

City of Moose Jaw
Material Crushing &
Recycling Program

- The City of Moose Jaw operates a historic landfill site that has been in operation since the 1920's at its current location of 1802 Caribou St E.
- Landfill charges were in place on separated concrete materials up until 2016 at \$40 per tonne
- City of Moose Jaw has repurposed these materials in the past (asphalt and concrete)
- Asphalt shavings being used by Streets and Roads in alley, parking lot, and road repairs
- Concrete rubble used for erosion protection on reservoirs, lagoons, dams, banks & storm outlets

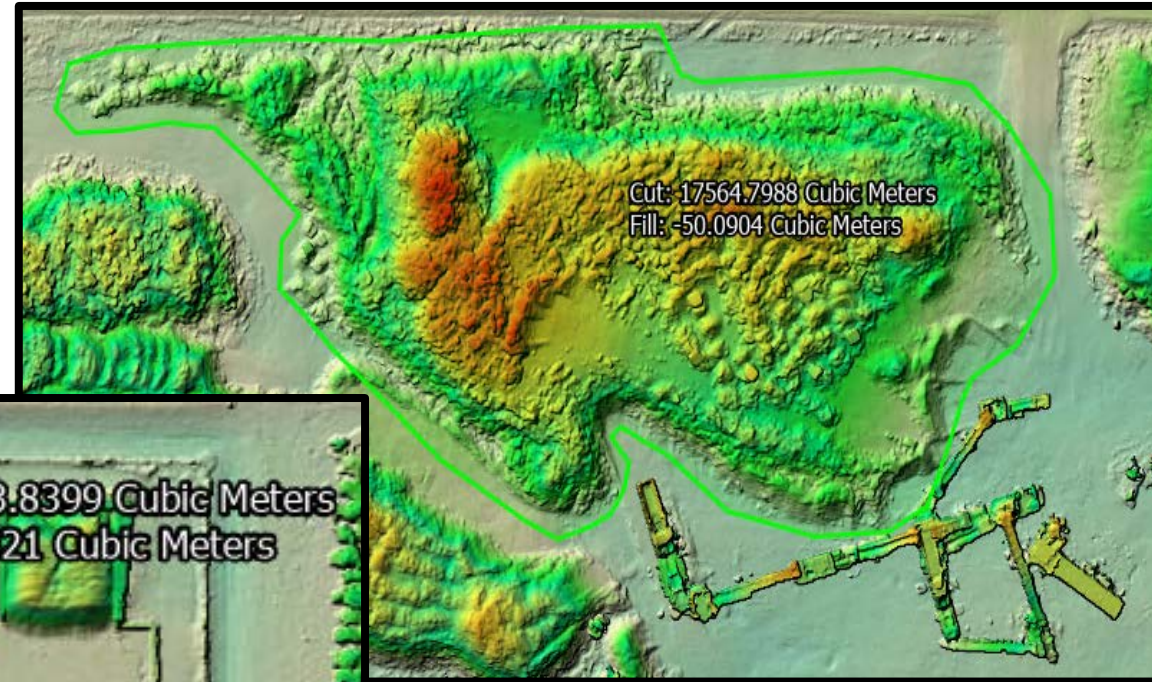
BACKGROUND

- Major demolition of the Union Hospital was undertaken in 2016
- Current landfill site did not have space or storage for the materials and there were concerns on the landfill life expectancy
- Program started with the original intent to divert materials from the landfill, but determined the process of repurposing the materials could also create savings or generate revenue for the City
- City of Moose Jaw in working with the contractors began diverting (asphalt and concrete)
- A site located close to our current aggregate stockpile yards was chosen to divert the materials to
- Asphalt and Concrete from various construction throughout the City was stock piled until 2020
- As we started to approach storage capacity a tender was released to have the material crushed and turned into usable materials

How it Started

Aerial Surveys

- Aerial surveys of the stock piled materials were completed at the beginning and end of the project, giving an estimate of the materials needing to be processed and as a basis for comparisons to final processed material for survey accuracy



Aerial Surveys Confirming Quantities

- Industry standard conversion factors for stockpiled materials was used to convert materials into tonnes for tender estimates.

Concrete Piles - Concrete – 510kg/m³ -
 Pile 2 – 1,706.65m³
 Pile 4 – 10,432.10m³
 Pile 5 – 5,798.22m³
 TOTAL VOLUME – 17,936.87m³
 TOTAL WEIGHT – 9,147,803.7 kg = 9147.8 MT

Asphalt Piles - Asphalt – 458kg/m³ -
<https://scdhec.gov/sites/default/files/Library/CR-011175.pdf>
 Pile 3 – 3,951m³
 TOTAL VOLUME - 3,951m³
 TOTAL WEIGHT – 1,809,558kg = 1,809.55 MT

CONSTRUCTION & DEMOLITION (C&D) DEBRIS (continued)				
PRODUCT	VOLUME	POUNDS	TONS	SOURCE
ASPHALT PAVING				
Large asphalt paving with re-bar	1 cubic yard	773.00	0.387	Tellus Institute
Large asphalt paving without re-bar	1 cubic yard	773.00	0.387	Tellus Institute
Small asphalt paving with re-bar	1 cubic yard	773.00	0.387	Tellus Institute
Small asphalt paving without re-bar	1 cubic yard	773.00	0.387	Tellus Institute
CONCRETE				
Concrete, cinder	1 cubic foot	100.00	0.050	FEECO
Concrete, scrap, loose	1 cubic yard	1,855.00	0.928	Tellus Institute
Large concrete with re-bar	1 cubic yard	860.00	0.430	CA IWMB
Large concrete without re-bar	1 cubic yard	860.00	0.430	CA IWMB
Small concrete with re-bar	1 cubic yard	860.00	0.430	CA IWMB
Small concrete without re-bar	1 cubic yard	860.00	0.430	CA IWMB



Tendering

- Issued a tender to crush the materials based on the quantities from the survey and using the appropriate conversions.
- Site meetings were held with potential bidders, where it was determined that there was an excessive amount of materials to process
- Tender was awarded for \$13.45/tonne for crushing concrete and \$12.05/tonne for crushing asphalt
- The tender had a option to use a 25% overage clause. This was exercised as more material was accumulated before crushing began

Crushing

- Crushing of materials began in fall of 2020
- Two ¾" minus materials, asphalt and concrete, were created, the purposes of each to be used within City Operations
- During crushing, noticed a significant amount of unanticipated waste such as Styrofoam, wood etc. therefore a roll off waste bin was utilized during crushing
- At the end of crushing a significant amount of metal (rebar, posts, steel, etc.) ended as a waste by-product of the process.
- High degree of difficulty sourcing someone to take the metal by-products reached out to multiple scrap recyclers and unfortunately a majority of it ended up going to landfill
- 25,000 tonnes of concrete and 7,500 tonnes of asphalt was crushed

Testing

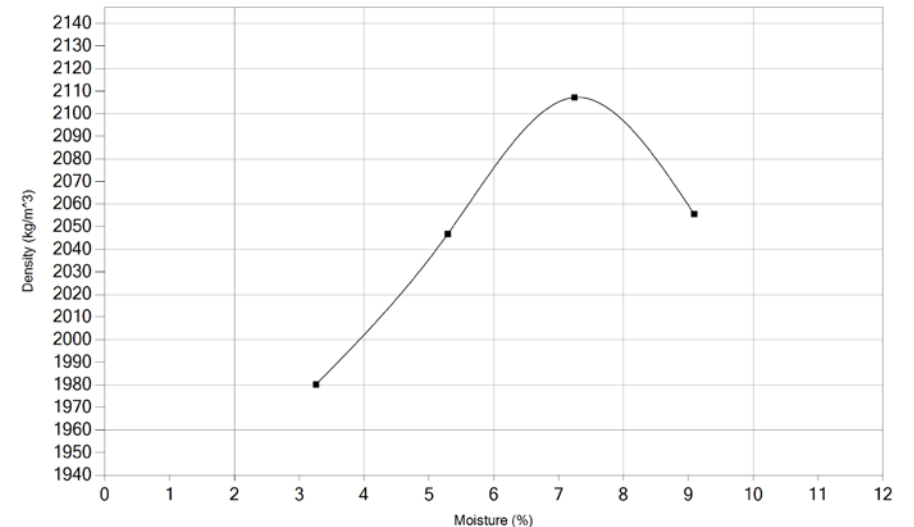
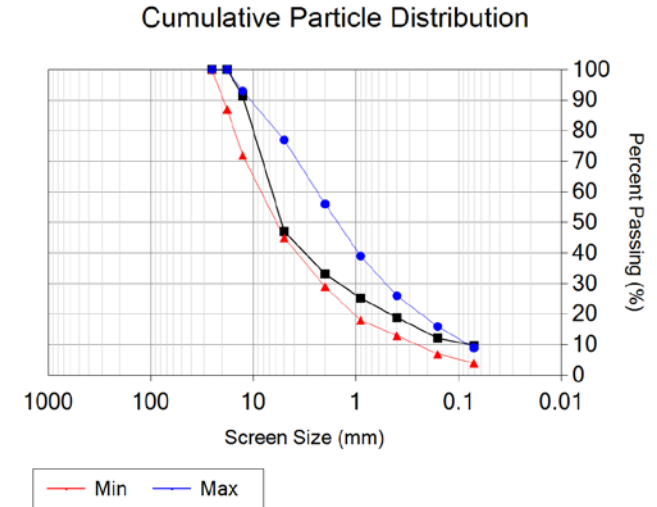
- Sieve Analysis and Proctors of the crushed materials were performed after crushing was completed.
- Material was tested for asbestos because of where the material originated

Crushed Concrete

Type of Test	Estimated # of Test
Proctor	25
Sieve Analysis	25
Asbestos	7

Crushed Asphalt

Type of Test	Estimated # of Test
Proctor	11
Sieve Analysis	11



How Rates were Determined

- At first revenue was not the main objective. The goal was to create material that is useable by the Public Works & Utilities programs
- The City continues to receive a strong supply of feedstock, more than can be used internally
- Comparisons to other local municipalities was done for rate setting, local contractor's rates were not considered
- Input, admin, labour, material handling, loading, equipment, maintenance costs were all considered when determining rates
- Revenue projections were approx. \$650,000 for the concrete and \$210,000 for asphalt
Recommended to City Council that selling rate be set very similar to nearby communities
- Standard truck load rate was based on a 10 tonne tandem thus ensuring contractors wouldn't need to weigh on a certified scale which is at the Landfill
- Rate set as \$26/tonne for concrete and \$28/tonne for asphalt. The standard tandem truck charge of \$234 for concrete and \$280 for asphalt. All other truck or semi configurations require weight verification at the landfill scale
- Revenue from sales of aggregates is placed into Solid Waste Utility reserve

Potential Future Uses

The City continues to investigate potential uses of the crushed materials such as:

Proposed uses for crushed concrete:

- Sub-base and base for roads
- Gravel parking lots
- Gravel roads
- Pathways
- Pipe bedding in weak, soft soils under bedding sand
- Stabilizing weak subgrades
- Landscaping protection of embankments
- Shoulder base along paved roads
- Full depth trench repairs or water/sewer line backfill.

Proposed uses for crushed asphalt:

- Surfacing material on low volume gravel roads
- Gravel parking lots
- Walking paths
- Shoulder base along existing paved roads
- Rear lane stabilization on high grade slopes
- Sub-base for road construction repairs
- Blending with oil to make our own cold mix for repairs of potholes or other repair areas
- Used in new asphalt pavements as partial granular replacement.