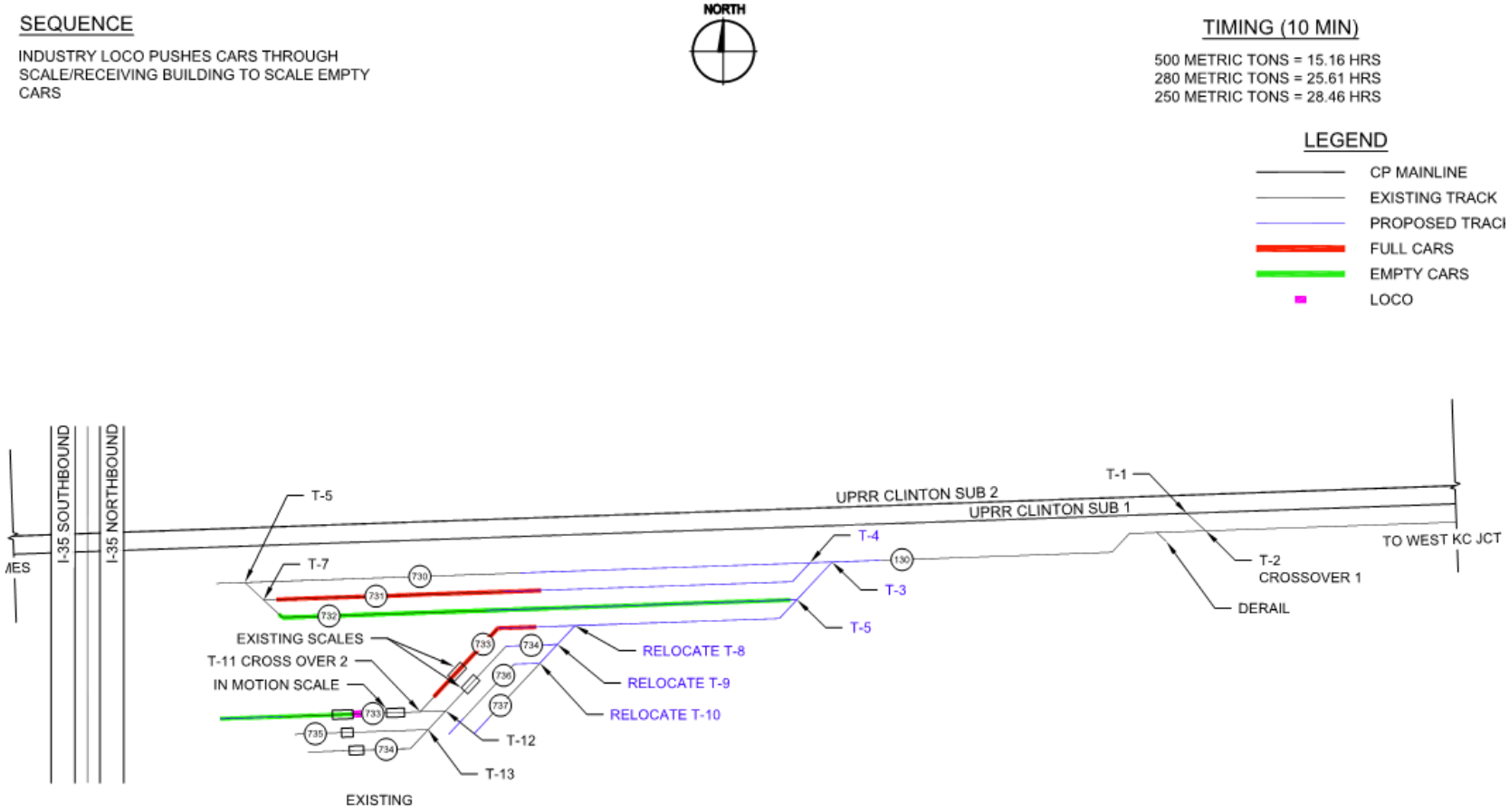


5. Sequence of Operations

Existing conditions



5. Sequence of Operations



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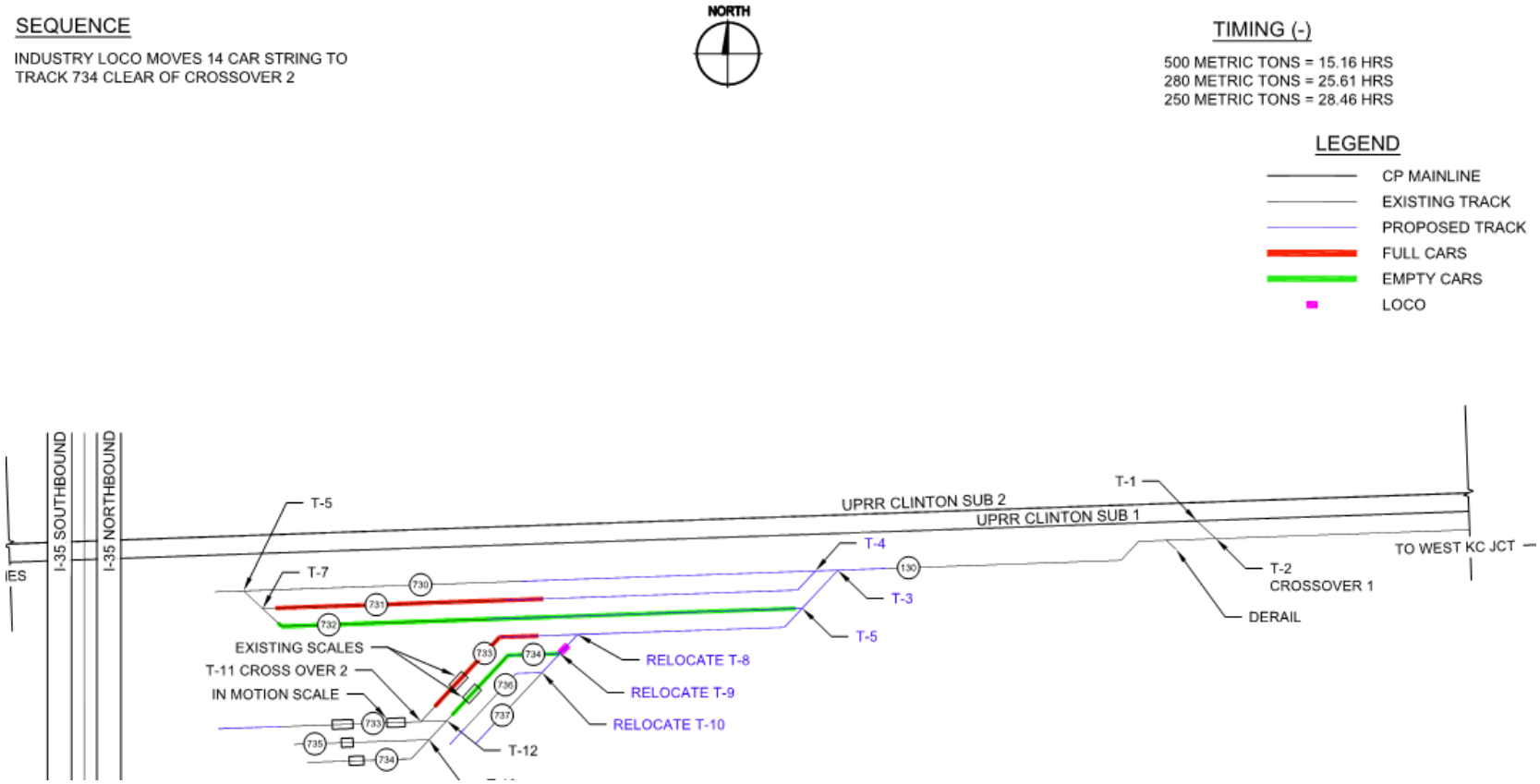


5. Sequence of Operations
Final

SEQUENCE

INDUSTRY LOCO TO RECEIVING SHED - READY TO DEPART

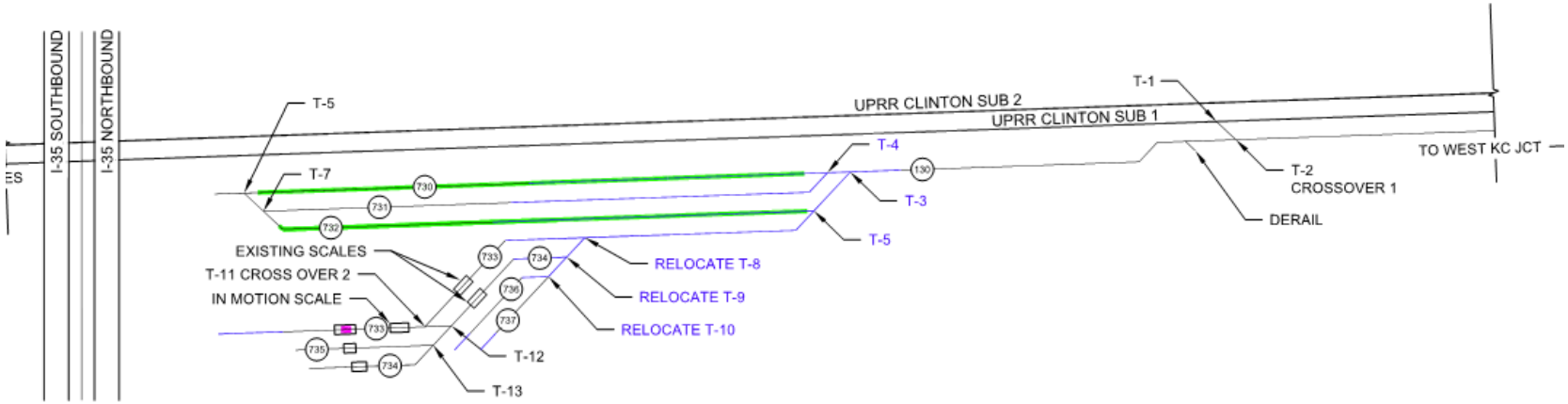
NORTH

TIMING (-)

500 METRIC TONS = 23.97 HRS
280 METRIC TONS = 40.88 HRS
250 METRIC TONS = 45.34 HRS

LEGEND

- CP MAINLINE
- EXISTING TRACK
- PROPOSED TRACK
- FULL CARS
- EMPTY CARS
- LOCO



5. Maximize rail receiving / loadout

- Importance of capacity sizing
  - Adequate bin storage to hold train loads
  - Size of reclaim & blending equipment
  - Bulk scale sized with adequate upper & lower garner size to keep system from shutting down
  - Loading spout easy to run & flexible to adjust for car misalignment

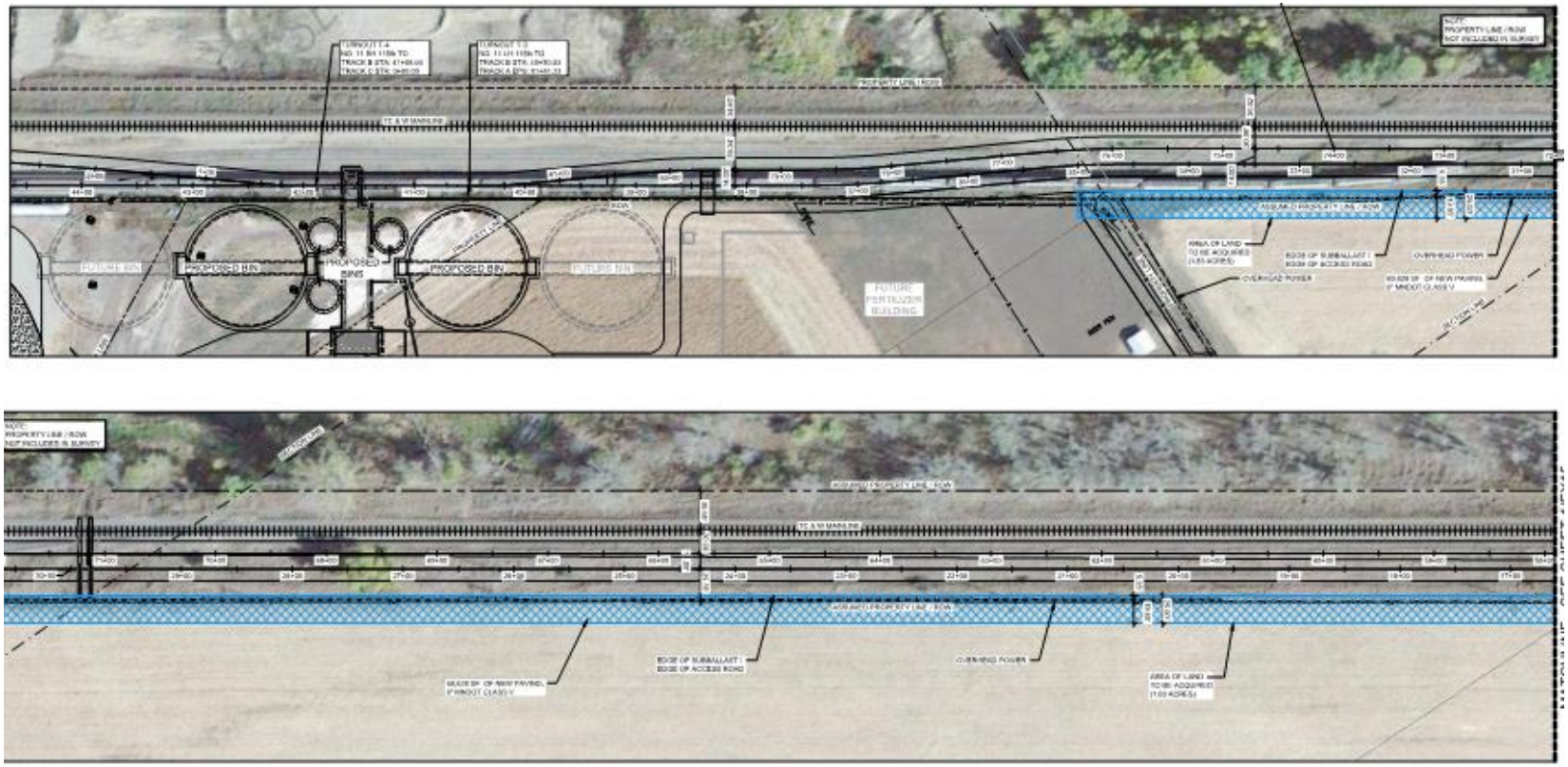
5. Master Planning

Site issues

WETLAND DELINEATION EXHIBIT

5. Master Planning

Land purchase



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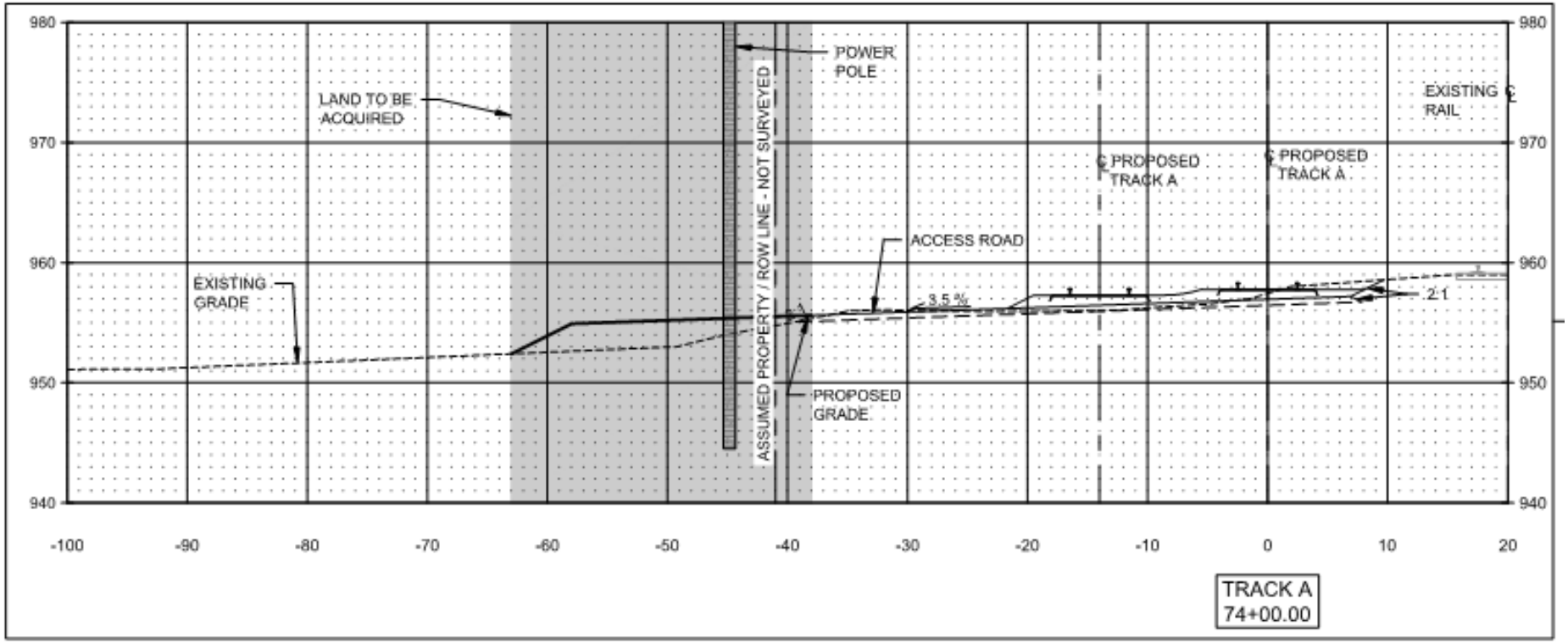
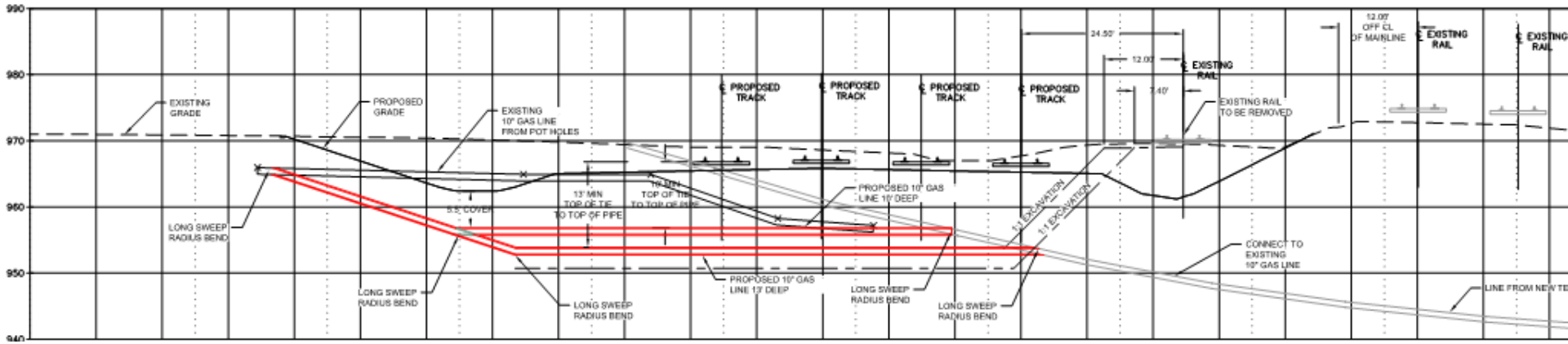
Land purchase



5. Master Planning

Existing utilities



Questions?

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Thanks for your time today