BURNS McDONNELL

Economic Impact Study on C&D Diversion Requirements

AUSTIN RESOURCE RECOVERY

City of Austin, Texas

Final Report

6/2/2020

(This page intentionally left blank)

TABLE OF CONTENTS

Page No.

LIST OF TABLES

APPENDIX

EXECUTIVE SUMMARY

The following Economic Impact Study on C&D Diversion Requirements (Study) provides an assessment of the economic impact of existing disposal and diversion rates on household affordability and an assessment of future markets for reuse of construction and demolition materials. The Study evaluates the markets for C&D debris recovered from new construction and demolition for both reuse and recycling. This Executive Summary presents a project overview and the key findings and recommendations based on the content in Sections 1 through 4 of this Study.

Overall Study Recommendations

Key findings and recommendations are described under each section summary. However, the following are the overall study recommendations most relevant for the City Council's decision on whether to approve implementation of more stringent requirements for Ordinance No. 20151119-098 (C&D Ordinance) on October 1, 2020.

1. As demonstrated in Section 2 of this Study, there is minimal impact from the C&D Ordinance on the overall cost of developing residential and commercial projects.
2. Demolition projects have only been part of the C&D Ordinance requirement since October 1, 2019, at which time the demolition projects were required to meet the minimum 50 percent diversion requirement and not dispose of more than 2.5 pounds per square foot. If approved by City Council, these requirements would increase to 75 percent diversion and no more than 1.5 pounds per square foot beginning on October 1, 2020. There has not been sufficient time to collect data from demolition projects since they were required to comply with the ordinance on October 1, 2019 and therefore Burns & McDonnell recommends that the decision on whether to include demolition projects in the stricter requirements should be delayed to allow City staff additional time to study the impact of the ordinance on demolition projects.
3. Reporting of diversion results to demonstrate compliance with the C&D Ordinance has, to date, relied primarily on voluntary reporting. The percent of projects that are submitting the necessary information is relatively low compared to the total number of projects that meet the criteria for compliance. Therefore, the diversion results are likely not representative of all projects. City staff from the Austin Resource Recovery Department are in the process of implementing an enforcement program that will begin in late 2020 or early 2021. Therefore Burns & McDonnell recommends that the decision on whether to implement the stricter requirements should be delayed to allow City staff additional time to implement the enforcement program and study the results once a higher percentage of projects submit the required project diversion information.

Section 1 – Introduction

As detailed in Section 1, the City Council adopted the C&D Ordinance, included as Appendix A, in 2015 outlining minimum diversion requirements for construction and demolition including single-family, multi-family and commercial projects that exceed 5,000 square feet. The requirements of this ordinance, including a maximum disposal rate of 2.5 pounds per square foot or a minimum diversion rate of 50 percent, went into effect October 1, 2016.

Effective October 1, 2019, commercial and multifamily projects requiring a demolition permit are required to meet the minimum disposal and diversion requirements of the C&D Ordinance. The next milestone defined in the C&D Ordinance is October 1, 2020 with approval from City Council. Council will consider a decrease to the maximum disposal rate to 1.5 pounds per square foot and an increase of the minimum diversion rate to 75 percent.

Burns & McDonnell was awarded a contract by the City of Austin in December 2019 to evaluate the potential economic impact of the ordinance on household affordability. This includes evaluating the effect of increased diversion based on the requirements of the C&D Ordinance and the market capacity for additional C&D debris. This Study was commissioned, in part, to evaluate the economic impact of the C&D Ordinance prior to implementation of this next milestone. Further goals stipulated by the C&D Ordinance include future goals of a maximum disposal of 0.5 pounds per square foot and 95 percent diversion, taking effect October 1, 2030 with approval from City Council.

Projects that are affected by the C&D Ordinance are required to submit a form available through the Re-TRAC Connect (Re-TRAC) platform that allows the City to collect and analyze project information to understand if projects are complying with the requirements. To gather information, Burns & McDonnell interviewed City Departments and stakeholders among the C&D debris supply chain including generators (e.g. construction, deconstruction and demolition contractors), reuse outlets, haulers, processors, and disposal sites. The purpose of the outreach was to identify costs associated with diverting C&D debris, as well as current and future markets for C&D debris generated in the City.

After collecting, compiling and analyzing data collected from the C&D Related Entities (as defined in the Scope of Work for this Study), Burns & McDonnell calculated the economic impact that the increased diversion of C&D debris would have on residential and non-residential construction in the City by quantifying the cost of disposal and diversion of C&D debris generated on a per square foot basis by project sector (i.e. single family residential, multi-family residential, non-residential).

Section 2 – Economic Impact Analysis

Section 2 provides the results of the data analysis that Burns & McDonnell completed to assess the economic impact of the C&D Ordinance. While household affordability was one of the key areas of interest for the City, this section also includes the impact on non-residential properties. The information presented in this section is a combination of information gathered from City departments and from Burns & McDonnell's outreach efforts to key C&D Related Entities

Key Findings

- **Minimal cost impact resulting from C&D ordinance.** Based on the analysis shown in Section 2, as the diversion requirements of the C&D Ordinance increases from 50 to 75 percent, the resulting economic impact of compliance will be a net cost increase ranging from $0.01 - $0.03 per square foot depending on project sector (e.g. residential, multi-family and non-residential).
- **Projects achieving strong diversion rates.** The diversion percentages from projects between 2016 and 2019 reporting as part of the Austin Energy Green Building program and the C&D Ordinance are diverting 70 – 85 percent of material generated. However, based on conversations with City Staff, the reporting rate has steadily declined since the C&D Ordinance was first implement in 2016 and therefore the high diversion reported under the C&D Ordinance could be a result of only higher-diversion projects reporting results. The City is currently developing an enforcement program to increase the number of projects that report results.
- **Opportunities to increase data integration capabilities.** Permit holders that submit reports as part of the C&D Ordinance are not currently required to provide the project sector/type (e.g. single-family, multi-family, non-residential). This presents a challenge to integrate reports generated by the Re-TRAC system and permit reports generated by Development Services Department (DSD) to analyze the C&D debris generation and diversion for each sector.
- **Limited verification of C&D ordinance reporting requirements.** Based on conversations with C&D debris processors, there is little or no verification of processing system or reported diversion figures among the facilities that are not considered Qualified Processors. While there are opportunities for registered evaluators to validate average diversion rates, there are no registered evaluators approved by the City as of the writing of this report.

Recommendations

- **Continue to minimize cost impact of C&D ordinance.** The City should continue its focus on developing policy that incentivizes diversion in alignment with its zero waste goals while minimizing cost impact to single family household affordability.
- **Identify project sector and project type in Re-TRAC survey.** As part of the existing information solicited from permit holders under the C&D Ordinance, the City should consider requesting further information about the project including the project sector as defined by DSD and the type of project (e.g. new construction, demolition, remodeling) to more swiftly analyze data by integrating DSD and Austin Energy Green Building Program (AEGB) reported figures. Additionally, the City should clarify in the report that information can be submitted for both materials diverted through reuses and as well as recycling. The City could also consider having separate entries in the report for reuse and recycling so that amount of material diverted through reuse could be better quantified.
- **Increase oversight of facilities that are not qualified processors.** The City utilizes the Recycling Certification Institute's (RCI) certification program to determine Qualified Processors. The City should encourage increased oversight of facilities that are not Qualified Processor to be sure that the diversion reported by these facilities accurately reflects the volume of material that is truly diverted from disposal. The City could do so by advertising the need for registered evaluators (there are currently none) which would allow facilities that are not Qualified Processors to validate average diversion rates.

Section 3 – Assessment of Future Reuse Markets

Section 3 provides information Burns & McDonnell gathered from C&D Related Entities regarding minimizing C&D debris generation, deconstruction projects, materials accepted for reuse, incentives to encourage reuse, initiatives in other cities and outlets for processing and selling reusable materials.

Key Findings

- **Local market can support increased reuse material.** Materials salvaged from projects are processed and sold at local reuse outlets. There is currently one Habitat for Humanity Re-Store location in the City and another that has opened in San Marcos. Given that there are limited number of soft-strips projects that are affected by the C&D Ordinance, the increase from 50 to 75 percent diversion required will not inundate the local reuse market. However, if there were more

widespread requirements for deconstruction, beyond what is required in the C&D Ordinance, there would likely be a need for additional reuse outlets in the City.

- **Limitations on volume of material diverted through deconstruction.** There are limitations on the amount of material that can be diverted through deconstruction projects. The additional labor requirements, usability of some fixtures (e.g., less efficient plumbing or lighting fixtures) and limits on the reuse market may not support a widespread expansion of deconstruction activity in the City.

Recommendations

- **Support the local reuse market to increase capacity as the City's growth continues.** The City should seek to support the addition of reuse outlets in the City based on the City's continued growth and associated construction and demolition activity.
- **Incentivize deconstruction projects for projects under the C&D Ordinance including multi-family and non-residential properties.** The City should explore available permit fee relaxation or tax incentives for affected projects that reuse material based on the volume and/or value of donated material. The City could also apply a factor to materials diverted for reuse such that diverting materials for reuse results in a higher calculated diversion percentage than only diverting material for recycling. The following formula is an example of how the diversion percentage could be calculated under this scenario based on an example factor of two applied to material diverted for reuse:

$$\%\ Diversion = \frac{(2 \times Tons\ of\ Reuse\ Materials) + (Tons\ of\ Recycled\ Materials)}{(Tons\ of\ Reuse\ Materials + Tons\ of\ Recycled\ Materials + Tons\ of\ Landfilled\ Materials)}$$

Section 4 - C&D Debris Markets

Section 4 provides information Burns & McDonnell gathered from C&D Related Entities that generate, haul, process and sell C&D debris and offers perspective on the C&D Ordinance diversion requirements, material markets, and economic constraints associated with managing C&D debris generated in the City. The following summary information has been aggregated to maintain the confidentiality of the C&D related entities interviewed.

Key Findings

- **Local markets available for key materials.** Local markets are available for key materials including concrete/aggregate, metals, cardboard, plastic, lumber, and gypsum.

Concrete/aggregate, metals, cardboard and plastic have established end-markets that are strong and consistent. Lumber and gypsum markets are more limited or intermittent. The market prices for materials fluctuate like any, but the materials with strong markets provide incentive for processors to dedicate resources to separate and sell. There is a high demand in the local market for clean, processed concrete/aggregate given the high level of local construction and industrial activity. Cardboard and plastic generated as part of construction projects is typically taken to one of the local Material Processing Facilities (MRFs) and sold along with other residential and commercial materials in the secondary materials markets. Wood or gypsum is often ground on the processor's site and used as part of disposal operations, composted, or otherwise repurposed on site. C&D processors seek alternative end-markets for lumber to process it into a commodity product.

- **Limited local markets for hard to recycle materials.** There are limited local markets for hard to recycle materials such as treated wood and painted gypsum (once painted, gypsum becomes difficult to recycle). Processors struggle to separate and recycle these materials in a cost-effective way. There had been a market for asphalt shingles, but it has since closed. Facilities with stockpiles of shingles are working to sell them as they are able, and they are moving slowly.
- **Challenges for third party haulers.** Facilities that operate automated processes often have hauling operations and only accept material from their own hauling operations or from limited contract customers. With only four of the 58 permitted haulers that manage C&D debris operate processing facilities, there is a challenge for third party haulers in an open market to deliver materials to locations that have the equipment, staffing and capacity to separate and recycle co-mingled material. With the requirements of the C&D Ordinance, customers seek hauling companies that can support their compliance with diversion requirements and this leaves third party haulers at a disadvantage to provide these services given the limited number of outlets where they can deliver material to be processed and recycled.

Recommendations

- **Increase recycling of key materials.** The City should encourage general contractors to prepare to minimize contamination of key materials including concrete/aggregate, metals, untreated wood, cardboard, plastic (i.e. those that have strong local market value) on project sites. Source separation techniques could be provided as part of a technical assistance effort by the City to increase education efforts regarding reducing contamination in loads bound for recycling facilities**.**

- **Consider phased approach to increasing diversion requirements and maximum disposal rate for C&D debris generated from new construction and from demolition.** The City should consider a phased approach to increasing diversion requirements to 75 percent and maximum disposal requirements to 1.5 pounds per square foot. The current standard of 50 percent diversion has been shown to be achievable from at least some projects. However, reporting has primarily been voluntary. Burns & McDonnell recommends the City continue to gather data in conjunction with increased enforcement and third-party verification efforts. Further, demolition projects have been required to meet the current requirements since October 1, 2019 and therefore there has not been time to gather and analyze data from those projects.
- **Support third party haulers active in the city.** Third party haulers face a disadvantage when bidding on projects because there are limited outlets that accept third party C&D debris recycling in the City. The City should consider opportunities to support haulers that do not own a processing or disposal facility to recycle C&D debris as part of the update of its Zero Waste Master Plan by exploring public private partnerships.

(This page intentionally left blank)

1.0 INTRODUCTION

Burns & McDonnell has developed the following Economic Impact Study on C&D Diversion Requirements (Study) to provide the City of Austin (City) with an assessment of the economic impact of existing disposal and diversion rates on household affordability and an assessment of future markets for reuse of construction and demolition materials. The Study also includes an evaluation of the markets for C&D debris recovered from new construction and demolition for both reuse and recycling. This section provides project background information and an overview of the methodology used to complete the Study.

1.1 Project Background

The City Council adopted Ordinance No. 20151119-098 (C&D Ordinance) included as Appendix A in 2015 outlining minimum diversion requirements for construction and demolition including single-family, multi-family and commercial projects that exceed 5,000 square feet. The requirements of this ordinance, including a maximum disposal rate of 2.5 pounds per square foot or a minimum diversion rate of 50 percent, went into effect October 1, 2016.

Effective October 1, 2019, commercial and multi-family projects requiring a demolition permit are required to meet the minimum disposal or diversion requirements of the C&D Ordinance. The next milestone defined in the C&D Ordinance is October 1, 2020 with approval from City Council. Council will consider a decrease to the maximum disposal rate to 1.5 pounds per square foot and an increase of the minimum diversion rate to 75 percent. This Study was commissioned, in part, to evaluate the economic impact of the C&D Ordinance prior to implementation of this next milestone. Further goals stipulated by the C&D Ordinance include future goals of a maximum disposal of 0.5 pounds per square foot and 95 percent diversion, taking effect October 1, 2030 with approval from City Council.

Projects that are affected by the C&D Ordinance are required to submit a form available through the Re-TRAC Connect (Re-TRAC) platform that allows the City to collect and analyze project information to understand if projects are complying with the requirements. Burns & McDonnell was awarded a contract by the City of Austin in December 2019 to prepare a report concerning the economic impact of existing disposal and diversion rates on household affordability and an assessment of future markets for reuse of construction and demolition materials.

1.2 Methodology Overview

To gather information, Burns & McDonnell interviewed City departments and stakeholders among the C&D material supply chain including generators (e.g. construction, deconstruction and demolition contractors), reuse outlets, haulers, processors, and disposal sites. The purpose of the outreach was to identify costs associated with diverting C&D materials, as well as current and future markets for C&D materials generated in the City.

Table 1-1 lists the C&D Related Entities contacted and briefly describes the information and/or data Burns & McDonnell requested as part of the outreach. Note information provided in this Study was dependent on the responsiveness of C&D-related Entities and their willingness to share the information. Burns & McDonnell has documented all efforts to contact the Entities and has aggregated data collected to provide confidentiality to individual C&D Related Entities.

Table 1-1 – Description of Outreach to C&D-Related Entities

C&D Related Entity	Outreach Description
City Departments	Interviewed City departments including Austin Resource Recovery (ARR), Development Services (DSD), Austin Energy Green Buildings (AEGB) and Housing and Community Development to collect data for analysis and discuss methodology. Burns & McDonnell analyzed information regarding tonnage, generation and diversion of C&D material from projects affected by the C&D Ordinance.
Real Estate Non-Governmental Organization (NGO)	Attempted to contact various associations and trade groups, including an email request and follow up calls, with membership that include businesses involved in the leasing and selling of properties to gain their perspective regarding the C&D Ordinance's impact on affordability of real estate in Austin. The cost information from real estate associations and trade groups was not included in the evaluation methodology.
Deconstruction NGO	Interviewed groups working to preserve historic sites, strip projects of reusable and recyclable materials before demolition occurs, and handle or sell reusable material back to market to identify common reusable items materials and the capacity of the reuse marketplace.
Construction NGO	Interviewed associations and trade groups with membership that include contractors involved in the development, demolition, and construction of real estate in Austin to understand the impact that the C&D Ordinance has on C&D debris management costs.
Contractors	Based on referrals from the Deconstruction and Construction NGOs, interviewed individual contractors to gain their perspective on any additional costs and operational considerations regarding the current and future diversion requirements associated with the C&D Ordinance.
Haulers	Interviewed haulers that transport C&D material from demolition and construction projects to gain perspective on costs, local end markets, and administrative requirements or other costs passed on to customers associated with the C&D Ordinance.
Processors/Disposal Facilities	Interviewed operators of C&D processing and disposal facilities to discuss processing equipment, capacity, and recyclable material markets and to gain perspective on recycling, beneficial use, administrative costs and broader economic considerations associated with the C&D Ordinance.

After collecting, compiling and analyzing data collected from the C&D Related Entities, Burns & McDonnell calculated the economic impact that the increased diversion of C&D material would have on residential and non-residential construction in the City by quantifying the cost of disposal and diversion of C&D material generated on a per square foot basis by project sector (i.e. single family residential, multi-family residential, non-residential).

Based on the information provided by City departments, including Re-TRAC data from ARR and compiled permit data from DSD, Burns & McDonnell calculated the average generation rate of C&D material by project sector on a per square foot basis. Based on interviews with haulers, processors and disposal facility operators, Burns & McDonnell established the average cost of disposing and diverting C&D material and then calculated the cost impact of increasing diversion on a dollar per square foot basis.

Additionally, Burns & McDonnell has as provided key insights and recommendations based on discussions with C&D Related Entities and have compiled them to provide perspective on the market impacts of the C&D Ordinance and recommendations about how to encourage sustained reduction and recycling of C&D debris in support of the City's existing material management goals.

1.3 Report Organization

The report sections are organized as follows:

- **Section 1: Introduction.** Communicates the project background and provides an overview of the methodology to develop the Study.
- **Section 2: Economic Impact Analysis.** Provides the results of the data analysis assessing of the cost impact of the C&D Ordinance.
- **Section 3: Assessment of Future Reuse Markets.** Provides information gathered from C&D Related Entities regarding minimizing C&D debris generation, deconstruction projects, and outlets for processing and selling reusable materials.
- **Section 4: Analysis of Current C&D Debris Markets.** Provides information gathered from C&D Related Entities that generate, haul, process and sell C&D debris to support key findings and recommendations detailed in the Executive Summary.

(This page intentionally left blank)

2.0 ECONOMIC IMPACT ANALYSIS

This section provides the results of the data analysis that Burns & McDonnell completed to assess the economic impact of the C&D Ordinance. While household affordability was one of the key areas of interest for the City, this section also includes the impact on non-residential properties. The information presented in this section is a combination of information gathered from City departments and from Burns & McDonnell's outreach efforts to key C&D Related Entities, as described in Section 1.

2.1 C&D Generation Analysis

Burns & McDonnell has provided the following analysis regarding C&D debris generation and diversion based on the information provided by City departments including the AEGB program, Re-TRAC data from ARR and compiled permit data from DSD. The following analysis is limited to the historical information provided by these City departments and does not quantify the total volume of C&D debris generated in the City. Additionally, information submitted by multi-family and commercial demolition projects that have become affected projects under the C&D Ordinance as of October 1, 2019 were not included in the analysis as this was not yet available as of the writing of this report.

2.1.1 Historical C&D Generation and Diversion

Austin Energy has tracked C&D debris diversion since 2007 for multi-family and commercial properties that are a part of its Green Building Program (AEGB). Table 2-1 shows the historical diversion performance of multi-family and non-residential projects in the Green Building Program on an annual basis for 2017, 2018 and 2019. Note that diversion from single-family projects is not tracked by AEGB and reporting in this program is voluntary, which may result in higher overall diversion rate because projects that do not meet diversion rates are not required to submit information to the City.

Table 2-1 – Diversion Performance of Projects in Austin Energy Green Building Program

	Non-Residential			Multi-Family		
Year	Total Tons	Diverted Tons	Diversion Percentage	Total Tons	Diverted Tons	Diversion Percentage
2019	47,196	33,208	70%	7,877	5,676	72%
2018	49,401	39,331	80%	16,725	14,171	85%
2017	19,774	16,365	83%	6,696	8,688	77%

When the C&D Ordinance was implemented in 2016, ARR began tracking the performance of projects over 5,000 square feet. To analyze the diversion performance of projects on a sector-by sector basis, Burns & McDonnell reviewed permit numbers from the self-reported Re-TRAC data provided by ARR

and the DSD data. The Re-TRAC data provided diversion and disposal data and other key project metrics, but did not include project type nor data submitted by multi-family and commercial demolition projects that have become affected by the C&D Ordinance as of October 1, 2019. The DSD data included project type. By using permit data as the common identifier, Burns & McDonnell was able to summarize the Re-TRAC data by project type. Table 2-2 shows the historical diversion performance of single-family, multi-family and non-residential projects covered by the C&D Ordinance from 2016 through 2019. It is important to note that Burns & McDonnell was unable to successfully match all projects between the Re-TRAC data and the DSD data and that multi-family and commercial demolition data may impact the diversion performance by sector going forward. Therefore, Table 2-2 does not include every project for which a Re-TRAC survey was submitted nor does it include multi-family and commercial demolition projects that have recently become affected by the C&D Ordinance as of October 1, 2019.

Table 2-2 – C&D Ordinance Projects Diversion Performance by Sector

Project Sector	Single Family	Multi-Family	Non-Residential
Total Number of Projects	19	5	372
Total Diversion (tons)	731	2,941	66,353
Total Generation (tons)	906	4,111	90,809
Diversion Percentage	81%	72%	73%

As shown, the diversion from projects tracked by AEGB and ARR show diversion rates range from 70 and 85 percent among all sectors, exceeding the current 50 percent requirement and several meeting the 75 percent requirement. However, these rates may not be representative of all projects due to low reporting rates among affected projects. The number of projects reporting under the C&D Ordinance has steadily declined since the ordinance was implemented due in part by the lack of enforcement for non-reporting. City staff from the Austin Resource Recovery Department are in the process of implementing an enforcement program that will begin in late 2020 or early 2021 to ensure that diversion figures are reflective of representative of all affected projects

2.1.2 C&D Debris Generation Rate

Table 2-3 compares the average generation rate of C&D debris, including both new construction and demolition, from single-family, multi-family and non-residential projects between 2016 and 2019.

Table 2-3 – C&D Generation Summary

Project Sector	Single Family	Multi-Family	Non-Residential
Project Size for All Projects (square feet)	112,825	1,353,516	14,904,941
Average Project Size (square feet)	5,938	270,703	40,067
Total C&D Generation (tons)	906	4,111	90,809
C&D Generation Rate (lbs per square foot)	16.1	6.1	12.2

To provide perspective, as part of its 2003 Building-Related Construction and Demolition Materials Amounts report the Environmental Protection Agency (EPA) estimates that single family construction generates between 2.4 and 8.2 pounds per square foot and demolition projects produce between 41 to 52 pounds per square foot. Non-residential construction projects produce between 2.1 and 8.2 pounds per square foot and demolition projects between 36 and 358 pounds per square foot.[1] There is significantly more tonnage generated as part of demolition projects compared to new construction. The information provided in Table 2-3 includes predominately new construction projects, as multi-family and commercial demolition projects that have become affected projects under the C&D Ordinance as of October 1, 2019 were not available as of the writing of this report. However, for projects that required a partial or full demolition prior to start of new construction, the results reported in Table 2-3 may have also included material from the demolition phase of the project, even though not part of the C&D Ordinance requirements prior to October 1, 2019, which would increase the average generation rate.

Table 2-3 only represents projects where Re-TRAC data was reported and where Burns & McDonnell was able to identify and confirm project sector using data from DSD. It does not represent all C&D Ordinance projects or all C&D generated within the City. Burns and McDonnell was unable to match a total of 1,540,731 square feet, or nine percent, of reported development to a project sector because the permit number identified as part of the Re-TRAC data was not found in the information from DSD permit data for projects over 5,000 square feet. This may occur due when multiple permit applications are required for an individual project (e.g., a permit for demolition and a permit for new construction), incorrect data entries or other reasons. The City may consider requesting additional information from

[1] For further information see the report here: https://www.epa.gov/sites/production/files/2017-09/documents/estimating2003buildingrelatedcanddmaterialsamounts.pdf

affected projects (e.g. project sector) or streamlining data validation techniques for C&D Ordinance data to identify all projects by sector.

The generation rate of C&D debris from projects that were categorized by project sector show that the majority of debris generated from projects affected by the C&D Ordinance are non-residential. Although the feedback from C&D-Related Entities reveals that projects under 5,000 square feet generate C&D debris, these volumes are not captured by the City as part of the C&D Ordinance based on previous analysis conducted by ARR before the C&D Ordinance was implemented, showing diminishing returns on diversion compared to required staff time to regulate the number of projects under 5,000 square feet.

2.2 Cost of Diversion and Disposal

Based on interviews with haulers and processors of C&D debris, the cost for diversion ranges between $47.00 per ton and $80.00 per ton depending on the facility and the cost for disposal ranges between $40.00 per ton and $55.00 per ton. The available facilities and differences are further discussed in Section 4.0. For the purposes of this analysis, Burns & McDonnell used the average of the range of per-ton costs for diversion ($63.50 per ton) and disposal ($47.50 per ton) to calculate the per square foot cost of diverting and disposing C&D debris, which is shown in the following section.

There may be costs associated with increased effort to source separate C&D debris on projects sites. Burns & McDonnell was not able to quantify these costs as part of the outreach conducted to C&D Related Entities, but would expect that there may be some incremental costs for additional training and supervision associated with sorting debris into the correct container for either recycling or disposal.

2.3 C&D Ordinance Cost Impact

Table 2-4, Table 2-5, and Table 2-6 estimate the diversion rate, stated in pounds per square feet, based on achieving 50 percent (current requirement) and 75 percent (requirement as of October 1, 2020) diversion of the total C&D debris generated and the economic impact on each project sector, on a dollars per square foot basis, based on the increase from 50 to 75 percent.

Table 2-4 – C&D Ordinance Cost Impact on Single-Family Projects

	50% Diversion	75% Diversion	Difference
Diversion Rate (lbs/sqft)	8.0	12.0	4.0
Average Diversion Cost ($/ton)	$63.50	$63.50	n/a
Diversion Cost ($/sqft)	$0.25	$0.38	$0.13
Disposal Rate (lbs/sqft)	8.0	4.0	4.0
Average Disposal Cost ($/ton)	$47.50	$47.50	n/a
Disposal Cost ($/sqft)	$0.19	$0.10	($0.10)
Total Cost ($/sqft)	**$0.445**	**$0.478**	**$0.032**

Table 2-5 – C&D Ordinance Cost Impact on Multi-Family Projects

	50% Diversion	75% Diversion	Difference
Diversion Rate (lbs/sqft)	3.0	4.5	1.5
Average Diversion Cost ($/ton)	$63.50	$63.50	n/a
Diversion Cost ($/sqft)	$0.10	$0.14	$0.04
Disposal Rate (lbs/sqft)	3.0	1.5	4.0
Average Disposal Cost ($/ton)	$47.50	$47.50	n/a
Disposal Cost ($/sqft)	$0.07	$0.04	($0.03)
Total Cost ($/sqft)	**$0.169**	**$0.181**	**$0.012**

Table 2-6 – C&D Ordinance Impact on Non-Residential Projects

	50% Diversion	75% Diversion	Difference
Diversion Rate (lbs/sqft)	6.1	9.1	3.0
Average Diversion Cost ($/ton)	$63.50	$63.50	n/a
Diversion Cost ($/sqft)	**$0.19**	$0.29	
Disposal Rate (lbs/sqft)	6.1	3.0	3.0
Average Disposal Cost ($/ton)	$47.50	$47.50	n/a
Disposal Cost ($/sqft)	$0.14	$0.07	($0.07)
Total Cost ($/sqft)	**$0.338**	**$0.363**	**$0.024**

The diversion and disposal rate are calculated by multiplying the total generation rate from Table 2-3 by 50 or 75 percent diversion. The costs are calculated on a dollars per square foot basis by multiplying the diversion and disposal rates by the average diversion and disposal costs (converted from dollars per ton to dollars per pound). The costs are added together to calculate the total costs for managing material at that requirement.

If diversion requirements of the C&D Ordinance are increased from 50 to 75 percent, the resulting economic impact of compliance will be a net cost increase ranging from $0.01 - $0.03 per square foot depending on project sector.

To put the economic impact of diversion and disposal in perspective, the cost of developing residential properties typically range between $100-$200 per square foot and commercial/industrial properties between $100-$180 per square foot, although the range vary substantially based on type of property. For the purposes of this analysis, Burns & McDonnell used the average of the range for single-family ($150 per square foot), multi-family ($150 per square foot) and non-residential ($140 per square foot) to provide perspective on the economic impact on affordability. Table 2-7 Table 2-8 and Table 2-9 show a range of project sizes and cost impacts for residential and non-residential property developments based on the average cost for square foot to develop the type of property and the costs for increased diversion from 50 to 75 percent as shown in Table 2-4 Table 2-5 and Table 2-6. The ranges of the project sizes provided are based on the range of sizes for each sector submitted as part of the C&D Ordinance reporting.

Table 2-7 – Single-Family Property Cost Impact

Project Size (Square Feet)	Average Cost per Square Foot	Total Project Cost	Cost for Increased Diversion Per Square Foot	C&D Ordinance Cost Impact
5,000	$150	$750,000	$0.032	$160
7,500	$150	$1,125,000	$0.032	$240
10,000	$150	$1,500,000	$0.032	$320

Table 2-8 – Multi-Family Property Cost Impact

Project Size (Square Feet)	Average Cost per Square Foot	Total Project Cost	Cost for Increased Diversion Per Square Foot	C&D Ordinance Cost Impact
5,000	$150	$750,000	$0.012	$60
15,000	$150	$2,250,000	$0.012	$180
25,000	$150	$3,750,000	$0.012	$300
50,000	$150	$7,500,000	$0.012	$600
100,000	$150	$15,000,000	$0.012	$1,200
150,000	$150	$22,500,000	$0.012	$1,800
200,000	$150	$30,000,000	$0.012	$2,400

Table 2-9 – Non- Residential Property Cost Impact

Project Size (Square Feet)	Average Cost per Square Foot	Total Project Cost	Cost for Increased Diversion Per Square Foot	C&D Ordinance Cost Impact
5,000	$140	$700,000	$0.024	$120
15,000	$140	$2,100,000	$0.024	$360
25,000	$140	$3,500,000	$0.024	$600
50,000	$140	$7,000,000	$0.024	$1,200
75,000	$140	$10,500,000	$0.024	$1,800
100,000	$140	$14,000,000	$0.024	$2,400
150,000	$140	$21,000,000	$0.024	$3,600

(This page intentionally left blank)

3.0 ASSESSMENT OF FUTURE REUSE MARKETS

This section provides information Burns & McDonnell gathered from C&D Related Entities regarding minimizing C&D debris generation, deconstruction projects, materials accepted for reuse, incentives to encourage reuse, reuse initiatives in other cities and local outlets for processing and selling reusable materials.

3.1 Minimizing C&D Debris Generation

Similar to waste reduction of residential and non-residential municipal solid waste, minimizing the volume of C&D generated is the most environmentally conscious and economically cost-effective approach to material management. Preserving structures in the City by relocating building material to another property or renovating, with or without partial demolition, is a is component of minimizing C&D debris generation. Renovation is a common activity for both residential and non-residential structures and reduces the C&D debris that would otherwise be generated by a full demolition. The C&D Ordinance does not apply to residential renovations under 5,000 square feet and renovations for which only mechanical, electrical or plumbing permits are required are not required to comply with the C&D Ordinance. Additionally, structures can be relocated from one location to another to avoid generating C&D debris. The City provides permits for two types of relocations for residential and non-residential structures:

1. Relocating a structure from outside the City limits to inside the City limits; or from inside the city limits to a different location inside the City limits
2. Relocating a structure from inside the City limits to outside the City limits

Relocation is not a widespread solution to reducing C&D debris, as there are challenges associated with each type of relocation. Relocating to a location in the City may require structural modifications to meet zoning codes and relocating to a location outside the City will have increased transportation costs.

Re-zoning of structures as historical landmarks prevents demolition. While the primary goal is preservation of historic structures, doing so also reduces C&D debris generation. The Historic Landmark Commission promotes historic preservation activities in Austin by reviewing:

- Applications for heritage grants
- Applications for historic zoning cases
- Certificates of appropriateness and tax exemption applications for City landmarks
- Sign and building permits in historic districts

For more information historical preservation, see the following link to the City's Historic Landmark Commission: https://austintexas.gov/content/historic-landmark-commission.

3.2 Deconstruction Projects

Deconstruction projects in the City are completed by NGO organizations and general contractors that develop projects to "soft-strip" buildings to salvage materials and make them available for reuse and resale. Burns & McDonnell was only able to identify one NGO organization that actively participated in deconstruction and that organization only conducts these projects on single-family homes. Contractors conduct deconstruction projects before demolition and the material diverted from deconstruction serves as a component of material diverted from demolition. Although Burns & McDonnell only identified one NGO organization conducting single-family deconstruction projects, soft strips may be conducted by contractors if the salvage value justifies the labor and transportation of material to reuse outlets. The amount and value of material salvaged from individual deconstruction projects depend on the type of structure and zoning (e.g., historically zoned structures may generate more material with salvage value such as antique bricks or items with historical significance).

3.2.1 Material Accepted for Reuse from Deconstruction

Based on discussions with C&D Related Entities, common items that are targeted for reuse are:

- Windows
- Doors
- Cabinets
- Light Fixtures
- Metal Roofing
- Unused Tile
- Cabinets
- Counters
- Toilets
- Sinks
- Antique Bricks

Reusable materials are often the items within a building that can be removed before demolition work would begin. The items with the most resale value identified as part of deconstruction are transported to outlets that can assess the value of items and sell them back to contractors in the City for installation into new construction or remodel projects.

Items generated as part of deconstruction projects that may not be acceptable or discouraged for reuse are provided below, with a brief description:

- **Used asphalt shingles.** Used asphalt shingles are difficult to sort and manage and are often damaged while being removed.
- **Hollow core doors**. More readily damaged than solid core doors and harder to repair. Less desirable for resale than solid core doors.

- **Aluminum pane windows.** Older aluminum pane windows (without thermal breaks) are less energy efficient than thermal break aluminum windows, vinyl windows or wood windows.
- **Toilets exceeding 1.28 gallons per flush.** Older models are less efficient and may not meet current City code.
- **Used concrete, tiling or other aggregates –** it is difficult to recover clean, unbroken tile from projects. Concrete and other aggregates are highly recyclable, but not as easily reusable without processing.

These materials are rejected or disposed as part of materials screening process at reuse locations. These items may not be accepted or disposed as part of the screening process because of (1) excess manpower required to handle/process, (2) incompatibility with current code for new construction projects, or (3) lack of demand for the product.

3.2.2 Single-Family Deconstruction Projects

For single-family households, deconstruction projects can be structured to maximize tax benefits to the project owner through Internal Revenue Service Form 8283, Noncash Charitable Donation. Organizations dedicated to supporting material reuse provide services to identify the change in value of the property based on the donation of the salvaged material. Tax benefits associated with donation of soft strip materials may reduce the cost impact of a demolition contractor for single-family property owners.

The amount of material generated from soft-strips in single-family properties ranges from three to seven tons per project depending on if material salvaged includes metal roofing or flooring. Reuse People, interviewed as part of this Study, only does soft-strips of residential properties. General contractors for non-residential projects may choose to perform soft-strips when it is economically favorable. The City may consider approaches to incentivizing deconstruction for projects that fall under the C&D ordinance, including multi-family and non-residential properties, such as:

- Allowing reuse material to be weighted higher toward diversion requirements than recycled material to encourage reuse
- Rebates of permitting fees or tax incentives based on the volume or value of material that is reused versus recycled

As a point of reference, the City of San Antonio is in the process of evaluating a Deconstruction and Salvage Initiative[1] to provide insight and expertise to recommend direction for policy and informs the

[1] See the following link for more information on the City of San Antonio's Deconstruction and Salvage Initiative https://www.sanantonio.gov/historic/CurrentProjects/Deconstruction

public input process on this subject. The City may consider reviewing and evaluating the policy, once developed by San Antonio, particularly if it provides perspective on encouraging deconstruction of structures that are permitted for demolition.

Burns & McDonnell does not recommend mandating deconstruction for projects because the current infrastructure (reuse outlets) is not sufficient and the market for recovered materials may be limited for the reasons discussed in Section 3.2.1.

3.3 Outlets for Material Reuse

Material generated in deconstruction projects are transported to material reuse operations for resale. The primary reuse outlet in the City is currently the Habitat for Humanity's Re-Store. The reuse operations in the City sell this material to contractors that are building or renovating residential and non-residential properties. Based on Burns & McDonnell's interview with the procurement manager at the Habitat for Humanity Re-Store, they have opened a new Re-Store in San Marcos and have plans to open another Re-Store in the north part of the City. With this additional capacity, Habitat for Humanity does not anticipate having challenges handling or selling an increased volume of salvaged material from projects affected by increased diversion requirements under the C&D Ordinance.

Although reuse is not mandatory in the City and represents a small percentage of the tonnage of C&D material diverted, there are opportunities to increase the amount of material that is stripped from projects before demolition begins. Besides single-family homes, where organizations provide opportunities for homeowners to realize tax savings associated with donating material for beneficial reuse, Burns & McDonnell identified anecdotal instances where private contractors conduct soft-strips on commercial projects (e.g., hotels, universities) if the value of salvage material justifies labor and transportation costs associated with deconstruction. The City may consider efforts to encourage reuse from non-residential and multi-family projects by providing incentives for private contractors to soft-strip projects before demolition.

Although Habitat for Humanity indicated that they would be able to handle increased reuse material based on the increased diversion required as part of the C&D Ordinance, mandatory deconstruction on a City-wide basis may overwhelm its capacity. Burns & McDonnell was not able to identify other large-scale material reuse operations that could support the increase in salvage material if deconstruction was mandated on a City-wide basis.

4.0 ANALYSIS OF CURRENT C&D DEBRIS MARKETS

This section provides information Burns & McDonnell gathered from C&D Related Entities that generate, haul, process and sell C&D debris. This section provides perspective on the C&D Ordinance diversion requirements, material markets, and economic constraints associated with managing C&D debris generated in the City. The following summary information has been aggregated to maintain the confidentiality of the C&D related entities interviewed.

4.1 C&D Debris Separation

General contractors and demolition contractors generate C&D debris over the course of demolition and construction projects. C&D debris is generated and handled on the construction and/or demolition project sites by separating C&D debris into separate roll-off containers for individual recyclable materials. Based on conversations with processors and haulers, most job sites have two types of containers, one for commingled recyclables and one for disposal. What counts as recyclable can vary from processor to processor depending on their sorting capabilities and the markets each has for the recovered material. Minimizing contamination in the commingled recycling container is a critical issue for processors due to labor to remove the contamination and cost to transport and dispose of it. These containers are serviced at a frequency determined by the project owner and hauler based on the type of material and volume generated.

4.1.1 Demolition and New Construction Debris

Demolition debris is typically heavier and requires more frequent hauls than demolition debris generated as part of the construction phases of projects. Recyclable materials from demolition debris typically include:

- Concrete
- Brick
- Block
- Asphalt
- Aggregate
- Untreated wood
- Steel, aluminum, copper and other metals

Based on responses from C&D-Related Entities, demolition debris contain more aggregate, hard to recycle materials (e.g. treated lumber, insulation), or hazardous materials (e.g., asbestos, lead) depending on the type of demolition required (e.g., full demolition, partial demolition of electric and/or mechanical).

Construction debris consists of similar material as demolition debris, but projects generate less volume of debris and include other potentially recyclable materials such as:

- Clean gypsum
- Cardboard
- Plastic

Note that these materials may exist in demolition debris but are typically less recoverable due to contamination (e.g., painted drywall) and may be sent for disposal due to high levels of contamination.

4.1.2 Handling and Reporting

Based on conversation with C&D-Related Entities, processors typically request that recyclable materials from construction and/or demolition are separated at the project site into "recyclable" containers and "landfill" containers to minimize contamination that is hauled to the processor. A recycling load is considered contaminated if the material is heavily mixed with non-recyclable material (e.g., garbage, hazardous waste) or is not clean and dry (i.e., exposed to heavy rainfall). If loads are contaminated loads upon arrival at processing sites, they are re-directed to disposal.

Depending on the job site, it may be difficult to provide space for multiple roll-off containers to separate recycling material at the jobsite. Additionally, separating demolition debris into multiple roll offs may require additional supervision and jobsite training, as well as added transportation costs. Some general contractors will source separate higher-value materials (e.g., metals) for recycling as part of standard operations and haul material themselves to local outlets (e.g., metal scrap yard). However, it is more common that recyclable C&D debris is commingled on site and the responsibility for separating and diverting falls on the material processor. The City supports best practices of jobsite management through technical assistance and education efforts.

It is critical that general contractors effectively communicate with processors at the initial stages of the project so that the facility-specific requirements are understood and processes are implemented to minimize contamination in the recycling loads.

Even though general contractors provide the report to the City when the Certificate of Occupancy is issued, the burden of quantifying material diverted and disposed falls on the processor, and requires overhead and labor costs to estimate, record, and report material diversion.

4.2 Hauling

Haulers transport C&D debris from project sites to processing facilities or landfills for diversion and disposal. Hauling fees are based on the location of the project site, type of project, size of project, anticipated material types, and other factors as determined by the hauler. Haulers typically charge on a per load basis and may charge additional fees for excess weight, handling requirements for co-mingled recycling loads, or increased administrative costs for recycling reporting.

Haulers will service both demolition and construction phases of projects. As discussed in Section 4.1.1, demolition debris is typically heavier, containing more aggregate material and potentially hazardous material such as asbestos or lead paint. Construction debris may require less frequent hauls, and general contractors are better able to source separate debris into key recyclable materials such as concrete, metals, untreated lumber, cardboard and plastic compared to demolition projects.

4.2.1 Hauler Market Considerations

With the requirements of the C&D Ordinance, companies that operate automated processing equipment and hauling services attract customers that need to comply with reporting and diversion needs. Third party haulers, without their owning processing facility or a contract with processing facility, are at a disadvantage to provide these services given the limited number of outlets where they can deliver material to be processed and recycled.

Facilities that operate processing operations often only accept C&D debris from their own hauling operations and or a limited number of contract customers. Four of the 58 active permitted haulers that manage C&D have facilities, creating a challenge in the City's open market for third party haulers to deliver recyclable materials to locations that have the equipment, manpower and capacity to separate and recycle co-mingled material.

4.3 Diversion and Disposal

The diversion and disposal of C&D debris occurs when material is transported to processing and/or disposal facilities by haulers.

4.3.1 C&D Processors

There are several facilities that accept C&D debris for processing and/or disposal in the City. Facilities process material either with automated systems that convey material for a combination of hand-picking and automated sorting or facilities will utilize rolling stock (e.g. grapple truck, skid steer, etc.) to manually separate recyclables.

Table 4-1 shows local processors of C&D debris that Burns & McDonnell was able to interview as part of this Study, identifying if they are considered a Qualified Processor, as explained in Section 4.3.2, and a describing of the processing type and acceptance of material from third party haulers. One of the processors that Burns & McDonnell interviewed stated that they were midway through the certification process with Recycling Certification Institute (RCI). Burns & McDonnell also attempted to contract several other local processors but did not receive responses to interview requests.

Table 4-1 – C&D Debris Processors in the City

Processor	Qualified Processor	Description
Recon/973	Yes	Recon hauls to its facility and runs it through its automated processing line that includes both hand picking and automated optical sorting. Recon accepts only limited third party C&D debris.
Texas Disposal Systems (TDS)	No	TDS hauls to its facility and manually separates recyclable material at its campus. TDS does not accept third party C&D debris.
Waste Management	No	Waste Management hauls to its landfill where material is manually separated and recycled. Waste Management does not accept third party C&D debris.
Waste Connections	No	Waste Connections operates a C&D landfill but also separates and recycles materials on-site. In the past it has used more automated processing line, but currently utilizes a more manual process with equipment and personnel. Waste Connections accepts third party C&D debris.
Walker Aero Environmental/JV Dirt	No	Walker Aero Environmental /JV Dirt operates an automated processing line and composting facility. They accept third-party C&D debris, but only through contracts with a limited number of customers.

4.3.2 Qualified Processors

Qualified Processors are designated by the City based on their certification with the RCI. With this certification, the diversion rate of individual projects are considered to be the same diversion rate of the overall facility.

According to the RCI website, facilities certified through RCI "… have been evaluated by third-party evaluators and are certified as reporting accurate, transparent, and reliable recovery, use and recycling rates according to the protocols and standards of the Recycling Certification Institute." The RCI certification is a national standard and may differ from local definitions. For example, the RCI certification allows for energy recovery from C&D debris whereas the City's C&D Ordinance does not.

The advantage of having RCI, or similar certifications, is that the facilities are independently evaluated, and facilities must adhere to the reporting and standards of the certification entity. Facilities that are not utilizing a certification entity rely on self-reporting and the City is not independently verifying the procedures or data from these facilities.

4.3.3 Registered Evaluator

Registered evaluators an approved alternative to Qualified Processors. A registered evaluator is a third-party auditor that the City approves to validate average diversion rates through onsite inspections and audits of a qualified processor applicant. To receive approval, a registered evaluator shall provide the City with information that demonstrates operational or consulting experience and relevant certifications in waste management, building design, construction, demolition, renovation, environmental protection or accounting. Approval by the City is effective for one year. However, there are currently no certified auditors approved by the City.

4.3.4 C&D Recycling Markets

While the C&D Ordinance provides a policy incentive to divert recyclable C&D debris, the markets for these materials determine the extent to which processors are able separate and divert material. Specific to each material market, the processors Burns & McDonnell interviewed were not willing to share material-specific values. Processors continue to evaluate alternative outlets for materials such as wood and gypsum. These materials are often used to create products used internally at processing sites such as compost, soil amendments, and road base.

Processors are also focusing resources on processing and selling concrete and aggregate materials because the local market demand for this material is strong.

Based on these conversations, the most recyclable materials generated as part of C&D debris include concrete, metals, plastic, and lumber. Table 4-2 lists the recyclable C&D debris, identifies if it is typically generated as part of construction or demolition, and provides a description of the material and its end market.

Table 4-2 – C&D Debris Materials and Markets

Material	Construction	Demolition	Description	End-market
Concrete/ Aggregate		✓	Concrete/aggregate consists of inert materials such as concrete, asphalt, rock and rubble.	Concrete is crushed on site as part of operations or sold as aggregate. There is a high demand in the local market for clean, processed concrete/aggregate given the high level of local construction and industrial activity. Continued economic and industrial activity will drive demand for recycled concrete/aggregate.
Cardboard	✓		Old corrugated cardboard or similar fibrous material (e.g. kraft paper) is generated on construction sites part of materials management and construction operations.	Cardboard generated as part of construction projects is typically taken to one of the local Material Processing Facilities (MRFs) and sold along with other residential and commercial cardboard. This material can also be processed in composting operations. Although prices have decreased due to global commodity downturn, there is still local demand for clean source separated cardboard material. Historically cardboard is a valuable material based on published market indices.
Gypsum	✓		Gypsum board, also known as drywall, plasterboard or wallboard, is used to form panels as partitions and linings of walls, ceilings, roofs and floors in construction projects.	There are limited end-market for gypsum material other than processing the material on-site as part of composting operations. The price for this material is unavailable. To make use of this material as an input to composting operations, the gypsum must be source separated and uncontaminated by paint or wall covering. For this reason, drywall from demolition or reuse projects are not generally accepted by processors. Market development supported by entrepreneurs in the material management space would be needed to drive demand for this material.
Un-Treated Lumber	✓	✓	Wood, from framing, concrete forms, crates, excess hardwood flooring or used pallets, is the heaviest component of C&D debris. Treated wood is unable to be recycled.	Wood is often ground on the processor's site and used as part of disposal operations (e.g., wet weather roads), composted, or otherwise repurposed on-site. There are third party composting operations that accept this material (e.g. Organics by Gosh, Austin Wood Recycling), but the price for this material is unavailable. Since end market are also able to source clean brush and wood, There are few local end markets for wood products. For this reason, C&D processors are seeking alternative end-markets for wood-derived products.

Material	Construction	Demolition	Description	End-market
Metal	✓	✓	There are various types of metals generated as part of construction and deconstruction projects including roofing, piping, copper, sheet metal and steel.	Metals are sold to local scrap recyclers such as Commercial Metals Company, Austin Metal and Iron, etc. The price of metals follow established indices for scrap metals (e.g., steel, copper, aluminum, brass) that range based on local, regional and national trends. Local scrap yards will drive demand for clean, source separate metal with low contamination.
Plastic	✓		Plastic sheeting, tarping, wrap, and bulky plastics (e.g. crates) are generated at construction sites as part of materials management and construction operations.	Plastic generated as part of construction projects is typically taken to one of the local Material Processing Facilities (MRFs) and sold along with other residential and commercial plastic. This includes bulky rigid plastic and film product that may consist of clear, post-commercial or post-industrial material including Low Density Polyethylene (LDPE), High Density Polyethylene (HDPE) or Polypropylene (PP) plastic material. The value of this materials can vary widely based on the resin component types. Materials with more homogeneous resin profiles are higher value on the secondary materials market.
Shingles		✓	Asphalt shingles are stripped from roofs and are generally considered aggregate. This material can be recycled or repurposed as road base.	There had been a market for asphalt shingles for use in asphalt, but that market has since diminished. Facilities with remaining inventory of shingles are working to sell them as opportunities arise. Processors are not currently accepting asphalt shingles for recycling, but that could change if a sustainable market for asphalt shingles develops.

The market size for individual materials is hard to quantify based on information that the companies were willing to share. Table 4-3 shows the latest scrap metal commodity index prices based on publicly available indices as of April 2020. Haulers and processors sell individual items at scrap metal recyclers for prices ranging between $0.20 and $4.53 per pound. Prices fluctuate based on local, regional and national trends.

Table 4-3 – Scrap Metal Index Pricing ($/ton)[1]

Material	April 2020 Average Price
Scrap Aluminum Old Sheet	$400
Scrap Aluminum Old Cast	$300
Scrap Painted Siding	$400
Scrap Aluminum Can	$460
Scrap Brass Solids	$2,320
Scrap #1 Copper 96-98%	$3,140
Scrap #1 Insulated Copper	$2,040
Scrap #3 Insulated Copper	$460
Scrap #2 Copper 94-96%	$2,760
Scrap #3 Light Copper	$2,500
Scrap #2 Insulated Copper	$960
Scrap Cast Iron	$9,060

Cardboard and plastic generated as C&D debris are ultimately sold on the secondary commodity markets. Table 4-4 provides the current sale price for post-commercial film plastic, bulky rigid plastic and old corrugated cardboard on the secondary material market. The value of this material is dependent on the uniformity of resin profiles (i.e. Grade A plastic is a single resin where Grade B and Grade C are composites and therefore valued less).

[1] For additional scrap price indices and prices see https://www.barchart.com/futures/cash/scrap

Table 4-4 – Plastic and OCC Index Pricing ($/ton)[2]

Material	Current Average Price
Film Plastic – Grade A	$180
Film Plastic – Grade B	$80
Film Plastic – Grade C	$20
Bulky Rigid Plastic	$60
Old Corrugated Cardboard	$43

Note that the price of old corrugated cardboard has fallen from about $160 per ton in March of 2017 to $42.50 per ton in March 2020 due to the constriction of international end-markets. Fluctuations in secondary commodity markets have not had an impact on markets of other recyclable materials from C&D debris.

4.3.5 Processing Capacity

All the processors Burns & McDonnell spoke with seemed to indicate that the markets could accept more recycling material. Some processors state they were operating significantly under their current capacity while others stated they need to make additional investment if there were significant increases in C&D debris being diverted. Overall, processors did not seem concerned with an increase in the amount of C&D diverted.

Access to processing capacity was a more significant issue in Burns & McDonnell's opinion than the total processing capacity. Small haulers without their own processing facility or that not able to contract with a processing facility. This puts these haulers at a disadvantage in the market because they are not able to compete with hauling companies with processing capability (either owned or contracted) on projects that must comply with the C&D Ordinance.

[2] For additional secondary material market indices and prices see www.recyclingmarkets.net

(This page intentionally left blank)

APPENDIX A - C&D ORDINANCE

(This page intentionally left blank)

ORDINANCE NO. 20151119-098

AN ORDINANCE AMENDING CITY CODE CHAPTERS 15-6 (*SOLID WASTE SERVICES*) AND 25-11 (*BUILDING, DEMOLITION, AND RELOCATION PERMITS; SPECIAL REQUIREMENTS FOR HISTORIC STRUCTURES*) RELATING TO DIVERSION AND DISPOSAL OF CONSTRUCTION AND DEMOLITION MATERIALS; AND CREATING A PENALTY.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:

PART 1. City Code Section 15-6-1 (*Definitions*) is amended to add new definitions of "Average Diversion Rate", "Austin Metro Area", "Beneficial Use", "Deconstruction", "Project", "Project Disposal Rate", "Project Diversion Rate", and "Qualified Processor" to read as follows and to renumber the remaining definitions accordingly:

§ 15-6-1 DEFINITIONS.

(1) Average Diversion Rate means the percentage of all inbound commingled material over a period of time that a facility diverts for beneficial use.

(2) Austin Metro Area means the five-county metropolitan area that surrounds the City of Austin.

(3) Beneficial Use means productive use of materials reclaimed through separation, processing, deconstruction, or other means, and made available for recycling or reuse, but does not include placement in a disposal facility, used as daily cover in a disposal facility, or used for energy recovery.

(10) Deconstruction means dismantling or extracting reusable materials from a project prior to or instead of traditional demolition.

(21) Processor means a facility that sorts, crushes, grinds, composts, or recycles materials.

(22) Project means activities described in Subsection 25-11-39(C) (*Construction and Demolition Materials Diversion Required*).

(23) Project Disposal Rate means the total pounds of material generated by a project and disposed per square foot of the project.

(24) Project Diversion Rate means the percentage of the materials generated by the project and diverted for beneficial use onsite or offsite.

(25) Qualified Processor means a facility that meets the qualifications in Division 2 of Article 9 (*Construction and Demolition Materials Diversion Program*).

PART 2. City Code Chapter 15-6 (*Solid Waste Services*) is amended to add a new Article 9 (*Construction and Demolition Materials Diversion Program*) to read as follows.

DIVISION 1 PROGRAM REQUIREMENTS.

§ 15-6-150 COMPLIANCE REQUIRED.

(A) Except as provided in Section 15-6-156 (*Waiver*), a permittee subject to Section 25-11-39 (*Construction and Demolition Materials Diversion Required*) shall comply with this Article.

(B) A permittee complies with this Article if the permittee meets or exceeds either the project disposal rate in Section 15-6-151 (*Project Disposal Rates*) or the project diversion rate in Section 15-6-152 (*Project Diversion Rates*).

(C) In this chapter, materials includes non-hazardous materials that are directly, or indirectly, by-products of a project including, but not limited to, building components, concrete, corrugated cartons, gypsum wallboard, metal, paper, paving, plastics, and wood; but does not include excavated soil, stone, land-clearing debris, asbestos-containing materials, lead-containing materials, and similar items.

(D) Building components include, but are not limited to, doors, windows, fixtures, structural members, architectural parts, masonry, and similar items.

§ 15-6-151 PROJECT DISPOSAL RATES.

(A) Beginning October 1, 2016, a permittee or its agents may not dispose more than 2.5 pounds of materials per square foot of the project.

(B) Beginning October 1, 2020, subject to approval by City Council of the report required in Section 15-6-157(A), a permittee or its agents may not dispose more than 1.5 pounds of materials per square foot of the project.

(C) Beginning October 1, 2030, subject to approval by City Council of the report required in Section 15-6-157(B), a permittee or its agents may not dispose more than 0.5 pounds of materials per square foot of the project.

§ 15-6-152 PROJECT DIVERSION RATES.

(A) Beginning October 1, 2016, a permittee or its agents shall divert a minimum of 50 percent of materials generated by the project for beneficial use.

(B) Beginning October 1, 2020, subject to approval by City Council of the report required in Section 15-6-157(A) , a permittee or its agents shall divert a minimum of 75 percent of materials generated by the project for beneficial use.

(C) Beginning October 1, 2030, subject to approval by City Council of the report required in Section 15-6-157(B), a permittee or its agents shall divert a minimum of 95 percent of materials generated by the project for beneficial use.

§ 15-6-153 PROJECT DISPOSAL AND DIVERSION REPORT.

(A) A permittee shall provide the department the report required by subsection (B) at the same time it requests final inspections to complete the building or demolition permit requirements.

(B) A report must include:

(1) the quantity of materials generated by the project and put to beneficial use onsite;

(2) the quantity of materials delivered to a qualified processor;

(3) the quantity delivered to a processor or end-user and diverted for beneficial use;

(4) the quantity of materials delivered to a processor or end-user and disposed;

(5) the quantity of materials delivered directly to a disposal facility; and

(6) any other information required by the department

§ 15-6-154 CALCULATIONS.

The department will establish by rule the calculations for project disposal and diversion rates.

§ 15-6-155 QUALIFIED PROCESSOR.

A permittee may deliver materials to a qualified processor to meet the rates established in Section 15-6-151 (*Project Disposal Rates*) or Section 15-6-152 (*Project Diversion Rates*)

§ 15-6-156 WAIVER.

(A) A permittee may request a waiver from the disposal rates in Section 15-6-151 (*Project Disposal Rates*) and the diversion rates in Section 15-6-152 (*Project Diversion Rates*) for a project subject to this Chapter.

(B) A permittee's request for a waiver must be submitted on a form approved by the director and include a project disposal and diversion report required by Section 15-6-153 (*Project Disposal and Diversion Report*).

(C) The director may grant a waiver if the permittee shows a good faith effort to divert materials generated by the project but could not meet the disposal or diversion rate requirements because the materials are not marketable in the Austin Metro Area.

§ 15-6-157 REPORTS.

(A) The City Manager must provide a report concerning the economic impact of existing disposal and diversion rates on household affordability and an assessment of future markets for reuse of construction and demolition materials on or before April 2, 2020.

(B) The City Manager must provide a report concerning the economic impact of existing disposal and diversion rates on household affordability and an assessment of future markets for reuse of construction and demolition materials on or before April 2, 2030.

(C) The City Council may approve each report by resolution

DIVISION 2 QUALIFIED PROCESSORS.

§ 15-6-160 REGISTRATION REQUIRED.

(A) The department may register a facility that meets the requirements in Section 15-6-161 (*Qualified Processor Requirements*) as a qualified processor.

(B) A registration is effective for two years.

(C) To remain registered, the facility owner must submit a renewal application at least 90 days before the expiration of the registration.

§ 15-6-161 QUALIFIED PROCESSOR REQUIREMENTS.

(A) A facility is a qualified processor if it meets the following criteria:

(1) complies with all federal, state, and local regulations, including any permit requirements;

(2) weighs the items described in Subsection (B);

(3) provides the information described in Subsection (C);

(4) is located in the Austin Metro Area;

(5) authorizes an inspection of its facility by the department; and

(6) agrees to the requirements described in Section 15-6-163 (*Audit Requirements*).

(B) A qualified processor must be able to weigh:

(1) inbound mixed materials;

(2) materials reclaimed for use from mixed materials; and

(3) residual material disposed.

(C) A qualified processor must be able to provide customers with documentation that shows the date, quantity of materials, and the disposition of materials, mixed or separated, received from projects subject to this Article. Amounts may be calculated based on tons, or in a manner provided for in the Rules.

(D) A qualified processor must submit a report each six months to the director that includes the average diversion rate, the types of materials recovered, and the beneficial uses for the materials. The report is due no later than 30 days after the end of each six month period.

(E) A qualified processor must have its average diversion rate validated in accordance with Section 15-6-162 (*Average Division Rate Calculation and Validation*).

§ 15-6-162 AVERAGE DIVERSION RATE CALCULATION AND VALIDATION.

(A) A qualified processor's average diversion rate is calculated as the tons of materials reclaimed divided by the tons materials processed and multiplied by 100 percent.

(B) A person is authorized to validate a qualified processor's average diversion rate if the person:

(1) has operational or consulting experience in waste management, building design, construction, demolition, renovation, environmental protection, or accounting;

(2) completes City-approved training, as may be required by the director, on construction and diversion material recycling, Zero Waste, or other related topics; and

(3) is approved by director.

(C) A person qualified under this Section to validate average diversion rates may not charge fees contingent upon a City registering a facility as a qualified processor.

(D) An employee, owner, or other agent of the qualified processor may not validate the average diversion rate for the qualified processor.

§ 15-6-163 AUDIT REQUIREMENTS.

(A) A qualified processor shall make its records available for audit by the department during regular business hours.

(B) Failure to comply with Subsection (A) is cause to suspend the qualified processor's registration

§ 15-6-164 SUSPENSION.

(A) The department may suspend a qualified processor's registration if the qualified processor fails to comply with the requirements in this division.

(B) Prior to suspending a registration, a written notice of proposed suspension must be sent to the facility owner and operator.

(C) The notice described in Subsection (B) will include the violation and a time period to correct the violation.

(D) If the facility does not correct the violation within the time period stated in the notice, the department will notify the facility owner and operator that the facility is no longer a qualified processor.

(E) A facility owner or operator may appeal the decision to suspend the qualified processor's registration. An appeal must be filed with the director no later than 20 days after the date the registration was suspended. The appeal must identify each alleged point of error, facts, and evidence supporting the appeal and reasons why the suspension should be set aside. The appeal must be signed by the facility owner or operator. The director must provide a written response to the appeal that affirms, reverses, or modifies the suspension within 30 days from the date the appeal is received by the director.

DIVISION 3. ENFORCEMENT

§ 15-6-170 ENFORCEMENT.

(A) A permittee who fails to submit the report required in Section 15-6-153 (*Project Disposal and Diversion Rate Report*) commits an offense punishable as described in Section 1-1-99 (*Offenses; General Penalty*).

(B) A permittee who fails to submit a substantially complete report required in Section 15-6-153 (*Project Disposal and Diversion Rate Report*) commits an offense punishable as described in Section 1-1-99 (*Offenses; General Penalty*).

(C) A permittee who fails to meet the requirements in Section 15-6-151 (*Project Disposal Rates*) or Section 15-6-152 (*Project Diversion Rates*) commits an offense punishable as described in Section 1-1-99 (*Offenses; General Penalty*).

(D) A culpable mental state is not required, and need not be proved.

(E) Each day a permittee fails to submit a report is a separate offense.

PART 3. City Code Section 15-6-44 (*Reporting Requirements*) is amended to read as follows:

§ 15-6-44 REPORTING REQUIREMENTS.

(A) A licensee shall maintain a list of the containers used for the collection, storage, or disposal of solid waste that are owned or serviced by the licensee, with the customer number and the location of each container.

(B) A licensee shall file a quarterly report of the number of containers it services in the city. A licensee shall submit the container fee required by this article with a report filed under this section.

(C) A licensee who provides solid waste collection service under Article 3 (*Private Solid Waste Collection Service*) or recycling service under Article 5 (*Universal Recycling*) shall file a report with the Austin Code Department [~~Compliance~~]. The report shall be on a form provided by the Austin Code Department [~~Compliance~~]. The report shall be filed with the Austin Code Department [~~Compliance~~] semi-annually on or before the last business day in January and July of each calendar year. Beginning with the report due in January, 2017, for the six-month reporting period that ends December 31, 2016, t[~~T~~]he report shall contain the following information:

(1) the amount in tons of solid waste, recyclables, and organic materials (but excluding construction and demolition materials) [~~each of the following types of material~~] hauled to:

(a) landfills [~~solid waste~~];

(b) recycling facilities [~~recyclables~~]; and

(c) organic materials processing facilities [~~collected and transported to a receiving facility~~];

(2) the amount in tons of construction and demolition materials hauled directly to:

(a) landfills;

(b) recycling facilities; and

(c) organic materials processing facilities; and

(3) other information required by the Austin Code Department [~~Compliance~~].

PART 4. City Code Chapter 25-11 (*Building, Demolition, and Relocation Permits; Special Requirements for Historic Structures*) is amended to add a new Section 25-11-39 (*Construction and Demolition Materials Diversion Required*) to read as follows.

§ 25-11-39 CONSTRUCTION AND DEMOLITION MATERIALS DIVERSION REQUIRED.

(A) Except as provided in Subsection (D), each person that applies for a building permit or demolition permit for activities described in Subsection (C) must

acknowledge the person's need to comply with this Section and Chapter 15-6, Article 9 (*Construction and Demolition Materials Diversion Program*) before a building or demolition permit is issued.

(B) This section is applicable in the City's zoning jurisdiction.

(C) Except as provided in Subsection (D), construction and demolition materials diversion is required for

(1) construction projects that exceed 5,000 square feet of new, added, or remodeled floor area; and

(2) beginning October 1, 2019, commercial and multifamily projects that require a demolition permit.

(D) Construction and demolition materials diversion is not required for the following activities:

(1) projects for which only mechanical, electrical, or plumbing permits are required; or

(2) work for which a building or demolition permit is not required.

PART 5. The Council directs the City Manager to provide a report concerning the economic impact of these requirements on household affordability and an assessment of the markets for reuse of construction and demolition materials. The report should be provided to the City Council four years from the effective date of this ordinance.

PART 6. This ordinance takes effect on October 1, 2016.

PASSED AND APPROVED

November 19, 2015

§
§
§

Steve Adler
Mayor

APPROVED:

Anne L. Morgan
City Attorney

ATTEST:

Jannette S. Goodall
City Clerk

BURNS McDONNELL

CREATE AMAZING.

Burns & McDonnell
8911 N. Capital of Texas Hwy, Suite 3100
Austin, TX 78759
O 512-872-7130
F 512-872-7127
www.burnsmcd.com