Chicago Metropolitan Agency for Planning

233 South Wacker Drive
Suite 800
Chicago, Illinois 60606

312 454 0400
www.cmap.illinois.gov

MEMORANDUM

To: **CMAP Board and MPO**

From: CMAP Staff

Date: January 25, 2019

Re: Proposed Amendment to ON TO 2050 – O'Hare Express System

The City of Chicago has requested to amend the ON TO 2050 comprehensive plan to add the proposed O'Hare Express System (OES) to the list of fiscally constrained projects. This memo represents the initial staff analysis, which will be provided for public comment to CMAP on the proposed amendment, from January 25 to February 25, 2019. This memo and other aspects of the amendment process are described in a November 9, 2018, memo to the CMAP Transportation Committee.[1]

Amendments to ON TO 2050 are expected to be occasional and to address projects with a significant change in funding or development status, warranting a new evaluation. Amendments undergo the same analysis and public discussion as projects identified in the plan development process. Selected projects should substantially implement ON TO 2050 by addressing current needs, improving travel over the long term, and having positive impacts on plan priorities, such as investing in existing communities, enhancing environmental quality, and improving quality of life. An amendment must also meet fiscal constraint requirements, described further below.

PROJECT DESCRIPTION

The OES project aims to provide express transportation service between O'Hare International Airport (O'Hare) and downtown Chicago. The Boring Company was selected to advance to exclusive negotiations by the Chicago Infrastructure Trust (CIT), in partnership with the City of Chicago, to design, build, finance, operate, and maintain the OES.[2]

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[1] Chicago Metropolitan Agency for Planning, "ON TO 2050 Regionally Significant Projects: Proposed amendment process," November 2018, https://www.cmap.illinois.gov/documents/10180/944935/CmteMemo_RSPAmendmentProcess.pdf/3212c417-cb9b-621e-c671-204e5f69d894.

[2] Chicago Mayor's Press Office, "Mayor Announces Company Selected to Build and Operate Express Service to O'Hare," accessed January 2, 2019, http://chicagoinfrastructure.org/2018/06/14/company-selected-to-build-and-operate-chicago-express-service/.

The project's objectives are construction of twin, 17.5-mile tunnels with anticipated termini at Block 37 in downtown Chicago and O'Hare airport. The tunnels will be constructed such that the ceiling is approximately 30 feet below the surface, or deeper where appropriate. According to The Boring Company's proposal, electric vehicles would travel through these tunnels at 120-150 miles per hour and could leave as frequently as every 30 seconds. To support the service, The Boring Company would construct a new station at O'Hare Airport and complete the unfinished underground transit station at Block 37 for the downtown terminus. This will require overcoming engineering challenges that include tunneling under Randolph Street and the Chicago Transit Authority (CTA) Blue Line, and connecting the tunnels to the Block 37 Station via vehicle elevators or other technology. Travel time on the service would be approximately 12 minutes each way, and special vehicles would carry up to 16 passengers plus their luggage. A construction timeline has not been finalized, but City representatives have indicated an opening year of 2024 at the latest.

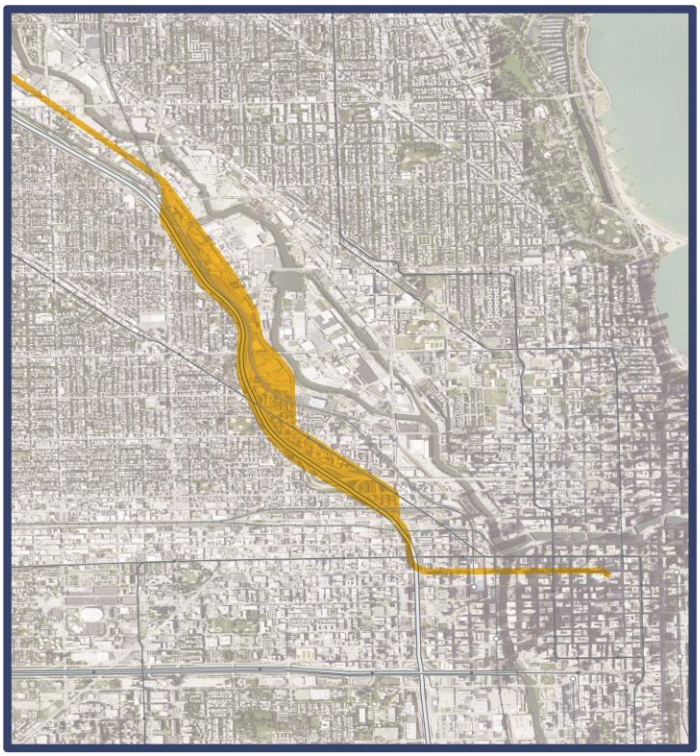
The City's ridership demand study projects initial ridership of 3,000-5,000 passengers per day, with full ridership potential ranging from 14,000-18,500 passengers per day in 2045.[3] This is equivalent to 1.1-1.8 million passengers a year at opening, and 5.1-6.8 million per year by 2045. Maximum capacity for the Boring Company's proposal is approximately 76,800 passengers per day, via trips every 30 seconds for 20 hours per day. Fares are expected to be $20-30 per trip.

The maps below depict the project study area. While much of the alignment has been chosen, the project team has two route options between the Elston/Ashland intersection and Downtown Chicago. The chosen route will not be defined prior to conclusion of this amendment process.

The Boring Company considers the capital and operating cost of the project proprietary information. However, as submitted by the City to CMAP for Transportation Improvement Program (TIP) amendment consideration, the estimated cost is $999,999,999. Thus, the project meets the threshold for evaluation as a Regionally Significant Project (RSP) and requires an amendment to ON TO 2050 for inclusion on the fiscally constrained list of priority projects.[4]

[3] Exhibit C of the O'Hare Express System RFQ, available at http://chicagoinfrastructure.org/wp-content/uploads/2017/11/OES-RFQ-Complete-ADD2-Clean-20180119-2.pdf.

[4] Chicago Metropolitan Agency for Planning, "ON TO 2050 Mobility Chapter: Build regionally significant projects," https://www.cmap.illinois.gov/2050/mobility/regionally-significant-projects.



O'Hare Express System

- Study area
- CTA rail ("L") lines
- Metra rail lines
- Interstate

Source: City of Chicago

Project history

Express service to O'Hare airport has been contemplated for some time. Most recently, the Richard M. Daley administration pursued the concept in the early 2000s, culminating in development of the Block 37 Station, meant to serve as a hub for service that utilized the CTA Blue Line right of way. Recent proposals have also considered using underutilized freight right of way and/or Metra tracks, including the CrossRail proposal submitted for consideration in ON TO 2050.[5] Versions of the service were included on the unconstrained list in both GO TO 2040 and the GO TO 2040 update. The most recent evolution of the project was included in ON TO 2050's unconstrained list, but without a specific service concept. ON TO 2050 notes that additional study and financial information is needed before consideration for fiscal constraint.

Recent and planned improvements to O'Hare will expand the airport's passenger capacity. The O'Hare Modernization Program -- focused on runways – is largely complete. O'Hare 21 – an $8.7 billion terminal expansion -- was announced in 2018.[6]

The Chicago Infrastructure Trust issued a Request for Qualifications[7] (RFQ) for the project in November 2017, with four private entities responding in February 2018[8]. Two respondents were shortlisted[9], and a Request for Proposals (RFP) was released in March 2018. On June 14, 2018, the Mayor of Chicago announced that one respondent -- The Boring Company -- had been selected to proceed to the exclusive negotiations stage of procurement.[10] A final agreement has not yet been presented to the City Council, although City and CIT staff indicate that this should occur within the next several months.

Project status

The OES is still in the early stages of project development, with engineering still underway and gaps remaining in available information. For example, final alignment is subject to the ongoing NEPA process. The Boring Company also has not identified the location of the planned ventilation shafts/emergency exits, the siting of which may require community engagement processes. The acquisition costs and processes for the parcels needed for ventilation shafts/emergency exits may extend the project development timeline.

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[5] Midwest High Speed Rail Association, "CrossRail Chicago," accessed January 2, 2019, https://www.midwesthsr.org/crossrail-chicago.

[6] Bill Ruthart, "Chicago, airlines nearing $8.5 billion deal to dramatically expand O'Hare," February 26, 2018, https://www.chicagotribune.com/news/local/politics/ct-met-city-hall-story-20180223-story.html.

[7] The RFQ, RFP, and other documentation are available at http://chicagoinfrastructure.org/initiatives/ord-express/ on the "Documents" tab.

[8] Ibid.

[9] Ibid.

[10] Chicago Mayor's Press Office, "Mayor Announces Company Selected to Build and Operate Express Service to O'Hare," accessed January 2, 2019, http://chicagoinfrastructure.org/2018/06/14/company-selected-to-build-and-operate-chicago-express-service/.

Other engineering challenges have not been met yet, including development of a higher-capacity passenger vehicle for the project, smoothing and aligning the tunnel to allow 120-150 mph speeds, and others. Media reports have provided some details on a recently completed a test tunnel in Hawthorne, California. The Boring Company has indicated that the tunnel is intended to prove the viability of the tunneling approach rather than be a completed prototype of the final technology. In a recent demonstration, Teslas outfitted with tracking wheels to keep the car on the 1.14-mile test track made the journey carrying stakeholders, media, and others.[11] Performance of that test track is only known through media reports.[12]

The information needs described above will typically be filled as a project advances through the NEPA process, which the OES is in the early stages of. The innovative nature of the technology proposed, coupled with the pursuit of a public-private partnership for the project -- which limits publicly available information on the project's costs, revenues, and financing -- means that key information needed to the evaluate the project and its impact on the region's transportation system are currently unavailable.

Project costs and revenues

Capital costs

Negotiations between the CIT/City of Chicago and The Boring Company are ongoing, and no estimated project costs have been officially released. The project cost as submitted by the City to CMAP for Transportation Improvement Program (TIP) amendment consideration is $999,999,999 in private funds.

Urban tunneling is typically expensive. Large underground transit projects in the U.S. have cost between $600-920 million per mile in recent years, although these projects have constructed tunnels of substantially larger diameters than The Boring Company proposes and include station and other costs.[13] Statements by representatives of The Boring Company suggest that the firm intends to improve on conventional tunneling methods to reduce costs: "In order to make a tunnel network feasible, tunneling costs must be reduced by a factor of more than 10."[14] Cost reduction methods noted by the company are reduction in tunnel diameter (to less than 14 feet from the current standard of 20-30 feet), increasing tunnel boring machine (TBM) power, continuous tunneling (simultaneous excavating and erecting tunnel supports), automation, and electrification. The width proposed -- and current drilling technology being utilized -- is more in

[11] Alissa Walker, "Elon Musk debuts test tunnel in Hawthorne," Curbed Los Angeles, December 18, 2018, https://la.curbed.com/2018/12/18/18147366/elon-musk-tunnel-tesla-test-opening-grimes.
[12] Geoffrey A. Fowler, "Elon Musk's first Boring Company tunnel opens, but the roller-coaster ride has just begun," Washington Post, December 19, 2018, https://www.washingtonpost.com/technology/2018/12/19/elon-musks-boring-company-is-about-open-its-first-tunnel.
[13] Alon Levy, "Why It's So Expensive to Build Urban Rail in the U.S.," CityLab, January 26, 2018, https://www.citylab.com/transportation/2018/01/why-its-so-expensive-to-build-urban-rail-in-the-us/551408/.
[14] The Boring Company, "Frequently Asked Questions," accessed January 2, 2019, https://www.boringcompany.com/faq/.

line with sewer tunnels. Sewer tunnels vary substantially, from 8-33 feet for recent Metropolitan Water Reclamation District (MWRD) tunnels in the Chicago region.

Estimates of costs from a primary source are not available, but according to media reports of a Boring Company press conference, construction of the 1.14-mile test tunnel in Hawthorne took about 18 months and cost about $10 million to build (or $8.8 million per mile). That figure does not include research, development, or equipment, and it is not clear whether the figure includes property acquisition or labor costs.[15] As a prototype, the tunnel only allows movement in one direction at a time and does not have transit stations at either end. This makes it difficult to compare to other transportation, sewer, or similar tunneling projects.

For reference, the tunnel boring machine used by The Boring Company was previously used to dig a sewer tunnel in San Francisco at approximately $50 million per mile in construction costs.[16] A 17-foot diameter MWRD tunnel project in 2009 cost approximately $49 million per mile.[17] Note that the O'Hare Express Service will require two 17.5-mile parallel tunnels.

Operating costs

CMAP staff were not provided with proposed operating costs for the facility. As no comparable projects exist, staff were unable to develop an independent estimate of costs to operate and maintain the O'Hare Express Service.

Revenues and financing

The CIT's RFP stipulates that OES will be funded solely by project-specific revenues. Specific revenue sources will be subject to a future Project Agreement, but it is expected that fares will produce the majority of revenue. The RFP states a goal of "reasonable premium service fares less than the cost of current taxi and rideshare services."[18] A typical taxi or Transportation Network Company (TNC) trip from downtown to the airport costs about $40 and varies based on congestion and demand. The City has indicated that a one-way fare will be between $20-30.

Ridership forecasts and pricing for the OES are based on the 2017 O'Hare Express System Ridership Report, completed for the City by WSP USA as part of the project development process. In addition to providing data on current transit, taxi, TNC, and other trips between downtown and Chicago, the study builds upon a nearly 80 percent forecasted increase in

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[15] Laura J. Nelson, "Elon Musk unveils his company's first tunnel in Hawthorne, and it's not a smooth ride," Los Angeles Times, December 18, 2018, https://www.latimes.com/local/lanow/la-me-ln-elon-musk-tunnel-20181218-story.html.

[16] The tunnel was 3,070 feet (or .58 miles) at a cost of about $30.0 million. See http://crstunnelling.superexcavators.com/news/sunnydale-auxiliary-sewer-project-san-francisco-ca and http://www.sfwater.org/bids/BidDetail.aspx?bidid=2560.

[17] $147 million for an approximately 3-mile tunnel. Source: personal communication with MWRD staff, January 4, 2019.

[18] Page 8 at http://chicagoinfrastructure.org/wp-content/uploads/2018/05/OES-RFP-Addendum-3-20180501.pdf

enplanements at the airport overall through 2045, based on FAA forecasts.[19] The WSP report estimates ridership and mode share from Downtown Chicago and portions of the adjacent neighborhoods for a $20 trip of 26 minutes, at 5 minute frequency. The OES proposes a faster and more frequent service, which could lead to additional demand. The market study anticipates that the OES will capture most new airport travel to and from the downtown area, reaching roughly 7,000-9,000 daily riders each direction in 2045.

Revenues from the project depend on ridership growth and fare structure. Assuming fare revenues from a $20-$30 range and using linearly increased ridership estimates based on the market study provided in the RFQ materials, CMAP staff analysis indicates potential fare revenues of $1.8-2.7 billion through 2045, if fares increase at the rate of inflation. This calculation is a basic estimate of fare revenues, and excludes other revenue sources, premium services, concessions, etc. These funds would need to cover the cost of construction, engineering, land acquisition, vehicle acquisition, station construction, and operation and maintenance, with any funding gap made up by The Boring Company. City representatives have also stated that the contract will specify a maximum fare that can be charged by The Boring Company.

Per the requirements of the RFQ and RFP, The Boring Company retains the responsibility of financing the project. The Boring Company is currently seeking financing for a number of projects, including the OES, the Los Angeles Loop, and a New York City to Washington, D.C. hyperloop. As of April 2018, SEC filings indicate that the Boring Company had raised $112.5 million in equity in a recent funding round for its suite of projects. While other financing activity may be underway, the information has not yet been made public.

ON TO 2050 fiscal constraint

ON TO 2050 includes a financial plan for transportation investments, which is a requirement under federal regulation.[20] This compares the estimated revenue from existing and proposed funding sources with the estimated costs of maintaining, operating, enhancing, and expanding the overall transportation system. This process is known as "fiscal constraint." Constraint for plans is important because it reminds regional decision makers to set priorities and make trade-offs rather than including an extensive list of projects and activities that may not be affordable or sustainable. In order for ON TO 2050 to be amended, public costs for the O'Hare Express Service would need to be included within the plan's fiscal constraint.

If only private funds are expended on the OES project, it will not impact the fiscal constraint of the plan. City representatives have communicated to CMAP staff that no public funds will be required to be expended as part of the contract, and that any public funds expended would be the result of a discretionary future choice to change the scope of the project. Without examining the final contract document, CMAP staff is unable to state with certainty that no public funds

[19] CDA/Ricondo and Associates, 2016, cited in WSP, "O'Hare Express System Ridership Report," September 2017, available as Exhibit C of the O'Hare Express System RFQ http://chicagoinfrastructure.org/wp-content/uploads/2017/11/OES-RFQ-Complete-ADD2-Clean-20180119-2.pdf

[20] 450 CFR 324(f)(11)

will be expended on the project. This is discussed further under *Making transformative investments* below.

AIRPORT EXPRESS AND TRANSIT SERVICE CASE STUDIES

The OES proposal is a new concept in terms of its technology, but providing an express connection to an airport with existing transit service also has few examples globally. Many regions are also seeking to build their first rail transit connections. The past decade has brought new and under-construction airport connections to a number of North American regions, including Toronto, Salt Lake City, and Denver. Washington, D.C. Metro is extending the Silver Line to Dulles International Airport (to complement an existing connection to Reagan National) and Los Angeles is constructing a people mover to connect its Green Line service to Los Angeles International Airport. These services can be controversial. Proponents cite broader economic development and mobility benefits, and this is indeed the reason that many regions are pursuing a first airport transit connection. Critics offer the concern that these projects can direct limited public dollars away from residents most in need and do little to improve the commutes of low income residents.

While certain aspects of the OES project are without precedent in the region or country, a number of airport-to-downtown express transit services exist elsewhere, as well as a handful of express connections in regions with existing transit access to major airports. The following section discusses case studies of existing airport-rail transit systems to provide context on typical services, with the caveat that there are no exact comparisons for OES.[21] The table below summarizes cost, time savings, and mode share for a subset of airport express services worldwide.

City	Distance from CBD (miles)	Ride Time (min)		Cost (USD)		Express Service Ridership	
		Local	Express	Local	Express	Mode Share (2015)	Ridership (2015, millions)
London Heathrow	15	60	15-21	$13	$32	9%	5.9 M
London Gatwick	30	35	30	$26	$39	20%	5.8 M
Oslo	30	25	19	$11	$21	32%	6.6 M
Rome	19	30-50	32	$9	$16	13%	3.8 M (2014)
Stockholm	25	43	20	$17	$32	29%	3.5 M
Tokyo Narita (Express)	40	90	60	$12	$30	-	-
Toronto	15	25	-	$9-12	-	-	3.5 M
Vienna	12	25	16	$5	$11-14	9%	1.4 M

Sources: Global AirRail Alliance, Google maps, transit agency websites
Notes: Heathrow Express fares reflect recent changes in May 2018. Toronto fares reflect 2016 changes.

[21] Some information on these services was obtained from the Global Air Rail Alliance's 2016 Airport Express Directory, available via the "Airport Express Directory" link at https://www.globalairrail.com/.

London Heathrow Express

Heathrow is the hub airport for the United Kingdom. European airports often feature rail as one mode of access, and major airports like Heathrow often have an additional express rail connection. The London Heathrow Express rail link since 1998 has connected Heathrow Airport and downtown London. The trip is approximately 16 miles, with trip times of 15-21 minutes. Fares are approximately $32 USD but vary by time of day and purchase date. Heathrow Express offers time savings of approximately 12-24 minutes (depending on terminal destination) compared to Transport for London (TfL) rail and 35 minutes compared to London Underground (Tube) service.

The Heathrow Express was constructed as part of a package of initiatives to address environmental impacts of the airport in the 1990s. The service receives no public subsidy. The British Airport Authority (a private entity) constructed the service and contracts its operations to a third party, currently Great Western, which operates other rail public-private partnerships (PPPs) in Europe.[22] Heathrow Express does not offer discounted trips for airport employees, and only one percent of employees take either Heathrow Express or TfL rail. Seven percent take the Tube.[23] The Heathrow Express has been successful in increasing rail mode share from near Paddington Station to the airport from approximately 17 percent to approximately 23 percent, with the largest growth in the "resident business" market segment (i.e. London area residents on business travel). To compete with the recent addition of slightly slower and slightly cheaper service from Crossrail/TfL, the Heathrow Express now offers fares for $8-11, if purchased at least 30 days in advance for slower periods.

Overall, the Heathrow Express depends on the strong, global business market in central London to support its premium fares.[24,25] The service demonstrates several elements important to a successful airport express connection, and are similar to the proposed OES service. Heathrow Express has access from all terminals at airport, combined with frequent service and substantial time savings for destinations near the Paddington Station. It has also operated successfully as a privately funded and operated service without public subsidy since 1998, although may need to adapt its fares and service as competitive transit services are established.

Oslo Airport Express

The Oslo Airport is the hub and major international airport for Norway. Constructed in 1998, it sits approximately 30 miles from downtown Oslo. The Gardermoen rail line providing both express (Flytoget) and limited commuter service was constructed at the time the airport was

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[22] Heathrow Airport Limited, "Heathrow Express Service Confirmed to at least 2028", March 2018, https://www.heathrowexpress.com/news/corporate-news-pr/2018/03/29/heathrow-express-service-confirmed-to-at-least-2028

[23] Heathrow Airport Limited, "Our Approach to Developing a Surface Access Strategy," January 2018, https://www.heathrowconsultation.com/wp-content/uploads/2018/01/6747-Expansion-Surface-Access-v7-72dpi.pdf.

[24] Heathrow Airport Limited, "Our first Business Travel Insights Report", September 2017, https://www.heathrowexpress.com/news/corporate-news-pr/2017/09/21/our-first-business-travel-insights-report

[25] Matthew Coogan, "Ground access to major airports by public transportation," Airport Cooperative Research Program Report 4, Transportation Research Board, 2008. http://www.trb.org/Publications/Blurbs/157099.aspx.

built, and Norway set a goal of 50 percent mode share for all rail access to the airport. To achieve this, authorities tailored the Oslo Airport Express service to meet the needs of business travelers and marketed the service to major employers. Flytoget provides a faster ride than both local rail transit and driving; the Oslo Airport Express makes the 30 mile trip in 19 minutes, compared to 25 minutes by (infrequent) commuter rail and 45 minutes by taxi.

Flytoget consistently has among the highest mode shares for an airport express service (32 percent in 2015). This is likely driven by the time savings, high proportion of airport users traveling directly to Oslo, and marketing efforts.[26] The OES proposes a similar speed and dependence on the business market.

Toronto Union Pearson (UP) Express

Toronto's UP Express service, operated by public transit agency Metrolinx, connects Union Station in downtown Toronto with Pearson Airport 15 miles away with trip times of 25 minutes. It does not have a competitive local rail service. Transit mode share to the Pearson International Airport has historically been low, due to its distance from the central business district, configuration, and location in an auto-oriented area. The service faced public opposition throughout its planning and implementation phases. Resulting compromises on public and private roles as well as service configuration caused the PPP partner to depart the project in 2010. MetroLinx, took over final planning and construction of the service.

The UP Express opened in 2015, with one-way fares of approximately $15-20 USD, though early ridership was lower than expected. In particular, business travelers did not utilize the service at the original rates. Fares were reduced in 2016, with closer stations priced like equivalent commuter service. Ridership has since increased.[27] Once anticipated to generate enough revenue to break even on operating costs, the service is now expected to remain subsidized.[28] UP Express services about 3.5 million annual passengers, and offers discounted trips for airport employees. The service demonstrates the importance of matching pricing and service to market demand, as well as clear definition of public and private roles early in the process.

PROJECT EVALUATION

The following section contains CMAP staff evaluation of the OES. The project has been evaluated, to the extent possible, using the same metrics that were evaluated for all Regionally Significant Projects in the ON TO 2050 development process. This section also discusses the project's fit with the principles and goals of the plan.

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[26] Ibid

[27] CityLab, "How Toronto Turned an Airport Rail Failure Into a Commuter Asset", January 2018, https://www.citylab.com/transportation/2018/01/how-toronto-turned-an-airport-rail-failure-into-a-commuter-victory/551012/

[28] Ben Spurr, "Despite record ridership, how much it costs to operate Union Pearson Express remains a secret," Toronto Star, August 22, 2018, https://www.thestar.com/news/gta/2018/08/20/metrolinx-wont-say-how-much-it-costs-to-operate-union-pearson-express-train.html.

ON TO 2050 principles

The ON TO 2050 plan is guided by three principles.

The Inclusive Growth principle emphasizes that we must grow our economy through growing opportunity for all residents, particularly minority and low-income residents. The OES connects Downtown Chicago and the O'Hare Airport and serves mostly higher-income tourist and business travelers, and its economic impacts are unknown. Analysis indicates low ridership by low-income and minority residents.

The Resilience principle emphasizes the need to prepare for change, both known and unknown. The innovative nature of the proposal and focus on using new technology and methods promotes one aspect of resilience and adapting to future change. In addition, use of electric vehicles has modest benefits to larger greenhouse gas and climate resilience needs. The service also provides a redundant transit route to O'Hare, which may be considered an aspect of resilience.

The Prioritized Investment principle emphasizes the need to carefully target limited resources to maximize benefits. The 2050 plan calls for infill development to best utilize existing infrastructure. O'Hare airport and the Loop are areas that have infrastructure in place that would support additional development. By attracting additional development to these areas, the OES would reduce the burden on undeveloped areas. The OES is also not expected to require a public investment.

ON TO 2050 goals and recommendations

The ON TO 2050 plan builds on its principles to provide a comprehensive set of recommendations to guide decisions relating to development, the economy, the environment, and mobility. The following discusses how the OES impacts relevant goals and recommendations of ON TO 2050, by chapter.

Appendix I provides detailed findings of the quantitative analysis of the OES, and Appendix II summarizes its interaction with ON TO 2050 goals.

Community

The Community chapter touches on many issues relevant to creating vibrant places and communities. This includes reinvestment in existing communities and leveraging transportation investment to create walkable places with a mix of uses and amenities.

Strategic and sustainable development

This goal emphasizes that the region must invest in existing areas, pursuing limited expansion that is fiscally and environmentally sustainable. Specifically, the plan calls for targeted investment in major economic centers to focus limited resources. The project connects two major centers of economic activity for the region, with a scope of impact limited to downtown.

Continued investment in the region's economic core remains important for regional economic success.

Prosperity

The Prosperity chapter offers recommendations on economic development and workforce to help the region thrive. Its recommendations highlight the need to coordinate across governments to provide the infrastructure, human capital, and support needed to retain businesses and attract growth. However, the chapter, and ON TO 2050, emphasize that the region cannot grow without first providing opportunity for residents regardless of race, income, or ability.

Robust economic growth that reduces inequality

The Prosperity chapter of ON TO 2050 recognizes that the region is endowed with extensive assets, including its people, industries, educational and research institutions, infrastructure, and location. However, that chapter also emphasizes that economic development, infrastructure investment, and other initiatives must also pursue inclusive, equitable growth. The OES proposes to implement required City practices in hiring minority contractors and workers. The City also indicates that it intends to coordinate with local workforce agencies and City Colleges on hiring and training, both for short term construction and longer term employment opportunities.

The City has also indicated that the project is intended to bolster tourism and business travel, and therefore broader economic growth, by providing a fast, reliable, and unique connection from a global airport to downtown Chicago. There is limited academic literature on the economic impacts of adding an express airport connection in regions with existing high frequency rail access to major airports. The O'Hare Branch of the CTA Blue Line currently provides a 45-minute connection between downtown and O'Hare and is sometimes cited as a strong transit connection compared to other major cities. However, overcrowding and other issues on the line can make service unreliable and extend travel times.

Mobility

The Mobility chapter of ON TO 2050 focuses on achieving a safe and reliable transportation system for the future. It calls for careful investment to meet today's needs, while preparing the transportation system for changes in demand, technology, and the economy.

A modern, multimodal system that adapts to changing travel demand

The ON TO 2050 plan calls for taking bold steps to anticipate opportunities and harnessing technology to improve travel. The OES is undoubtedly a bold and innovative idea to improve travel. It takes advantage of new configurations of existing tunneling and transportation technology, and promises to innovate in both of these areas. The project's use of electric vehicles aligns with recommendations in ON TO 2050's Mobility and Environment chapters related to using transportation systems to reduce emissions.

ON TO 2050 also recommends a variety of strategies to make transit more competitive, including focusing on congested corridors. OES would provide an additional transit option and could reduce the number of taxi, rideshare, and private vehicle trips in the corridor, increasing transit trips and making transit a more competitive option. Some residents would also shift from the Blue Line, although the amount is unclear. CMAP's modeling shows a significant shift of current Blue Line riders to the OES, estimating that approximately two thirds of the 1,000-1,200 residents expected to use the OES shift from the Blue Line. Outside of the WSP ridership study, current data is not available for the count of business travelers or tourists traveling between downtown and O'Hare or the mode split for that trip. The WSP ridership study estimates an overall OES anticipated ridership -- including residents, business travelers, and tourists -- of 3,000-5,000 per day in 2015. Slightly more than 91,000 riders use the O'Hare Branch of the Blue Line at present.

The study forecasts that the majority of OES riders will come from a combination of increased users of the airport overall and a flattening ridership of Uber, Lyft, and other TNC providers that would have carried passengers to O'Hare from Downtown and surrounding neighborhoods. The report estimates that TNCs will shift from a mode share of 52 percent of trips between Downtown Chicago and O'Hare in 2015, to 28 percent in 2045.[29] The OES would instead carry 40 percent of those Downtown to O'Hare trips in 2045. The study anticipates that overall Downtown to O'Hare trips will increase by nearly 20,000 by 2045, roughly equivalent to the number of anticipated OES trips. Essentially, almost all new trips are anticipated to be on the OES.[30]

There has been some research that provides insight on airport transit connections and overall transit ridership. A 2008 TRB Airport Cooperative Research Program (ACRP) report addresses major considerations for transit access to major airports with a high public transportation market share.[31] Worldwide, the highest public transportation mode shares are achieved by airports that offer a variety of options, including both rail service dedicated to air travelers and rail service shared with commuters. The report indicates that some airport express connections can increase transit mode share for airports that already have transit service, particularly among business travelers. It further notes that mode share depends on the interaction of the many components of the travel experience: efficiency of the connection on the airport, speed of the transit trip, the quality of connecting transit services, and the provision of other services meeting the unique needs of the air traveler.[32] Providing dedicated service does not itself guarantee high rail market share. The report specifically cites Chicago for two desired attributes: its proportion of air travelers with trip ends in downtown and low within-airport

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[29] Exhibit C of the O'Hare Express System RFQ, available at http://chicagoinfrastructure.org/wp-content/uploads/2017/11/OES-RFQ-Complete-ADD2-Clean-20180119-2.pdf.
[30] Ibid, C-25 to C-26.
[31] Matthew Coogan, "Ground access to major airports by public transportation," Airport Cooperative Research Program Report 4, Transportation Research Board, 2008. http://www.trb.org/Publications/Blurbs/157099.aspx.
[32] Ibid, 64.

travel time. Frequency of service is another desired attribute, which the low headways envisioned for OES would achieve.

A system that works better for everyone

This ON TO 2050 goal emphasizes safety, resilience, and equitable access to the transportation system. CMAP analysis of planning factors shows limited improvement for each of these areas.

The plan recommends improving transportation options for Economically Disconnected Areas and investing public assets in these communities. The high fare required to use OES and the absence of a discounted fare program for airport employees suggests the project will generally not be used by low-income individuals. Modeling indicates 4 percent of OES passengers would come from Economically Disconnected Areas. Lower income travelers would likely continue to use the Blue line to complete this journey. While the Blue Line faces capacity limitations, a fiscally constrained project in ON TO 2050 is currently planned to upgrade power and make other improvements to reduce these constraints.

With regard to resilience and environmental impacts, the anticipated project ridership is small in the context of a highly congested transit and roadway corridor that sees 260,000 auto trips and 91,400 transit riders per day. As a result, staff estimates minimal change greenhouse gases. The project is pursuing innovative, all electric vehicles which may provide a model for other transit vehicle types or individual automobiles.

Making transformative investments

ON TO 2050 calls for fully funding the region's transportation system and building a relatively small number of RSPs chiefly aimed at rebuilding and enhancing the operations of the existing highway and transit network. Special attention was given to projects that improve access to jobs for the region's residents, remove capacity bottlenecks on the existing system, or serve Economically Disconnected Areas.

The OES could also be considered transforma
tive in providing a new service with the potential to bolster the region's standing among other metro areas and that would support the City's O'Hare 21 expansion project. As discussed above, a number of other international cities have premium express train service with higher fares and faster service, such as Rome's Leonardo Express and London's successful Heathrow Express. Beyond assessing impacts on mode share, little is understood about the broader economic and mobility benefits of these services.

This section of the plan includes ON TO 2050's recommendations related to public-private partnerships (PPP). The plan notes that PPPs have the potential to deliver benefits to projects but are complex and must be considered individually and transparently. The plan further notes:

PPP agreements must be structured to protect the public interest, which should include maintaining a specified level of performance with penalties for non-performance, reasonable limits on public risk, and provisions for revenue sharing above certain thresholds. Transportation agencies must also retain their ability to effectively operate, maintain, enhance, and expand transportation infrastructure connected or adjacent to facilities under a PPP. Transportation agencies must maintain ownership of and the right to share all data collected as part of a PPP.

The terms of the draft agreement between the City/CIT and The Boring Company have not been made public. Documentation has not been provided on the degree of risk to be borne by the public sector. However, City/CIT staff have indicated that the Boring Company will retain responsibility for construction and operations costs, as well as responsibility for costs to address risks associated with the project. The RFQ stated that the CIT and City of Chicago "will not contribute any public funding to support any Project financing."[33] The subsequent RFP states that "the Project is expected to be funded solely by Project-generated revenues and financed entirely by the Developer. The City and the CIT will not provide funding for the project."[34] The June 14 press release similarly notes that "the project will be funded entirely by the company with no taxpayer subsidy."[35] Additionally, City staff have indicated to CMAP staff that no City, State, or Federal funding would be expended on the project. In line with this, The Boring Company is independently pursuing property access and/or title purchases, without City assistance or eminent domain authority.

City representatives have stated that the contract with The Boring Company will protect the public interest, contain revenue sharing provisions, and avoid non-compete clauses that could limit improvement to adjacent or competing facilities. As described above, both the RFQ and RFP emphasized that respondents must not request public subsidy. Limiting public risk during bankruptcy of the completed project or failure to complete construction can be handled in a well-constructed contract, and in that event City officials have indicated that The Boring Company would be responsible for remediating the project site. However, it is possible that addressing issues in the interim would incur public costs that exceed the project performance bond or other moneys available. The City has stated that if any such public funds are required, they would be subject to recovery from the developer by the City. Similarly, while the City has stated that the contract will require that the OES be returned to the City in the event of bankruptcy, this eventually could have positive or negative financial impacts. The upside of this outcome could be the City receiving a revenue generating asset. On the other hand, public subsidy may still be required to operate the system, as has occurred with other airport transit

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[33] Chicago Infrastructure Trust, "Request for Qualifications to Design, Build, Operate, and Maintain O'Hare Express System," January 19, 2018, 11, http://chicagoinfrastructure.org/wp-content/uploads/2017/11/OES-RFQ-Complete-ADD2-Clean-20180119-2.pdf

[34] Chicago Infrastructure Trust, "Request for Proposals to Design, Build, Finance, Equip, Operate, and Maintain O'Hare Express System," May 1, 2018, 7, http://chicagoinfrastructure.org/wp-content/uploads/2018/05/OES-RFP-Addendum-3-20180501.pdf.

[35] Chicago Mayor's Press Office, "Mayor Announces Company Selected to Build and Operate Express Service to O'Hare," accessed January 2, 2019, http://chicagoinfrastructure.org/2018/06/14/company-selected-to-build-and-operate-chicago-express-service/.

systems. City officials have stated that, in either situation, the City would not carry the burden of repaying capital costs and would have no obligation to continue operating the asset.

Absent the ability to review contract language, CMAP staff cannot independently confirm that public protections are in place. It is also unclear to what extent data sharing requirements will be included in the contract, or to what extent they will facilitate tracking of performance benchmarks.

NEXT STEPS

CMAP has analyzed the impacts of this project based on available information. This memo provides the information currently available and resulting analysis, and may be supplemented if more information becomes available prior to the beginning of public comment. As the project development process continues to unfold, it is possible that more of this information may become available and demonstrate strong support for ON TO 2050 priorities. CMAP will incorporate all available information into its analyses as the agency prepares its staff recommendation.

The public comment period for amending the ON TO 2050 plan to include the O'Hare Express Service Project runs from January 25 - February 25, 2019. Public comment can be submitted by:

- Emailing ohareexpress@cmap.illinois.gov.
- Attending a CMAP meeting. During the public comment period, this project will be discussed at the CMAP Board Meeting on February 13th, as well as at the CMAP Transportation Committee meeting on February 22nd.
- Mailing a comment to:
  Chicago Metropolitan Agency for Planning
  Attn: Elizabeth Schuh
  233 South Wacker Drive, Suite 800
  Chicago, IL 60606

Additional information on submitting public comment or how to attend a meeting can be found at https://www.cmap.illinois.gov/updates/proposed-amendments.

Following the public comment period, CMAP staff will make a recommendation on whether the Plan should be amended to include the project. The CMAP Board and MPO Policy Committee will consider this recommendation at their respective meetings on March 13 and March 14, 2019.

APPENDIX I: EVALUATION OF IMPACT ON MOBILITY AND PLANNING PRIORITIES

Staff evaluated the proposed OES using the same criteria established for evaluation of all proposed ON TO 2050 Regionally Significant Projects.[36]

The unique mode of this project along with limited information on airport travel make modeling this project challenging. No services of the price, speed, and frequency proposed for OES exist today to calibrate travel models. The OES was modeled as transit using both CMAP's traditional travel demand model and using FTA's STOPS[37] model. The STOPS model was used for evaluation of all other transit projects in ON TO 2050. The two models had similar results, with 2050 weekday ridership between 1,000 and 1,200, for in-region residents only. Both of these models used CMAP's ON TO 2050 land use and travel forecasts as inputs.

Non-employment airport access trips are included in modeling as point-of-entry trips, however they are not modeled in the same way as the rest of the region's travel because of limited information about the traveler, trip purpose, and destination.[38] The OES project would primarily serve these airport access trips that suffer from limited information. Therefore, CMAP's model results likely under-represent project demand.

The Chicago Infrastructure Trust commissioned a market study by the firm WSP that uses additional data[39], including cell phone movement data to estimate that the project could see up to 18,072 daily rides in 2045. Roughly 77 percent of this projected ridership is forecasted to be tourists and out-of-town business travelers. While CMAP did not review all data behind this estimate, ridership of this magnitude could be possible for large trip generators such as O'Hare and the Loop.

Current conditions and 2050 Mobility

ON TO 2050 emphasizes improving conditions on the existing system. As a result, transit expansion projects do not affect the current needs measures of asset condition, reliability, or ADA accessibility of any existing assets. Modeling suggests that this project would take a small number of riders (in-region residents only) off of the Blue Line (700-1,000 per day), which may relieve pressure on this capacity-constrained line during peak periods. A project to enhance the capacity of the Blue Line was included in the ON TO 2050 Plan priority list.

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[36] Chicago Metropolitan Agency for Planning, "ON TO 2050 Regionally Significant Projects Benefits Report," https://www.cmap.illinois.gov/documents/10180/911391/FINAL+Regionally+Significant+Projects+Benefit+Report+Appendix.pdf/612e47c8-5038-c3f7-035e-22959ffb0c51.

[37] The latest version of STOPS (version 2.5) was used for OES evaluation, while ON TO 2050 used version 1.5.

[38] See page 134 of CMAP's ON TO 2050 Travel Demand Model Documentation Appendix https://www.cmap.illinois.gov/documents/10180/911391/FINAL+Travel+Demand+Model+Documentation+Appendix.pdf/f3b1322c-2e60-2513-720f-38ee68b799d1.

[39] Exhibit C of O'Hare Express System RFQ, available at http://chicagoinfrastructure.org/wp-content/uploads/2017/11/OES-RFQ-Complete-ADD2-Clean-20180119-2.pdf.

Planning factors

The station areas are highly developed, higher income areas, so the planning factors reflect these conditions. Use by residents of Economically Disconnected Areas is estimated to be 4 percent, similar to the share for several of the Metra extension projects evaluated. This project is not likely for commuting by low income populations, and the City has indicated that airport employees will not receive special fares, so the job access impact was not calculated. The highly developed areas around the stations mean that this project could support infill development, scoring a 75, similar to other urban projects. Impacts on greenhouse gases, industry clustering, and freight are expected to be negligible.

Planning Factor	**Score**	**Notes**
Project use by residents of EDAs	4%	Low. Comparable to Metra extension projects.
Support for infill development	75	A high score, reflecting the current development levels of the two station areas.
Economic impact due to industry clustering ($M)	$0M	Negligible impact.
Freight Improvement	N/A	Negligible impact.
Change in access to low barrier to entry jobs for residents of EDAs in 90 minutes	N/A	Negligible impact.
Change in access to low barrier to entry jobs for residents of EDAs in 60 minutes	N/A	Negligible impact.
Change in greenhouse gas emissions (metric tons/day in 2050)	-2	Low, reflecting the relatively low ridership of the project.

APPENDIX II: ON TO 2050 GOALS AND RECOMMENDATIONS

ON TO 2050 is divided into five chapters that are, in turn, comprised of 12 goal areas. The following table gives a brief summary of the O'Hare Express Service proposal's impacts relative to these goals. The body of this memo contains a more thorough discussion.

ON TO 2050 Chapter	Goal Area	O'Hare Express Service Proposal Impact
Community	Strategic and sustainable development	Potential impact
	Reinvestment for vibrant communities	Impact
	Development that supports local and regional economic strength	Potential impact
Prosperity	Robust economic growth that reduces inequality	Potential impact
	Responsive, strategic workforce and economic development	Negligible impact
Environment	A region prepared for climate change	Negligible impact
	Integrated approach to water resources	Negligible impact
	Development practices that protect natural resources	Negligible impact
Governance	Collaboration at all levels of government	Negligible impact
	Capacity to provide a strong quality of life	Negligible impact
	Data driven and transparent investment decisions	Potential impact
Mobility	A modern, multimodal system that adapts to changing travel demand	Impact
	A system that works better for everyone	Potential impact
	Making transformative investments	Impact