



East County Courts Construction Project

EcoAssessment Draft Report

June 2012

Prepared for:



Acknowledgments

Assessing a construction project requires cooperation from the entire project team. EcoLogistics would like to take this opportunity to thank the County and especially Peggidy Yates and Steve Cruzen for the opportunity to evaluate this project. Their guidance and feedback throughout this process were critical to improving the focus and content of this EcoAssessment. Many thanks to Howard S Wright Contractor's Dan Pelissier & Jeremiah Dodson for sharing project information and encouraging the cooperation of their subcontractors and suppliers. Finally, thanks to the subcontractors and suppliers that shared their cost and supply chain information with us.

Nothing in this report should be construed as a criticism of the project team or the material and vendor selections made to complete the East County Courts project. The County and its vendors made substantial efforts to balance the County's fiscal, community and environmental goals as they selected designs, materials and contractors for the project.

The project team utilized two tools that were instrumental in positioning the project to address County priorities; the contracting plan and the use of the LEED® certification process. The contracting plan helped the County and contractor to balance their MWESB participation goals with fiscal constraints. The LEED® certification process helped the project team incorporate environmental goals by guiding the selection of materials, designs and systems for the project. The LEED process also provided best management practices for selecting major material suppliers, increasing recycled content and managing construction logistics. The re-use of concrete debris from the demolished buildings as structural fill is one among the many sustainable strategies employed during the construction of this project.

The project team also facilitated a partnership between the County and the City of Portland to utilize the state's Clean Diesel program with the project's civil contractor. This program enabled the contractor to retrofit equipment with emissions equipment that removes particulates from exhaust fumes.

The project team's efforts were successful by any measure. The team was able to qualify for enough LEED checklist credits to certify the project at the Gold level; the USGBC program's second-highest certification level. The excavation equipment that was retrofitted with emissions equipment remains in place, reducing environmental impacts for this and future projects. The team also exceeded the MWESB hiring goal of 20% that was set in the project's approved contracting plan. Actual MWESB participation is 32.2%.

Achieving this level of success was a multi-faceted challenge. The tools provided by the LEED certification program and contracting plan address some but not all of the issues involved in making material and contractor selections. The selection of materials for the building envelope includes design and installation risks. The decision to hire a contractor or supplier is not just a matter of cost and affiliation. Contractors and suppliers have varying capacities to complete the work and more or less experience installing a particular design or product. Some vendors have demonstrated performance with the contractor or designer on previous projects, others have not but may have been similarly qualified.

The project designers and contractors worked collaboratively to weigh these considerations and made the choices they perceived to be best for the County. It is our hope that the data supplied by this report is well received and helpful to the project team and the County.

East County Courts | EcoAssessment | May 23, 2012

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Introduction

Multnomah County is committed to improving the fiscal, social, community and environmental impact of County activities. Over the past several years the County has adopted a series of policies to address the community and environmental impact of the County. The intent of these policies are affected when the County maintains, improves and builds County facilities. But not enough is known about the drivers or magnitudes of these impacts. A logical way to investigate these implications is to quantify the community and environmental impact of a County construction project. For this reason, the County elected to evaluate the impacts of the East County Courts construction project.

This report quantifies the community and environmental impact of the construction project using detailed construction data supplied by the project team. Ecologistics estimated the economic and environmental impacts of this project by applying construction data to established impact multipliers according to established methodologies. The contractor administered an MWESB hiring plan to encourage the participation of MWESB firms in the project. EcoLogistics integrated the metrics from these efforts to include a social equity aspect in this construction project evaluation.

Together, these impact metrics provide a triple bottom line impact measurement that the County can use to:

- ✓ Evaluate the project's impact on County community and environmental goals
- ✓ Identify sources and drivers of construction-related goal impacts
- ✓ Determine if additional measurements or best management practices are warranted

The EcoAssessment report begins with a description of the East County Courts construction project and its key participants. We then describe the process used to define the scope of this project's goal impact measurements and the measurement protocols that were utilized to quantify each impact. Next we detail the East County Courts' impact on selected County goals followed by our conclusions and recommendations for next steps.

Project Background

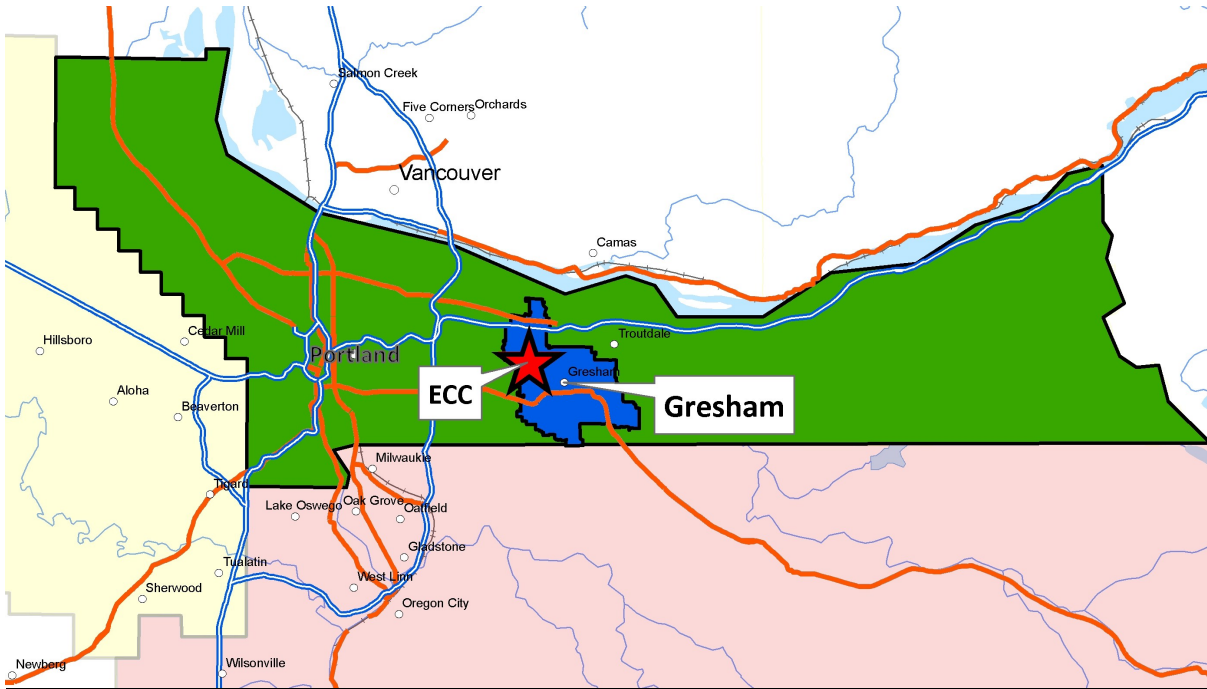
The East County Courts project is a redevelopment of six properties. The project required the demolition of two existing commercial buildings and reconfiguration of the site to accommodate this new 44,000 square foot, three-story building, basement and parking lot.

Exhibit 1: Project Rendering



The East County Courts construction project is located at 18430 SE Stark Street, in the community of Rockwood within the City of Gresham and Multnomah County, Oregon.

Exhibit 2: Project Area Map



Construction Project Information:

Exhibit 3: Project Information Table

Owner, Owner's Representative:	Multnomah County, Shiels Oblatz Johnsen
Construction Manager & General Contractor	Howard S. Wright Constructors
Facility Square Footage:	44,000 SF
Functions:	Court administration, District Attorney's offices, Data Center, Sheriff security
Justification:	Improved access to due process for citizens in Gresham residing east of 122 nd Ave.
Project Cost:	\$22,000,000
Project Start & Completion:	December 2010—Spring 2012

Exhibit 4: Project Features Table

Site:	Pervious Pavers, Recycled Fill, on-site storm water treatment, grey-water re-use system
Foundation / Basement:	Poured-in-place Concrete walls and floors
Superstructure:	Steel Framed
Windows:	Storefront and Curtain wall
Cladding:	Brick / Stone / Aluminum
Roof / HVAC Systems:	EcoRoof, Solar Power Panels, Geothermal heat pump, Heat capture ventilation system.

Exhibit 5: Project Objectives

Identity:	Facility will reflect prominence and importance of providing due process to Multnomah County citizens east of 122nd while reflecting fiscal responsibility to the taxpayers.
Operations:	Use of durable, sensible materials and systems, focused on low long-term operational cost, and a functional, efficient facility that is easy to maintain.
Longevity:	The facility is intended to last at least 80 years, and designed to accommodate future growth of three additional courtrooms.
Sustainability:	The project team is working toward the goal to achieve a LEED Gold rating, meet the Architecture 2030 Challenge, and will incorporate the 1.5% Solar program.
Minority Involvement:	The County is seeking high levels of participation from M/W/ESB businesses and organizations.

Assessment Process Summary

Each step of the EcoAssessment impact estimating process is summarized below. Detailed information about each of these steps is included in the next section, Assessment Process Details.

Step 1: Define EcoAssessment Scope

- A. **Clarify Assessment Motivation & Anticipated Use:** Identify the clients motivation and intended use(s) of this EcoAssessment
- B. **Review Goals & Select Impact Metrics:** Review County goals to anticipate how the project could affect those goals. Pair each goal with one or more impact metrics.
- C. **Develop Measurement Scope:** Determine how much of the project's spending to evaluate, which design and construction activities will be measured and the level of detail that should be measured.

Step 2: Collect Data

- A. Survey and collect project data from project participants.
- B. Assemble design and construction activity costs, quantities, material sources and other relevant data.

Step 3: Calculate Impacts

- A. Vet and organize project data by construction activity in preparation for economic and environmental impact calculations.
- B. Apply vetted input quantities for construction activities to appropriate input / output models.
- C. Identify impact sources and drivers, model impact data and apply impact multipliers.

Step 4: Analyze Impacts

- A. Analyze goal impacts for the overall project and selected construction activities within the project.
- B. Identify and confirm any anomalies of impact levels. Develop an appropriate context to evaluate impact magnitudes.

Step 5: Report Impacts

- A. Communicate measurement processes, impact metrics, analysis and conclusions.

Detailed Assessment Process

STEP 1: DEFINE ECOASSESSMENT SCOPE

Step 1A—Clarify Assessment Motivation & Anticipated Use:

The purpose of this step is to clarify the client's motivation for commissioning this assessment and understand how the client might want to use the data and report. This information is used to guide the scope of the analysis and the format of the report.

Outcome

Motivation: *The County believes that studying and quantifying the economic, social and environmental impact of the East County Courts construction project will elevate the County's understanding of how and how much construction project's affect County goals.*

Use: *Based on the outcome of this EcoAssessment, the County can evaluate the impact of the East County Courts construction project on the County's goals. The County anticipates that the methodologies and measurements from this EcoAssessment may be useful if the County elects to explore project measurement, management and or reporting strategies.*

Step 1B—Review Goals & Select Impact Metrics:

The next step of the EcoAssessment process is to review the client's organizational goals and anticipate how these goals could be impacted by the selection of designs, construction materials, contractors and suppliers. Selected organizational goals are then paired with one or more metrics, measurement units and measurement boundaries that are used to perform each goal impact measurement.

Outcome:

The team elected to measure the construction project's impact on certain County's goals. Measurements were scheduled to quantify, assess and evaluate the Project's:

- *Impact on the local economy*
- *Contribution to social equity in contracting*
- *Construction-related environmental impact*
- *Construction-related transportation impacts.*

Step 1B outcome details:**Goal #1: Quantify Local Economic Impacts**

The quality of life of citizens in the County is affected by the County's construction project purchasing decisions. These decisions impact where millions in tax payer funds will be spent which in turn affects the creation or retention of jobs to construct the project. Local businesses rely on local spending to survive and thrive. Local residents rely on wages to maintain their quality of life. When local businesses are underutilized for a period of time, they may have to lay-off employees. Measuring the economic impact of the East County Courts construction project will help policy and staff to evaluate the impact of construction procurement selections to County businesses and residents.

The Policy Statement from the County's Sustainable Purchasing Program reads: "Multnomah County recognizes that the products and services it purchases have inherent social, human health, environmental and economic impacts, and the County should make procurement decisions that embody its commitment to sustainability and to improving the environment and quality of life of its citizens."

Selected Metrics: Spending Stimulus & Local Jobs Created or Retained

Metric 1:	Amount of Direct, Indirect & Induced Spending Stimulus
Unit:	US Dollars ("\$\$")
Metric 2:	# of Local Jobs Created or Retained from the project
Unit:	Full-time Equivalent Jobs ("FTE")
Economic Benefit Boundaries:	Multnomah County, Clackamas County, Washington County and the State of Oregon
Boundary Notes:	Since the County is committed to a healthy regional economy, economic benefit boundaries include the project's benefits to neighboring counties and to the State.

Goal #2: Assess Social Equity

Multnomah County is committed to promoting social equity in the County through its purchasing decisions. Multnomah County's Good Faith Effort Program is specifically charged with ensuring diversity in contracting awards and tracking construction dollars paid to MWESB vendors.

East County Courts construction project MWESB participation was tracked by the County through a project-specific MWESB contracting plan that was developed by the contractor and approved by the County. In this plan goals for MWESB participation were set, good faith efforts were defined and verification requirements were established.

Selected Metric: MWESB Participation

Unit:	% Construction Contract Spending with MWESB Vendors
Boundary:	MWESB businesses registered in Oregon that received payment for work on this project.
Boundary Notes:	The State of Oregon's MWESB registry is the boundary used by the County's Good Faith Effort Program.

Goal #3: Evaluate Environmental Impacts

The County’s Climate Action Plan seeks to improve the environmental impacts of the County. The plan achieves this improvement by targeting continuous reductions in Greenhouse Gas (“GHG”) emissions. The Plan targets a 40% GHG reduction from 1990 levels by 2030 and an 80% GHG reduction from 1990 levels by 2050. Strategies to achieve these reductions include improving the energy efficiency of buildings and upgrades to transportation infrastructure, fuels and vehicles.

Construction projects are comprised of thousands of individual products. These products are produced all over the world and delivered through extensive supply chains. The installation of these products require workers from a variety of trades; often taking one or more years to construct.

Construction projects generate GHG emissions from the:

- ✓ Extraction, manufacturing and packaging of construction materials
- ✓ Fuel combusted in the transportation of materials and workers to the job site
- ✓ Fuel combusted by equipment to install materials at the job site
- ✓ Fossil fuels combusted to generate electricity that is used during construction

The County through its agents designs, specifies materials and selects contractors that ultimately impact the environment.

Selected Metric: Greenhouse Gas Emissions

Unit:	Metric Tons of Carbon Dioxide Equivalent (“MT Co2e”)
Construction Materials Boundary:	Emissions related to the extraction, manufacture, transportation, installation of major materials.
Worker Transportation Boundary:	Emissions from fuel combustion during worker commuting activities from the contractor office to the job site.
Boundary Notes:	These boundaries for construction materials and worker transportation capture the majority of Greenhouse Gas emissions related to a construction project.

Goal #4: Determine Transportation Impacts

The County’s Sustainable Purchasing Program requires that Bids / Competitive Proposal Quotes for goods “include packaging and delivery requirements that are less damaging to the environment to the extent practicable.”

Construction projects create transportation impacts when delivering materials and equipment to the job site and when workers commute to and from the jobsite to install the work. Construction transportation choices create varying levels of fiscal, social and environmental impacts depending on the transportation modes selected and distances traveled.

Fiscal impacts include the cost of fuel, the cost (or opportunity cost) of labor and costs to maintain vehicles, barges, ports, trains, rails and roadways. Social impacts include stress that is a byproduct of the commuting experience including congestion and commuting costs. Environmental impacts include various emissions related to the combustion of fuel including Greenhouse Gas emissions, benzene, carbon monoxide and host of other pollutants.

The County, through its consultants and contractors specify materials, and approved suppliers that affect the level of transportation impact a construction project will create.

Selected Metric: Construction-related Vehicle Miles Traveled

Unit 1:	Vehicle Miles Traveled Equivalency (“VMTe”)
Unit 2:	Vehicle Miles Traveled (VMT)
Construction Materials Boundary:	Transportation impact from the factory gate to the job site
Worker Transportation Boundary:	Transportation impact from the contractor office to the job site.
Unit Notes:	Major materials are transported by road, rail, barge, air and ocean vessels. Estimating the portion of this transport that occurs on roadways (VMT’s) provides a proxy to gauge the level of wear and tear and congestion impact that the construction project’s supply chains will generate. Non-road transportation is estimated with the VMTe unit. This measurement unit provides an proxy to gauge the local efficiency of the project’s supply chain.
Boundary Notes:	In a typical construction project many workers will report to the contractor office or shop location prior to traveling to the jobsite. The relationship between choices of where to live and where to work is a variable that is excluded from this assessment.

Step 1C—Develop Measurement Scope:

The next step of the EcoAssessment process is to develop the measurement scope. Based on prior EcoAssessments, EcoLogistics has determined that a portion of the project’s material and contractor selections drive the majority of the project’s economic, environmental and social impacts. These high-impact selections warrant a more detailed measurement than selections that are less impactful or actionable. To determine which construction activities to study in detail an Impact Logic Test is used that allocates construction project activities into two levels of measurement rigor; Detailed Measures and Aggregate Measures. ***Details about the Impact Logic Test are included in the next section.***

Detailed Measures: Construction activities that the Impact Logic Test determines are substantial, measureable and actionable are scheduled for a Detailed Measures estimating process. In this process, detailed material quantities, costs and supply chain information is used to estimate goal impacts.

Aggregate Measures: Construction activities that do not meet one or more of the thresholds from the Impact Logic Test are scheduled for an Aggregate Measures estimating process. In this process, cost information is applied to an Input / Output model to estimate the economic or environmental impact.

Outcome:

*The Impact Logic Test created a list of Detailed and Aggregate measurements to perform. See **Appendix 1** for a detailed list of construction activities and the estimating process that was utilized.*

Impact Logic Test

The Impact Logic Test is an evaluation tool that is used to determine which construction activities should be measured by Detailed Measure and which construction activities should be measured by Aggregate Measures.

To prepare for the Impact Logic Test, a list of major construction activities was developed based on material quantities and costs as provided by the project team. This list was then vetted and categorized by construction activity resulting in a final list of construction activities for application to the Impact Logic Test.

To perform the Impact Logic Test, three questions were posed about each construction activity on the list. The answers to these questions were then compared to impact thresholds for each goal impact to determine if the construction activity would be measured with a Detailed Measure or Aggregate Measure estimating process. If the answer to any of these questions was “No”, the construction activity was scheduled for an Aggregate Measures Process.

Impact Logic Test questions:

Logic Test 1: Is the construction activity’s pro-rata spending above the threshold established for this goal impact test? (Yes or No) Substantial spending usually indicates substantial economic, environmental and transportation impact potential.

Logic Test 2: Is the construction activity’s impact measureable? (Yes or No) Without adequate impact source details, accurate impact estimates cannot be generated.

Logic Test 3: Is the impact actionable? (Yes or No) If the project team cannot reasonably affect the impact, detailed impact measurements can be of limited value.

*Note: See **Appendix 2** for Impact Logic Test thresholds and results.*

STEP 2. COLLECT DATA

Data Collected for Detailed Impact Measurements

East County Courts material suppliers and contractors were surveyed or interviewed to determine the costs, material quantities, supply chain locations and transportation modes of their construction activities. Suppliers and contractors were also asked to identify the amount of spending and locations of any sub-sub contractors or material suppliers in their survey responses.

Data Collected for Aggregate Impact Measurements

Construction spending information was collected from the general contractor and Owner's Representative.

Outcome:

EcoLogistics surveyed and or interviewed the owner, owner's representative, general contractor and 28 subcontractors and suppliers regarding their construction project activities.

See **Appendix 3** for a complete list of project participants that contributed data for this EcoAssessment.

STEP 3. CALCULATE IMPACTS

Then cost, scope, supply chain and transportation information is processed to prepare the data for goal impact calculations. Processing activities include converting impact data measurement units to match the units of third-party impact multipliers and developing impact models to fill any gaps between data that was reported and the entire scope of each construction activity.

Once processed, costs and quantities are applied to a Detailed Impact Measures or Aggregate Impact Measures calculation methodology. The narrative below describes how each goal impact was calculated.

Goal #1: Quantify Local Economic Impacts

Economic Impact Sources & Definitions

The monetary spending stimulus and job creation effect of construction projects were estimated using economic impact multipliers from IMPLAN®, a nationally recognized economic impact analysis software. The IMPLAN software utilizes a data set from all available federal data sources compiled by MIG, Inc.

- **Direct Spending:** A construction procurement spending commitment such as a contract for construction work or purchase order for materials.
- **Indirect Spending:** The purchasing of materials or equipment by a vendor because of a contract or purchase order.
- **Induced Spending:** The consumer effect resulting from construction project activities such as the purchase of gas or groceries near the jobsite, contractor or supplier locations.

These Direct, Indirect and Induced Spending effects, when combined, are used to quantify the spending impacts of the East County Courts construction project.

See **Appendix 4** for a technical definition of Direct, Indirect and Induced spending from IMPLAN.

Economic Impact Methodologies

Detailed Impact Measures for spending and job creation / retention estimates were performed using data collected from the project team through electronic surveys. These surveys enabled EcoLogistics to identify construction spending effects with major material suppliers, sub-contractors, sub-sub contractors and their material suppliers.

Contract spending amounts for each construction activity were processed according to the following steps to produce the East County Courts' spending and job creation effect estimates.

1. Each Direct spending event amount is organized according to the location that the construction spending was received. This EcoAssessment identified spending within Multnomah County, Clackamas County, Washington County and the State of Oregon. Spending that was not received in these boundaries is called "spending leakage".
2. Direct spending estimates within each economic benefit boundary were combined and applied to location-specific economic spending and job creation multipliers from IMPLAN. These calculations produced estimates of the resulting Indirect and Induced spending effects and job creation / retention effect within each boundary. Indirect and induced effects to neighboring economic benefit boundaries were also captured in this estimating process.

Aggregate Impact Measures were used to estimate the Indirect and Induced spending effect of construction activities for which spending location data was not available. To estimate this effect, the results from the detailed impact measurements were extrapolated in order to distribute spending from anonymous construction activities into each of the economic benefit boundaries. These amounts were then applied to location specific multipliers for spending stimulus and job creation estimates.

Outcome:

Detailed and Aggregate spending impacts were then summed to quantify the East County Courts construction-related spending impacts. Detailed and Aggregate job creation effects were summed to quantify the East County Courts construction-related job creation / retention impacts.

Goal #2: Assess Social Equity

Social Equity Impact Sources and Definitions

Certain vendors in the market are certified as Minority, Women-owned and Emerging Small Businesses ("MWESB") and registered on an official list that is maintained by The State of Oregon. The contractor provided information indicating the MWESB firms that were hired for the project and the amount of spending with these firms.

Social Equity Impact Methodology

Outcome:

The MWESB spending percentage is used to quantify the social equity impact of the East County Courts construction project.

Goal #3: Evaluate Environmental Impacts

Emissions Impact Sources & Definitions

The Greenhouse Gas emissions (“Emissions”) impact of the construction project were estimated using Emissions impact multipliers. Emissions impact multipliers are produced and maintained by sources from the US government, universities, international governments and private companies.

See **Appendix E** for a complete list of Emissions impact multiplier sources.

Measurements of Emissions were performed for:

- **Material Emissions:** The emissions resulting from the use of energy inputs necessary to produce a quantity of construction material
- **Installation Emissions:** The emissions resulting from the combustion of fuel from construction equipment.
- **Transport Emissions:** The emissions resulting from the combustion of fuel when delivering materials or workers to the site.

Emissions Impact Methodologies

Detailed Impact Measures for the East County Courts construction projects were achieved by applying Emissions impact multipliers to quantities of material and fuel that were used to complete construction activities for the East County Courts project. Electronic surveys, project plans and specifications were used to estimate quantities of materials and fuel used to construct the East County Courts project.

Material Emissions: Material quantities were applied to the appropriate emissions multipliers.

Transport & Installation Emissions: Using information from the project design and project team members, transportation and equipment usage models were used to estimate the quantities of fuel used during construction activities. Quantities of combusted fuel were then applied to the appropriate emissions multipliers.

Aggregate Impact Measurements were achieved by applying construction activity spending estimates to a Greenhouse Gas Input / Output model produced and maintained by Carnegie Mellon University. This model estimates the Greenhouse Gas emissions of construction spending based on detailed models of historic industry spending activities and resulting emissions.

Outcome:

Detailed and Aggregate Emissions impacts were then summed to quantify the East County Courts construction-related Emissions impacts.

Goal #4: Determine Transportation Impacts

Transportation Impact Sources and Definitions

To estimate the transportation impacts from all transportation modes utilized for construction material deliveries and worker transport, two measurement units are utilized; Vehicle Miles Traveled (VMT) and Vehicle Miles Traveled Equivalent (VMTe).

VMT: A unit of distance resulting from one vehicle traveling one mile on a roadway. This unit is useful to appreciate the amount of time, fuel costs and wear and tear was associated with transportation modes that utilized the roadway system. The higher the VMT value, the more time, expense and wear and tear was involved to deliver materials and workers to the jobsite.

VMTe: A unit of distance that converts the transportation impact of ocean, air, barge or heavy rail freight transportation to its equivalent impact as if it were delivered by truck on a road. This unit is useful to appreciate how distant the project's inputs were from the jobsite. The smaller the VMTe value, the more local the project's supply chain was.

Transportation Impact Methodology

Detailed Measures Methodology:

EcoLogistics utilized electronic surveys from project participants, the project schedule from the General Contractor and EcoLogistics' supplier database to create a transportation impact model for the project. This model was utilized to estimate the VMT and VMTe impact of the project.

Material Transport: Mapping software was used to estimate the distances for each leg of each construction activity's supply chain. These distances were integrated into a transportation impact model which considered each construction activity's transport mode (s) and number of trips required for delivery. This model then output the VMT and total ton-miles for non-road transport. Ton-miles were then converted by EcoLogistics into the VMTe metric.

Worker Transport: The distance between each contractors home office and the job site was measured for each vendor. The project schedule was then used to estimate the number of workers and trips necessary to install the work. The commuting distance, average mode of travel and the number of trips required were all taken into account in order to estimate the worker transport VMT estimate.

Aggregate Measures Methodology:

When commuting or delivery information was not available, an aggregate measures methodology was utilized. In this method, spending estimates for each construction activity were applied to an Input/Output model produced and maintained by Carnegie Mellon University. This model uses a historic model of industry activities and resulting transportation impact to estimate the ton-kilometer impact of all transportation modes. This ton-kilometer estimate was then converted by EcoLogistics into a VMTe measurement.

Outcome:

Detailed and Aggregate VMT and VMTe impacts were then summed to quantify the East County Courts construction-related Transportation impacts.

STEP 4. ANALYZE IMPACTS

This section summarizes the East County Courts construction project's impact on County goals followed by a detailed accounting of the project's impact on each goal.

Impact Summary:

Exhibit 6: Total Project Impacts

GOAL:	Multnomah County Economic Impact		Social Equity	Environmental Impact	Transportation Impact
METRIC	Local Spending Stimulus	Local Job Creation / Retention	MWESB Participation	Greenhouse Gas Emissions	Vehicle Miles Traveled
UNIT:	\$ Spending	FTE Jobs	% of Contract Spending	MT CO2e	VMTe
TOTAL IMPACT:	\$18,580,606	131.26	32.2%	9,892.42	190,634.66

Impact Per \$million of Construction Spending:

Exhibit 7 divides the East County Courts' various impact estimates by amount of East County Courts' project spending that was evaluated, a prorated impact rate can be produced for each impact type. These per-million impacts could be used to extrapolate the potential impact of future County construction projects or as a baseline metric to compare the impact of similar projects.

Exhibit 7: Project Impacts per \$ million of total project spending evaluated

ECC Impact Type	ECC Construction Impact:	ECC Impact / \$ 19.78m
Multnomah County Construction Direct Spending	\$9.87m	\$498,824
Multnomah County Indirect & Induced Spending	\$8.71m	\$440,503
Multnomah County Job Creation / Retention (FTE)	131 Jobs	6.62 Jobs
MWESB Participation (% Contract Spent with MWESB firms)	\$4,950,932 (32.2% of \$15.36m)	\$250,290
Greenhouse Gas Emissions (Co2e)	9,892 MT	500.1 MT
Transportation Impact (Vehicle Miles Traveled equivalent)	190,635 VMTe	9,637.7 VMTe

Goal #1: Quantify Local Economic Impact

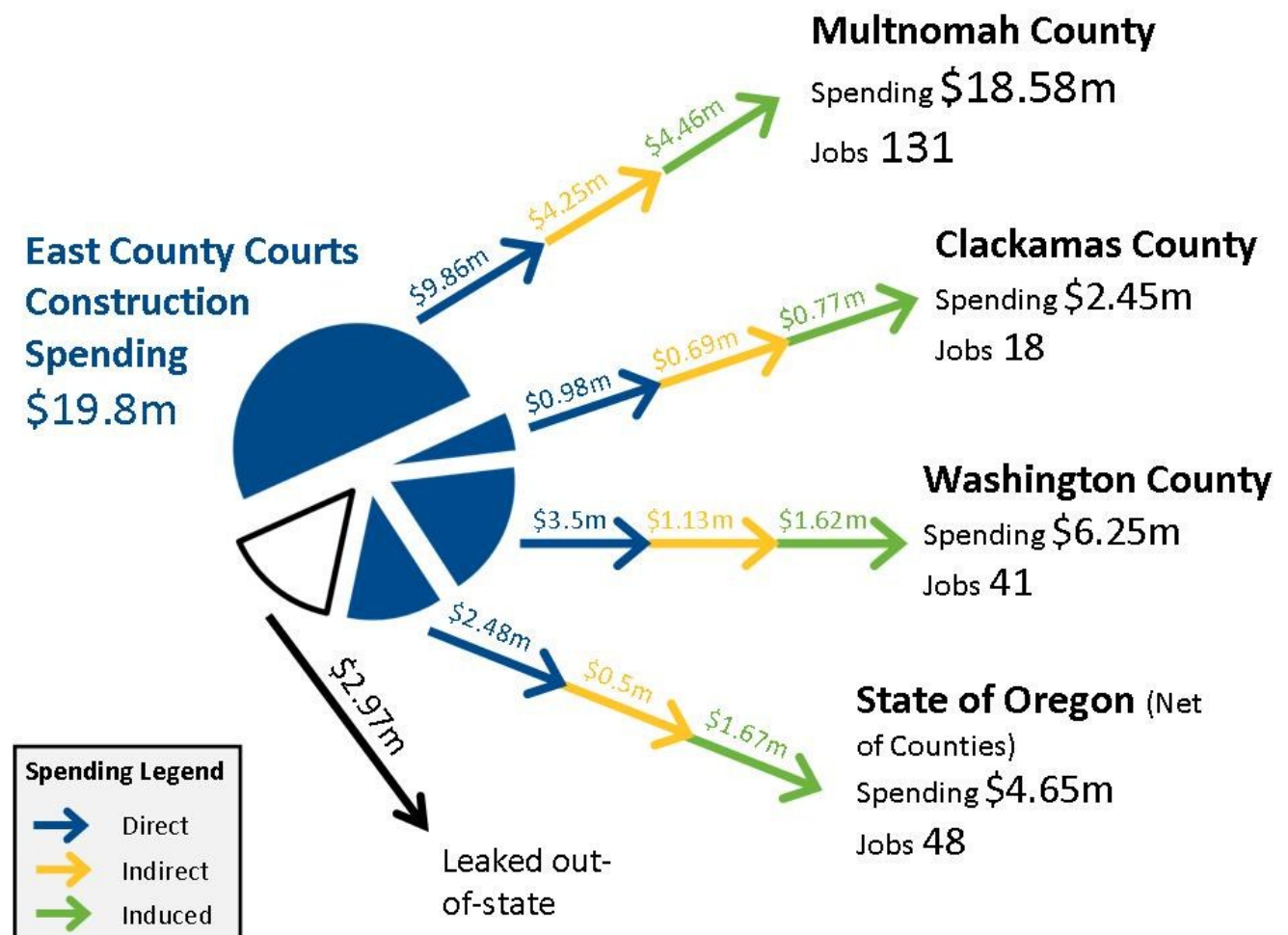
Economic Impact Summary:

The total project budget was \$22 million. This EcoAssessment evaluated \$19,780,762 million of this budget to determine which local economic areas received project spending and how much indirect, induced spending and job creation effects resulted from that spending.

- Direct contract spending in Multnomah County = \$9,867,113, 49.9%
- Direct, indirect and induced spending stimulus in Multnomah County = \$18,850,606
- Jobs created or retained in Multnomah County = 131 jobs (FTE)

The local economic impact of the East County Court's construction project was substantial; with approximately half of the spending occurring with businesses located in Multnomah County. This direct spending set off a chain reaction of spending and re-spending that resulted in the creation or retention of jobs in the County as companies procured the materials, equipment and services necessary to fulfill their construction purchase orders and subcontracts. Exhibit 8 below shows the spending, re-spending and job creation effect that the East County Courts project produced for each of the economic benefit boundaries.

Exhibit 8: Total Project Economic Impact Details



Economic Impact Context

Exhibit 9 below shows that direct payments made by Multnomah County and Multnomah County vendors produced 71 jobs. The indirect and induced effects created another 60.68 jobs. The jobs induced by this direct spending are jobs created by the consumer effect. This chart demonstrates the level of job creation activity that construction spending induces in the services and consumer portions of the economy.

Exhibit 9: Spending sources of jobs created/retained within Multnomah County

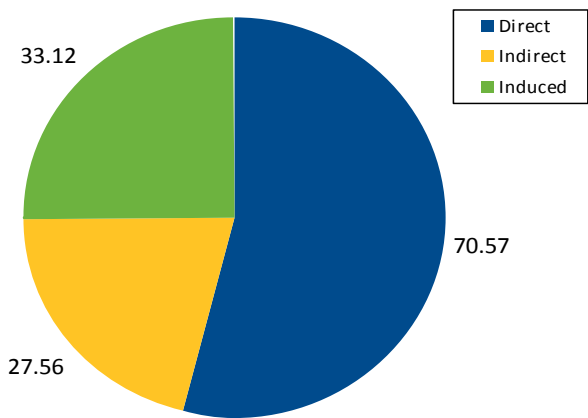
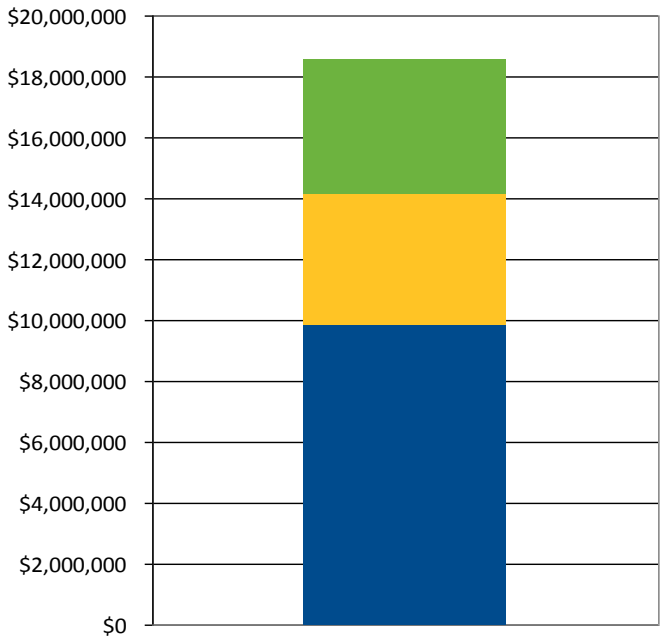


Exhibit 10 differentiates the spending effect of direct payments by the County and County vendors.

Exhibit 10: Spending effect within Multnomah County



Economic Impact Drivers:

The location of each material supplier and contractor determined where direct spending occurred. Direct spending commitments caused a chain reaction of additional spending and employment effects. Vendors that received direct spending payments bought materials and equipment to install the work. These vendors also hired or retained employees to install the work. The East County Courts’ procurement selections resulted in \$9.87 million of spending and the creation or retention of 131 jobs in Multnomah County.

The County’s consultant and prime contractor RFP processes resulted in 60.7% of County spending (\$5.99m) and just under 33% of County job creation / retention (43 jobs). \$7.24m of spending and over 51 jobs in Multnomah County. These vendors then produced designs, developed contracting plans and performed outreach efforts to purchase the products, materials and services necessary to construct the East County Courts construction project.

The County’s selection of the construction manager and general contractor (“CMGC”) created \$1.77m of local spending and over 12 jobs to be created. The CMGC’s used its own workforce to install the concrete materials for the building and its office is located in Multnomah County.

10 construction activities from the East County Courts project generated over 56% of the project's spending effect to Multnomah County.

Exhibit 11: Multnomah County Jobs and Spending Stimulus by Construction Activity

Top 10 Economic Impact Sources	Total Jobs Created or Retained	Total Spending Stimulus
Project Design	18.75	\$2,603,137
HVAC & Plumbing	14.79	\$2,053,564
Project Management	11.64	\$1,616,327
Building Concrete	7.09	\$984,171
Low Voltage, Security & Data	6.24	\$866,011
Electical	4.25	\$589,534
Structural & Misc. Steel	4.23	\$587,782
Glass & Glazing	3.24	\$449,448
Tile, Carpet & Resilient	3.23	\$448,519
Site Concrete	2.82	\$391,321
Total	76.27	\$10,589,815

Design Selections:

The local economic spending and job creation potential of projects is affected at the earliest stages of design. Architects and engineers select products and materials for each project that meet the County's requirements. These requirements often include form, function, longevity, aesthetic and cost criteria.

The East County Courts' design specified materials that were manufactured in Multnomah County and utilized on this project. These materials included ready mix concrete, crushed rock, precast pipe and asphaltic concrete. The Specification included other materials that could have been supplied by Oregon manufacturers including: wood doors, built-up roofing and steel rebar reinforcement. Most materials were fabricated and supplied by vendors in the local economic benefit areas of this EcoAssessment.

Product and material specifications have implications beyond the purchase of the products or materials themselves. Selections often implicate certain suppliers and installation contractors. Selections can even affect the number of qualified vendors to maintain the system long term.

Architects and engineers often re-purpose specifications and design details from previous projects because these selections have been proven to work and there are cost efficiencies to repurposing specifications and design details. Previously specified products are already in the design and accommodating a different design or material could require additional design work and cost. This provides an advantage to specified products and materials and creates a barrier to new products and materials. When these incumbent materials and designs are located in the County, the project's economic spending and job creation potential is higher.

When products and materials are not specified or designed in, the material supplier must rely on a supplier or contractor to initiate a substitution request process. The substitution request process requires additional work for the contractor, architect or engineer. The project team did overcome this barrier on the East County Courts project. The pavers specified for the parking lot were from an out-of-state manufacturer. Through the process of selecting suppliers, a paver from an in-state manufacturer was accepted and used for the project. This switch also enabled the use of a local supplier which increased the spending and job creation effect of the project to the County.

Contracting Plan:

The contractor conducted an extensive outreach effort to attract bids for the project. This effort was extended to both MWESB and non-MWESB potential bidders. All bids were then qualified and evaluated according to a point system in the contracting plan. The contracting plan helps the contractor resolve trade-offs between cost and other considerations such as MWESB participation. The contracting plan did not consider trade-offs for the economic benefits of local suppliers or contractors.

Goal #2: Assess Social Equity

Social Equity Impact Summary:

- Total Construction Contract = \$15,375,566
- Total MWESB spending = \$4,951,062
- MWESB Participation Aspirational Goal = 20%
- Total MWESB participation = 32.2%

Social Equity Impact Context:

MWESB firms are located across the State of Oregon. Exhibit 12 below shows that 61% of the MWESB project spending from the East County Courts construction project went to firms located in Multnomah County.

Exhibit 12: % Share of Total Project MWESB Spending by Location

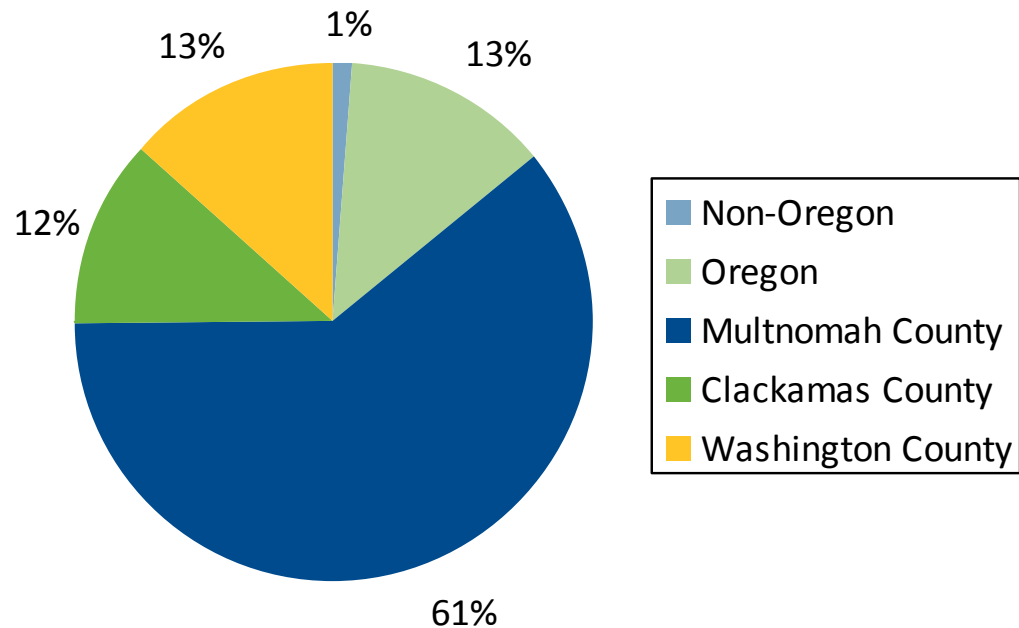


Exhibit 13 below identifies that the project team was able to contract for 9 different construction activities with MWESB firms located in Multnomah County.

Exhibit 13: Multnomah County MWESB Spending

Construction Activity	Multnomah County MWESB Spending	Share of Construction Contract
Building Concrete	\$114,884	0.7%
Structural & Misc. Steel	\$1,160,756	7.5%
Millwork & Casework	\$351,750	2.3%
Tiling	\$52,860	0.3%
Carpet & Resilient	\$183,426	1.2%
Painting	\$94,610	0.6%
HVAC & Plumbing	\$518,116	3.4%
Site Lighting	\$230,354	1.5%
Site Concrete	\$284,842	1.9%
Total	\$2,991,598	19.5%

Exhibit 14 below identifies MWESB spending by construction activity organized according to the MWESB firms location in each of the East County Court's economic benefit boundaries. Of all MWESB firms hired, only one firm was located out of state in Vancouver, Washington.

Exhibit 14: Total Project MWESB Spending Details

Construction Activity	Total MWESB Spending	Non-Oregon	Oregon	Multnomah County	Clackamas County	Washington County
Building Concrete	\$114,884			\$114,884		
Structural & Misc. Steel	\$1,160,756			\$1,160,756		
Millwork & Casework	\$351,750			\$351,750		
Tiling	\$52,860			\$52,860		
Carpet & Resilient	\$183,426			\$183,426		
Painting	\$94,610			\$94,610		
HVAC & Plumbing	\$518,116			\$518,116		
Site Lighting	\$230,354			\$230,354		
Site Concrete	\$284,842			\$284,842		
Earthwork	\$595,120				\$595,120	
Drywall & Acoustical Ceilings	\$173,952					\$173,952
Electrical	\$260,083					\$260,083
AC Paving	\$90,905					\$90,905
Fencing	\$133,895					\$133,895
Waterproofing	\$120,164		\$120,164			
Flashing & Sheet Metal	\$35,239		\$35,239			
Doors/Frames/Hardware	\$240,784		\$240,784			
Landscape & Irrigation	\$241,462		\$241,462			
Ornamental Railings	\$67,860	\$67,860				
Total	\$4,951,062	\$67,860	\$637,649	\$2,991,598	\$595,120	\$658,835

Social Equity Impact Drivers

MWESB participation is mandated by County procurement policies. For the East County Courts project an aspirational MWESB spending participation goal of 20% was established. The main driver of performance on this goal is the contracting plan which formalizes the requirements of the program, tracks the efforts towards achieving the contracting goal and guides decision makers when making contracting selections.

The contractors pre-bid efforts increased the number of bids received by MWESB firms. The contracting plan selection methodology enabled the project to achieve the 32.2% MWESB spending participation rate.

The magnitude of the project construction activities, complexity of the project's design, availability of MWESB resources and the perceived performance risks of those firms all affect the potential and actual participation of MWESB firms. Construction projects are constructed as quickly as possible to reduce construction risks and costs. As a result, large projects need contractors and suppliers that can deliver materials and install them properly and quickly. Complex designs require contractors that are experienced and have demonstrated success at achieving similar installations according to the project's specifications.

To address these barriers, the contractor adjusted the design and contracting strategies where possible to maximize the potential for MWESB firms to participate. Strategies included splitting larger contracts into smaller contracts, teaming large contractors with smaller, MWESB contractors and training inexperienced MWESB contractors so that they would qualify for future projects.

According to Multnomah County's Central Procurement and Contract Administration Annual Report from 2009, 16.8% of all County purchasing funds were spent with MWESB resources. The East County Courts project achieved a 32.2% participation rate, exceeding both the aspirational goal for the project and the participation rates listed in the 2009 report.

Goal #3: Evaluate Environmental Impact

Environmental Impacts Summary:

- Construction Greenhouse Gas emissions = 9,892 MT CO₂e
- 500.1 MT Co₂e / \$ million of project spending
- 0.275 MT Co₂e / Building Square Foot

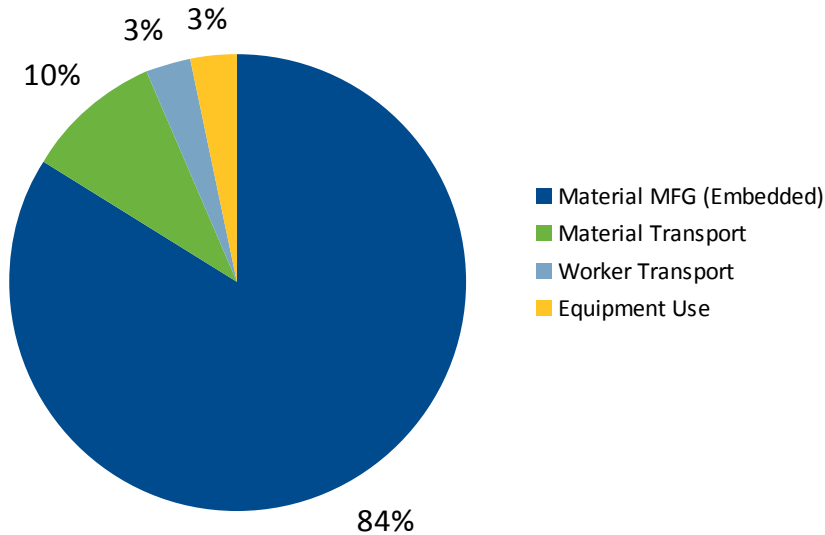
Exhibit 15 below identifies the 8 construction activities with the most GHG emissions that were measured in detail. Despite the proportion of impacts that steel and concrete had, when combined these construction activities account for just under 13% of construction emissions.

Exhibit 15: Environmental Impact Table

Construction Activity	Material MFG (Embedded)	Material Transport	Worker Transport	Equipment Use	Totals
Structural Steel	657.08	45.99	3.45	14.26	720.79
Concrete	493.39	30.09	6.61	21.42	551.51
Interior Framing	105.60	15.82	28.73	8.57	158.73
Fire Supression	52.96	64.84	1.56	3.51	122.87
AC Paving	78.67	2.49	0.83	5.57	87.56
Masonry	51.89	15.21	10.55	2.99	80.65
Storefront	57.89	2.41	2.22	2.33	64.84
Reinforcing Steel	43.23	0.81	1.33	1.58	46.95
Total	1,540.71	177.66	55.29	60.23	1,833.89

Exhibit 16 below identifies the relative Emissions impact of the East County Courts’ construction project by each Emissions source. 84% of this impacts is associated with the embedded impacts of materials extraction and manufacturing. Careful evaluation of design specifications offer a way to avoid the majority of construction project Emissions.

Exhibit 16: Environmental Impact Share by Source



Environmental Impact Context:

The Greenhouse Gas emissions of this project are equal to the annual US household and automotive emissions of over 167 homes. Exhibit 17 identifies the GHG emissions amounts and sources of household and automotive emissions.

Environmental Impact Drivers:

Construction related environmental impacts are dominated by implications of Steel and Concrete selections.

Steel shapes require vast amounts of energy to produce. Typically they are manufactured and transported from great distances, often overseas. Overall structural & misc. steel accounted for 7.3% of the ECC environmental impact. As shown in Exhibit 18, the primary driver of this impact is material production. The environmental impact of steel production is affected by two factors, the utilization of recycled inputs and the type of furnace used to manufacture the steel.

Steel with high levels of recycled inputs can have less than 50% of the environmental impact of virgin steel. Steel shapes with high concen-

Exhibit 17: Annual US Household CO2 Emissions

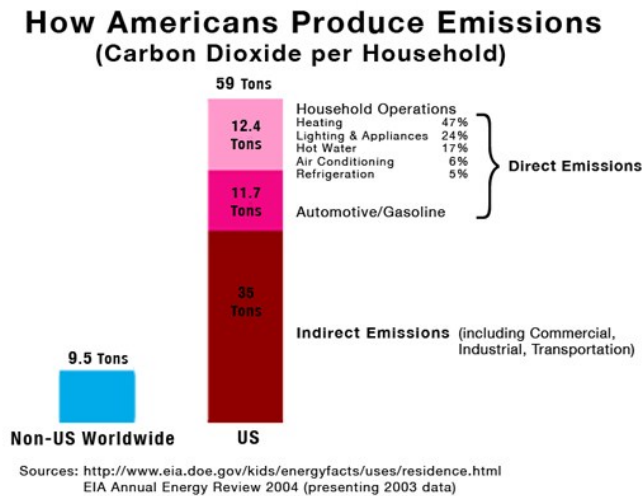
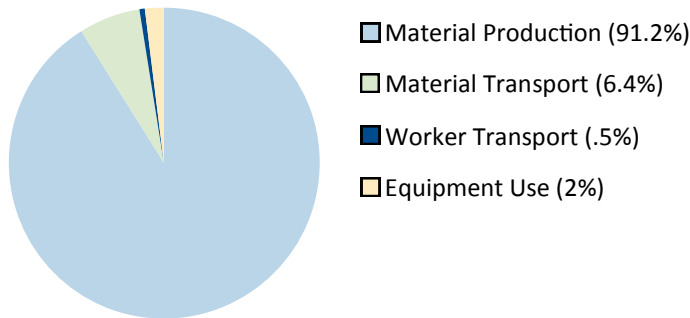


Exhibit 18: Structural Steel Environmental Impact Sources

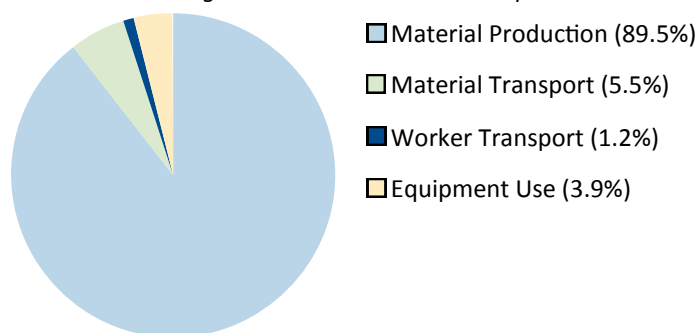


trations of recycled input are typically manufactured in electric arc furnaces which on average use significantly less energy than the blast oxygen furnaces used to manufacture steel shapes with virgin steel. Only certain steel shapes are manufactured with a high recycled content and/or in an electric arc furnace. Avoiding Emissions impacts through steel selections requires a deliberate effort to design for the potential of lower impact shapes.

Building Concrete also has a substantial Emissions impact. But concrete ready mix and many of its material inputs are available from local sources. East County Courts building concrete excluding reinforcing steel accounted for 5.6% of the construction project's Emissions impact.

Concrete is a mixture of primarily sand, aggregates, cement, cement alternatives, water and additives. Exhibit 19 identifies the relative emissions impact of building concrete. The production of ready mix concrete accounts for approximately 89.5% of the project's Emissions impact. Approximately 63% of concrete ready mix's impact comes from the manufacture of cement. Minimizing the cement content to only what is necessary to meet specifications is a best management practice that is often overlooked to expedite construction schedules and because of the risks not meeting specifications.

Exhibit 19: Building Concrete Environmental Impact Sources



Cement alternatives, while not exact replacements, can help to safely reduce the amount of cement in ready mix concrete. Projects regularly utilize fly ash from coal power plants and slag cement which utilizes steel slag from the steel production process to safely minimize the use of cement and avoid Emissions. Localizing the supply chain of ready mix and its inputs can also reduce the Emissions related to building concrete. The contractor utilized Knife River ready mix for the East County Courts project. The ready mix batch plant was located 8.1 miles from the jobsite.

Goal #4: Determine Transportation Impacts

Transportation Impact Summary:

- Total project transportation impact: 190,635 (VMT combined with VMTe)
- Total project Vehicle Miles Traveled = 148,265
- Total project VMTe = 42,370
- VMT's / \$ million of project spending = 9,637.7
- Net worker transport-related VMT's = 103,942 miles

Exhibit 20: Proportionate Transportation Impacts by Source

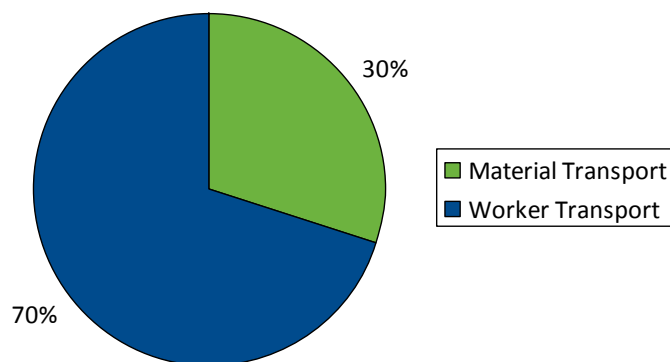


Exhibit 21 Identifies that drywall and acoustical ceilings work creates the most transportation impacts with over 39% of total VMTs. This is due to the quantity of work and labor intensity of that construction activity.

Exhibit 21: Transportation Impacts by Construction Activity

Construction Activity	Material Transport	Worker Transport	Total VMT	% Proportion	Gallons of Fuel Used
Drywall & Acoustical Ceilings	4,108.90	54,022.09	58,130.99	39.2%	4,099.40
Brick Veneer	3,915.00	19,832.14	23,747.14	16.0%	2,354.06
Building Concrete	10,305.70	12,424.34	22,730.04	15.3%	2,690.64
Fire Suppression	16,686.20	2,931.43	19,617.63	13.2%	1,091.72
Structural & Misc. Steel	7,840.24	6,491.94	14,332.18	9.7%	2,979.94
Glass & Glazing	619.40	4,178.57	4,797.97	3.2%	423.89
Reinforcing Steel	208.00	2,497.14	2,705.14	1.8%	196.43
AC Paving	639.60	1,564.29	2,203.89	1.5%	301.75
Total	44,323.04	103,941.94	148,264.98	100%	14,137.82

Transportation Impact Context:

Perhaps the most appropriate context to consider these VMT and VMTe estimates is as a proxy to evaluate the overall efficiency of the project's supply chain. The smaller the transportation magnitude, the less fuel, road wear and tear and driving time was required to complete the project.

Transportation Impact Drivers:

The magnitude and nature of construction project transportation impacts are a function of material and supplier selections and the subsequent transportation choices that suppliers, contractors and subcontractors make when delivering materials and workers to the job site. Design professionals specify the materials and list approved manufacturers; general contractors select the suppliers and subcontractors that meet the specifications at the lowest cost. **The East County Courts project utilized a program to encourage vendors and workers to avoid transportation impacts. While details about the effectiveness of this program were not available,** based on previous EcoAssessments, similar programs successfully reduce transportation impacts by 70% or more. These impact reductions benefit the workers, the local community and the environment.

Transportation impacts are not generally a criteria for inclusion or exclusion of a design or material from the project specifications. Bidding processes also do not typically weight potential transportation impacts when selecting suppliers or contractors at bid time. Without a system to incorporate transportation impact consideration into the design, bid and procurement processes, construction-related transportation impact intensities will vary.

Conclusion

This EcoAssessment measured the effect of design and procurement decisions of the East County Courts construction project on the community and the environment. Metrics for economic spending, job creation effect, greenhouse gas emissions and transportation impacts were combined with metrics for MWESB participation. Together, these detailed impact measurements provide a powerful new set of data that the County can use to evaluate this projects' impact on the community and environment. In this conclusion we will use this set of impact data to extrapolate the potential impact of future County construction projects. This extrapolation is intended to help the County gauge the relative magnitude of impacts and opportunities that their future construction projects could entail.

The economic portion of this data set demonstrates that the East County Court's design and construction strategies resulted in almost 50% of direct spending occurring with County businesses. Each dollar spent with businesses in the County produced \$1.88 of direct, indirect and induced spending. This effect is especially important considering the volume of construction activity in the County's 2010-2014 Capital Improvement Project ("CIP") list. This list anticipates \$1.08 billion for proposed construction projects to be constructed over the next 20 years. Based on the construction spending pattern of the East County Court's project, the local spending and job creation impact of the CIP list will be substantial.

To evaluate the Greenhouse Gas emissions impact, the East County Courts construction emissions are extrapolated to estimate the construction emissions of County projects over the next 20 years. The East County Courts project produced 500 metric tons of Emissions for every million dollars of spending evaluated. When we apply this rate of emissions to the list of projects on the 2010-2014 CIP, we can extrapolate that these projects could result in over 540,000 metric tons of Emissions.

Within each economic and environmental impact measurement are clues to manage their impact. Measurements allow impact drivers to be better understood. This understanding leads to alternatives that could improve the impact. As metrics quantifying the effect of design selections and construction strategies accumulate over time the data becomes a powerful tool to vet and select effective and affordable best management practices. Tracking impact levels over time creates a feedback loop enabling policy, staff and vendors to identify which practices are working and how well.

What matters tends to get measured and what gets measured tends to get managed. For example, when the County formally addressed their priorities for social equity with the contracting plan, the project team spent 32% of the contract with MWESB firms; exceeding the goal of 20%. When the County utilized an energy model to strike a balance between first cost and energy efficiency, the project team met the budget constraint and reduced energy use 20% or more per year. In each of these examples, the project team utilized metrics to identify and communicate which choice was best and why. A similar effort to address construction related economic and environmental impacts would leverage this winning formula for continuous improvement on County priorities.

Next Steps

This report illustrates a process to utilize the information already generated in the standard course of design and procurement activities to perform economic and environmental impact estimates. The techniques and protocols utilized for this EcoAssessment offer a transparent and rigorous approach to measure impacts.

The County is in an ideal position to leverage the lessons learned from this measurement process to develop a process that meets the County's objectives moving forward. There are two strategies that we feel are worthy of consideration by the County when considering next steps. Both strategies have the same objective; to empower County policy makers and staff with impact metrics that quantify the community and environmental impact of County construction projects. The strategies are differentiated by their approach to collecting this impact data.

Option 1: Because the impact measurement and evaluation process has been prototyped on the East County Courts project, the most difficult and time consuming work has already been completed. If triple bottom line evaluations similar in scope to this EcoAssessment are desired, the process described in this report can be easily adjusted as necessary to meet the County's needs and then efficiently applied to future projects. This option would produce detailed impact data and reports for each project.

Option 2: We have developed a program that augments preconstruction processes to automate data collection and drastically simplify the calculation and reporting scope of each project. This program supplements County reporting requirements so that project information is captured from contractors and suppliers as each County project is bid and when it is completed. From this information we can efficiently produce economic and environmental impact metrics for many projects and report these impacts upon request.

Each of these options would ensure more statistically relevant impact baselines with which to evaluate impacts from County construction projects. Since the County builds, maintains and renovates buildings and transportation facilities, the County can use this additional data to differentiate impact intensities based on the type, scope and scale of projects. Based on these evaluations, the County can better determine which types of projects or projects sizes warrant impact measurements, reporting and evaluation processes.

Impact metrics and enhanced decision making protocol are also vital tools to help the construction industry remain competitive. We have watched companies big and small make no-cost adjustments to localize supply chains for a chance to win the work. This industry transformation effect could be an important contribution to achieving the County's larger economic, community and environmental goals.

The County's Sustainable Purchasing Program provides a logical insertion point for construction impact metrics. Within this program is the acknowledgement that a broad spectrum of metrics is an important component to realizing the benefits of the program. Without an efficient, reliable and cost-effective way to generate these metrics baselines cannot be established and improvements are difficult to verify and report.

EcoLogistics' entire existence is dedicated to helping our clients get the metrics they need to achieve continuous improvements on their goals. The County, the construction industry and other counties across the US would benefit from efforts to quantify and improve construction project impacts. EcoLogistics would appreciate any opportunity to assist the County to explore options to this end.