Ward Village Block B Economic Impacts

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for
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EXHIBIT 12

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Executive summary

Ward Village Block B redevelopment will deliver 330 new condominium housing units in Howard Hughes' master plan for Kakaako urban renewal. This report summarizes economic impacts of Block B redevelopment in present values of constant, 2021 dollars, and documents substantial permanent economic impacts.

- Block B redevelopment is associated with $578 million in direct, indirect, and induced (total) output, peaking in 2024 amidst a 2023-2025 construction surge.
- Block B redevelopment is associated with $189 million in total workers' earnings.
- Block B redevelopment is associated with $35 million in total state tax receipts.
- An annual average of 373 jobs are associated with Block B redevelopment, with a peak annual impact of 949 jobs in 2024.
- Over thirty years beginning in 2026, in present values of constant 2021 dollars, Block B operations and maintenance will generate $148 million in future output, $49 million in earnings, $9 million in state tax revenues, and an annual average 20 jobs.
- Over thirty years Block B will accrue $127 million in the present value of future real county residential property tax revenues, with an upper bound of $138 million and a lower bound of $117 million, based on historical volatility of home price appreciation.
- Over fifty years Block B will accrue $198 million in present value real residential property taxes, ranging from $214 million to $182 million based on volatility.

[1] This report was prepared by Paul H. Brewbaker, Ph.D., CBE, Principal, TZ Economics of Kailua, Hawaii for The Howard Hughes Corporation, extending and updating *Ward Village Economic Impacts* ((December 2014) and subsequent reports related to the development master plan, under planning assumptions available from the developer at end-June 2021, subject to revision. An addendum from May 2022, upon submission for testimony, concludes.

1. Block B Economic Impacts: Introduction

Estimates of statewide economic impacts of Block B development of 330 housing units in the master-planned Ward Village of Honolulu's Kakaako area are reported here using the State of Hawaii's latest input-output (I-O) economic model.[2] Through interindustry linkages final expenditure on private investment activity—capital formation—is directly associated with a variety of economic activities. Investment outlay also is associated indirectly with economic activity through derived demand for intermediate goods and services that are part of supporting production. Earnings associated with the jobs created by these activities induce personal consumption expenditures which have additional economic impacts. Quantitative estimates of direct, indirect, and induced effects comprise total economic impacts attributable to Block B redevelopment.

Other economic consequences of Block B redevelopment are not quantified in this report. Those excluded are certain costs of entitlement acquisition necessary for building, state conveyance taxes not itemized in the I-O model, and county property taxes paid prior to completion, as well as impacts of recent tax policy changes which may be pertinent but currently are not incorporated in the I-O model. No estimate of external social costs—unintended, uncompensated by-products of development—is included in this report although fees often are justified partly to internalize privately social costs of negative externalities. No estimate is included of social benefits of positive externalities from urban agglomeration, from economies of scale, economies of scope, neighborhood valuations, or abatement of pecuniary externalities otherwise associated with offshore demand for Oahu residential real estate assets. Fourth no estimate of the project's contribution to conservation of natural resources is incorporated in this report.[3]

Economic impact estimates in this report are adjusted for 2 percent inflation, expressed in present values at a 3 percent discount rate from the standpoint of year 2021 taking into explicit account the impacts of the passage of time, account for net leakages from imported input requirements, and incorporate productivity growth in projected job impacts consistent with assumptions in the state's I-O- model. Reporting emphasis here is on total impacts of direct, indirect, and induced effects of inter-industry linkages and the personal consumption expenditure consequences of earnings from associated job creation. Output here comprises total value inclusive of intermediate goods and services, a broader measure than value-added (GDP) *per se*.

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[2] Research and Economics Analysis Division (READ), Hawaii Department of Business and Economic Development (DBEDT) (December 2020) *The Hawaii State Input-Output Study: 2017 Benchmark Report* (https://files.hawaii.gov/dbedt/economic/reports/IO/2017_state_io_study.pdf).

[3] The State of Hawaii constitution directs that, "the State and its political subdivisions shall conserve and protect Hawaii's natural beauty and all natural resources" (Article XI, Section 1), and that, "the State shall conserve and protect agricultural lands" (Article XI, Section 3). These criteria widely are interpreted and probably were intended to favor urban density in residential development over suburbanization of agricultural land. (The Rural District does not exist on Oahu in Hawaii's Land Use Law.) Ward Village contributes to this mandate through concentration of residential development in Honolulu's urban core. See League of Women Voters of Honolulu (https://www.lwv-hawaii.com/govt/constitution/art11.htm).

2. Development and construction economic impact estimates

Ward Village Block B development and construction economic impacts in 2021 dollars, over eight years 2018-2026, predominantly towards the end of this interval during a construction impulse, in present value terms, are as follows.

- Block B development and construction is associated with $399 million in direct and indirect impacts on output from interindustry consequences of development, construction and marketing and other management and administrative activities, and is associated with $578 million in direct, indirect, and induced (total) output including the expenditures arising from the incomes created directly and indirectly with the project.

- Block B development and construction is associated with $141 million in workers earnings directly and indirectly, and is associated with $189 million in direct, indirect, and induced (total) earnings.

- Block B development and construction is associated with nearly $27 million in state taxes directly and indirectly, and is associated with more than $35 million in direct, indirect, and induced (total) state tax receipts.

- An annual average of 255 jobs are associated directly and indirectly with Block B development and construction (one job-year or one job for one year), and with 373 jobs including the full scope of total effects (direct, indirect, and induced) over eight years, with a peak annual count of 949 jobs—both on the project and as its economy-wide consequence—in 2024 at the height of construction.

Following a multi-year period of planning and development, the economic impulse of Block B development surges from 2023-2025 in the construction phase of the project before impacts dissipate upon completion in 2026. These contemporaneous economic impacts are illustrated in Figures 1 and 2, below, and are summarized in Table 1.

Figure 1. Block B development job impact attributions (jobs per year)

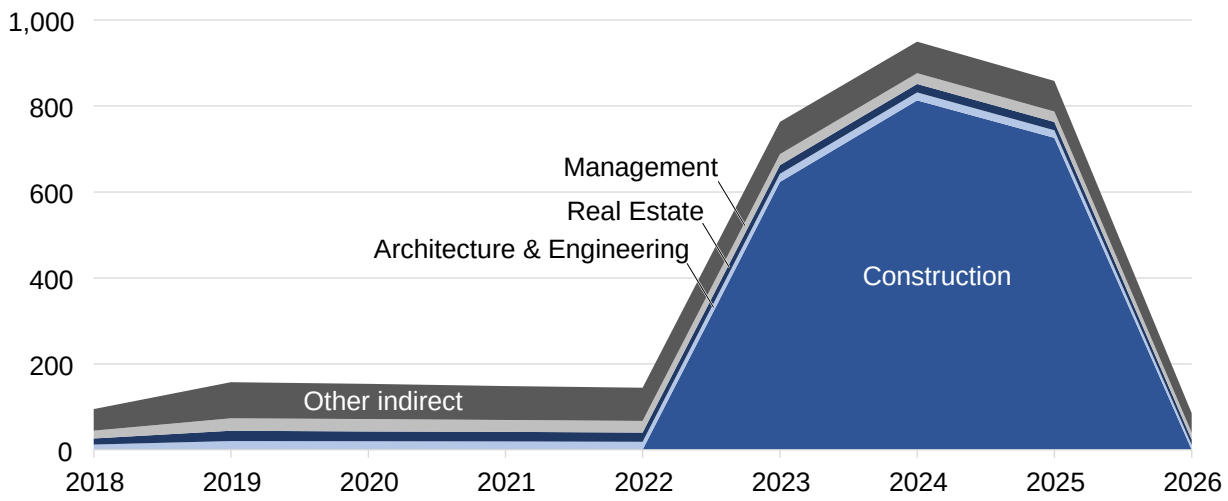


Figure 2. Block B economic impacts (million 2021$, in present values)

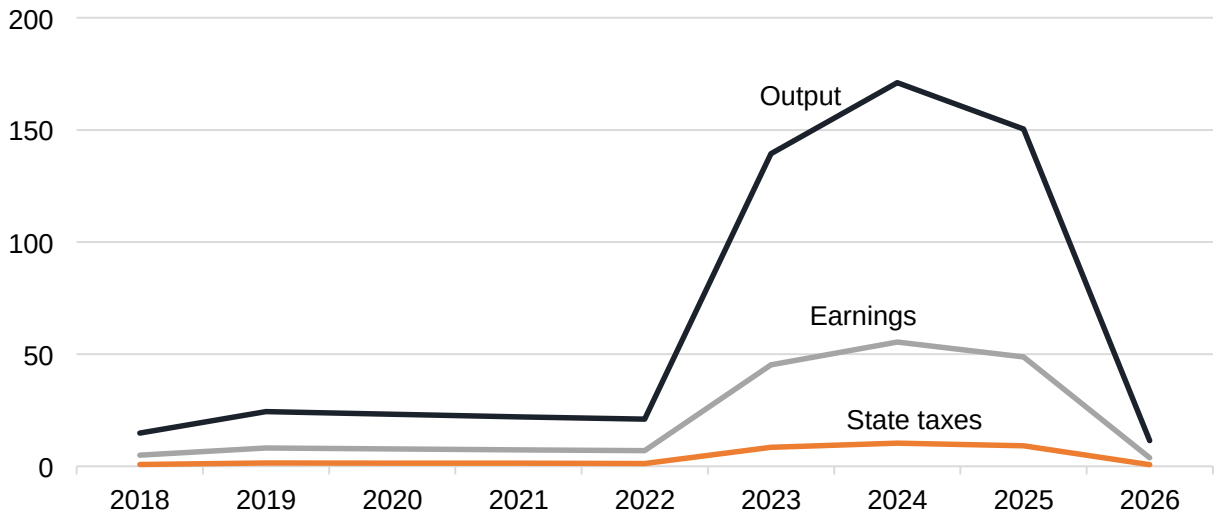


Table 1. Estimated economic impacts of Block B

BLOCK B DEVELOPMENT AND CONSTRUCTION IMPACTS

Million dollars of present value, or as noted		
	Direct + indirect impacts	**Total impacts**
Output	$ 418.2	**$ 606.0**
Earnings	$ 148.0	**$ 198.1**
State tax*	$ 27.9	**$ 37.0**
Average annual jobs	255	**373**

Million constant (2021) dollars of present value, or as noted		
	Direct + indirect impacts	**Total impacts**
Output	$ 398.9	**$ 578.2**
Earnings	$ 141.2	**$ 189.1**
State tax*	$ 26.7	**$ 35.4**
Average annual jobs	255	**373**
Peak annual jobs (2023)		**949**

*Disaggregated income, excise, and other tax impacts in Table 3

Development and construction outlay by economic activity

Million dollars of present value		
	Planned	Import-adjusted
Construction	$ 391.5	219.3
Architecture, engineering	$ 16.7	13.4
Real estate	$ 32.3	29.7
Management	$ 23.6	19.8
Administrative (other indirect costs)	$ 34.3	29.1
Total	**$ 498.5**	**311.2**

3. Permanent, ongoing economic impact estimates

Upon completion, the condominium tower, grounds, and related amenities in Block B require ongoing operations and maintenance of common areas and infrastructure, such as elevators and recreational spaces. These needs require annual collective outlays. Because they are aggregated and managed under homeowner association, they collectively comprise an independent, material economic consequence of the development

Permanent and ongoing Block B economic impacts in 2021 dollars are reported below. Permanent operations and maintenance outlays required to secure the building's longevity are associated through interindustry linkages with economic activity and related employment, incomes, and tax receipts. Like development, construction, and marketing activities arising from building the condominium, economic activities associated with its operations and maintenance give rise to imported goods and services which are excluded from onshore economic impact calculations.

Impacts of labor-saving productivity growth on employment over time are incorporated in the job impact calculations from permanent, ongoing activities, just as they are for contemporaneous development and construction. What happens over several years of construction, while incorporated in the impact estimates, is less noticeable than what happens over several decades of maintenance. Job creation erodes over time as productivity increases and cumulatively is larger over longer sweeps of time. Upon initiation of operations and maintenance in 2026, for example, 27.1 jobs are associated with Block B, but after thirty years of productivity growth, the associated count is 13.5 jobs based on calibrations implicit in the state's input-output model. This summary reports the average job impact for the entirety of the 30 years. The state's published estimates of job multipliers for this sector, 2018-2026, based on the 2017 Hawaii Census of Industry, are extended to 2055 and beyond using a log-linear regression model which embodies parameterization implicit in the published calibrations.[4]

As a result:

- Block B will be associated over thirty years beginning in 2026 with operations and maintenance outlays generating $148 million in the present value of constant, 2021 dollar future economic output, $49 million in the present value of future earnings, $9 million in the present value of future state tax revenues, and an annual average 20 jobs taking into account productivity growth, including direct, indirect, and induced economic effects,

as summarized in Table 2.

[4] Because published estimates are available, 2018-2026, the impact estimates reported here stipulate to the officially published job multipliers for those years. To extend the multipliers, the natural logarithms of published multipliers are regressed on a time index, and then projected for the subsequent three decades. For repair and maintenance activities, this method estimated a 3.45 percent annual reduction in Type 2 job multipliers, each year.

Table 2. Continuing Block B economic impacts

BLOCK B PERMANENT ONGOING IMPACTS Million constant (2021) dollars or as noted		
Present value of operations, maintenance over 30 years @3% Direct, indirect, and induced		
Output	**$**	**147.8**
Earnings	**$**	**48.9**
State tax*	**$**	**8.9**
Jobs (average number)		**20**

4. Real property tax revenue estimates

Block B generates real property tax revenues for the City & County of Honolulu. Estimates of their present value, in constant 2021 dollars, over a 30-year and a 50-year horizon are calculated under current (2021) tax law. The baseline around which upper and lower bound estimates of future home price appreciation paths are used to calculate alternative property tax revenues assumes that Oahu existing homes appreciates at an annual rate of 4 percent over time.[5] Other assumptions are designed to be conservative calibrations. Ownership patterns are adopted consistent with the "front-of-the-house" character of Block B and a spatial valuation gradient extending mauka from Ala Moana Boulevard with highest housing valuations at the development's makai location.[6]

[5] Under current tax law, assuming that old-age deductions are not pertinent, a homeowner's deduction of $100,000 from assessed value is included in the tax base. An effective residential tax rate of 0.0035 is applied to assessed value after the homeowner deduction, where appropriate. For investor-owned and second homes the first $1 million in assessed value is taxed at a rate of 0.0045 (the so-called Tier 1 rate), or $4.50 for each $1,000 of assessed value. Amounts of assessed value above the first $1 million are taxed at a rate of 0.0105 (Tier 2). Based on historical evidence summarized in the appendixes, taking into account the decline in background inflation during the forty years summarized by the median existing home price data upon which this benchmark calculation is based, price appreciation at the low end of the observed historical range of 4-5 percent annual appreciation rate is assumed to continue to raise assessed valuations over time, accordingly. From appreciated future values 2 percent inflation is removed each year, and then future values after inflation are discounted to a 2021 present value at a discount rate of 3 percent. Some issues regarding calibration of this discount rate also are discussed briefly in the appendixes.

[6] Calibrated to neighboring properties, the proportion of Block B units assumed to be held by owner-occupants is 36.9 percent of the building total. Proportions comprising units held as investments (31.7 percent), and as second homes (31.4 percent) are distinguished accordingly and by property tax rates (footnote 5).

Over thirty years the contribution of Block B to City & County of Honolulu real property tax revenues is substantial, in constant-dollar terms and present values. Given Hawaii jurisdictions' high bond ratings and relatively generous borrowing capacity extant, compared to the relevant legal borrowing constraints, the present values of *incremental* county property tax revenue are further accretive to the county's borrowing capacity.[7] For example, the city recently went to the market in a periodic refunding operation, borrowing across the maturity spectrum from 1 to 10 years, and issued municipal bonds at about a 2.2 percent average borrowing rate. As discussed further in the appendix, the term structure of risk-free interest rates proxied by constant-maturity yields on U.S. Treasury securities, and projections of monetary policy by the Federal Reserve Board discussed in the appendix, are consistent with an expectation that these borrowing costs are not likely to rise significantly in coming years.[8] Low funding cost, muted inflation risk premia, and adequate borrowing capacity are augmented by the substantial addition of incipient future property tax receipts arising from Block B redevelopment.

Hypothetically, a private development of a new residential condominium tower worth $125 million in the present value of future property tax receipts, reserving 20 percent of that value to be conservative (as an "equity" tranche), adds $100 million in incremental borrowing capacity *today* for future long-term infrastructure investments by the city. Whether or not this 20 percent "haircut" is taken into account, the hypothetical source of future property tax revenue generation stands up on the asset side of the jurisdiction's balance sheet, against which liabilities can be stood even when the investments associated with such borrowing are not revenue-generating. (Indeed, the $100 million in present value in this example equally would be available to offset $100 million in the present value of future current as well as capital expenditures.)

The hypothetical $100 million in this example is essentially bankable for the jurisdiction's future physical and human capital formation. Of course, infrastructure investments themselves typically *are accretive to the productive capacity* of the economy. They often augment the jurisdiction's ability to pay. By raising productivity, infrastructure investments can contribute to the tax base indirectly when such investments are not revenue-generating *per se*. But even when they are potentially revenue-generating, public infrastructure investments often are foregone. For example, high-speed scanning makes road-pricing or dynamic congestion-pricing (like surge pricing *a la* Uber), *technologically* feasible, but political and social constraints may pre-empt a jurisdiction from using such methods as algorithmic tolling to fund roadway development. At a time when global sea rise associated with climate change is rapidly become a significant, and coastal roadway alignments imminent, such thought experiments are not purely theoretical. The fact is that roadway and many other public infrastructure investments may not be self-funding even when they could be, and when their social benefits unambiguously support public investment outlays. A county jurisdiction's capital formation funding options are not limited to fiscal largesse of state or federal governments when private investments in real property tax-

[7] These attributes were sourced from local municipal bond fund managers.

[8] This is detailed in the appendix, but the yield on 10-year U.S. Treasury Notes in early-August, 2021 was approximately 1.35 percent (https://www.federalreserve.gov/releases/h15/), and the median forecast of participants of the Federal Reserve Board's Federal Open Market Committee meetings is a longer-run neutral interest rate of about 2.50 percent (https://www.federalreserve.gov/monetarypolicy/fomcprojtabl20210616.htm).

generating assets also are available. Block B redevelopment literally represents, in present value terms, a standing means to harvest those assets' returns.

That is, Block B redevelopment is *securitizable*: its existence provides a basis for repayment and public debt-servicing even when public investments themselves do not generate adequate revenue streams, as often is true when fulfilling social needs is a primary objective. Housing the homeless is unlikely to generate residential rents; that doesn't mean it should not be a collective undertaking. A jurisdiction, like a city with a good municipal bond rating anticipating a relatively low interest rate environment, benefits from the incremental present value of future property tax receipts generated by urban redevelopment in Block B and the relatively modest level of associated public services required in a master-planned community like Ward Village.

Over thirty years real property tax revenues of Block B redevelopment are estimated below.

- Block B will be associated over thirty years beginning in 2026 with $127 million in the present value of future county residential property tax revenues under the baseline assumption grounded in historical housing appreciation rates.

- Because of the exportability of the City's Residential A property tax rates (footnote 5), approximately 81 percent of the baseline property tax revenue will arise from second-home and other investors, and about 19 percent from owner-occupants.

- An upper bound estimate of the present value of real property tax revenues from Block B over thirty years beginning in 2026 is $138 million; a lower bound estimate is $117 million, based on the historical volatility of home price appreciation over time.

Over fifty years the present values of future Block B property tax receipts are higher.

- Block B will be associated over fifty years beginning in 2026 with $198 million in the present value of future county residential property tax revenues.

- An upper bound estimate of the present value of real property tax revenues from Block B over fifty years beginning in 2026 is $214 million; a lower bound estimate is $182 million.

The Block B real property tax estimates' attributions under thirty- and fifty-year time horizons are summarized in Table 3, below.

Table 3: Present value of future Block B real property tax receipts

Estimated central tendencies and upper and lower bounds based on a 4 percent nominal appreciation rate plus or minus conditional standard deviations (95% confidence interval)

in million 2021 dollars	Non-owner occupant	Owner-occupant	Total
Present value over 30 years	$103.4	$23.6	**$127.0**
Upper bound	$112.2	$25.3	$137.5
Lower bound	$94.7	$21.9	$116.6
Present value over 50 years	$161.9	$36.1	**$198.0**
Upper bound	$175.2	$38.7	$213.9
Lower bound	$148.6	$33.5	$182.1

5. Dynamic economic impacts

Development and construction and investment generally are distinguished from consumption activity by the fact that their economic impacts accrue over time. There are exceptions: consumer durables purchase of computers or motor vehicles give rise to consumption over time even when economic impacts associated with their purchase occur at a point in time. The convention in economic statistics is to take such considerations into account when possible, and to make distinctions where appropriate. Relatively long lives of buildings make their building (the verb) different in that the creation of the productive capacity—production of housing services—generates economic impacts over years or decades. This report explicitly takes into account the role of time, both in the *flow* of capital formation associated with development and construction, as well accruing to the *stock* of capital upon conclusion of the investment activity. The latter has been the focus of real property tax impact estimates, and economic impacts of operations and maintenance, in previous sections of this report.

This section details the annual flow of investment outlays and the timing of associated economic impacts during development and construction of Block B. Delivery of individual Ward Village block redevelopments has been staggered over time. Each one is associated with a crescendo of development and related administrative and management activities culminating in a construction impulse concluding with a building's delivery. Because time is of explicit importance in physical capital formation, economic impact estimates have been discounted to a common reference point, in this case the year 2021. The effects of inflation also have adjusted to align with that reference point. Annual economic impacts of Block B redevelopment are detailed in Table 4, below, consistent with the summary impacts in preceding tables.

Table 4: Annual Block B economic impacts

Block B development impacts (million 2021$ in present values,* job-years†, or as noted)

Direct and indirect	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Output (mil 2021$)	10.2	16.6	15.9	15.1	14.3	96.5	118.4	104.1	7.9	398.9
Earnings (mil 2021$)	3.7	6.1	5.8	5.5	5.3	33.9	41.5	36.5	2.9	141.2
State taxes (mil 2021$)	0.7	1.2	1.1	1.0	1.0	6.4	7.8	6.9	0.5	26.7
Jobs (average number)	70	116	113	109	106	512	634	573	63	255

Direct, indirect, and induced	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Output (mil 2021$)	15.0	24.4	23.3	22.1	21.0	139.4	171.1	150.4	11.5	578.2
Earnings (mil 2021$)	5.0	8.2	7.8	7.4	7.1	45.3	55.5	48.8	3.9	189.1
State taxes (mil 2021$)	0.9	1.5	1.5	1.4	1.3	8.5	10.4	9.1	0.7	35.4
Jobs (average number)	95	157	153	148	144	763	949	858	86	373

Block B state tax revenue impacts (million 2021$ in present values*)

Direct and indirect	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Individual income (mil 2021$)	0.190	0.309	0.295	0.280	0.267	1.635	2.000	1.759	0.146	6.881
GET (mil 2021$)	0.429	0.700	0.668	0.634	0.604	4.056	4.979	4.376	0.330	16.777
TAT (mil 2021$)	0.009	0.015	0.014	0.014	0.013	0.092	0.113	0.099	0.007	0.376
Other (mil 2021$)	0.082	0.134	0.128	0.121	0.115	0.602	0.732	0.645	0.063	2.622
Annual total	0.710	1.158	1.106	1.050	0.999	6.385	7.823	6.879	0.547	26.656

Direct, indirect, and induced	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Individual income (mil 2021$)	0.253	0.413	0.394	0.374	0.356	2.210	2.705	2.379	0.195	9.280
GET (mil 2021$)	0.550	0.898	0.857	0.814	0.774	5.150	6.320	5.555	0.424	21.342
TAT (mil 2021$)	0.017	0.027	0.026	0.025	0.024	0.160	0.196	0.172	0.013	0.660
Other (mil 2021$)	0.120	0.197	0.188	0.178	0.169	0.949	1.157	1.019	0.093	4.069
Annual total	0.941	1.535	1.465	1.391	1.324	8.469	10.377	9.125	0.724	35.351

Block F development outlays by econ. activity, adjusted for imports (mil. 2021$ in present values*)

Outlays (mil. 2021$)	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Construction	0.0	0.0	0.0	0.0	0.0	59.2	77.6	69.6	0.0	206.4
Architecture, engineering	1.0	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.0	13.1
Real estate	2.2	3.7	3.7	3.6	3.5	3.5	3.4	3.3	2.2	29.1
Management	1.5	2.5	2.5	2.4	2.4	2.3	2.3	2.2	1.4	19.4
Administrative (indirect)	2.2	3.7	3.6	3.5	3.5	3.4	3.3	3.3	2.1	28.5
Annual total	6.9	11.6	11.4	11.1	10.9	69.9	88.1	79.9	6.7	296.6

*Assumes 2% CPI inflation, 3% (risk-freee) discount rate, and trend productivity growth

†One job for one year; average annual labor requirement reductions from productivity growth 3% (*s.d.* 0.6-0.8 percentage points)

6. Discussion

Input-output models are linear by design. Changes in demand for interindustry goods and services translate directly into employment and output effects mechanically, without changes to factor prices for labor and materials. The resulting multipliers underlying the economic impacts of Block B redevelopment which have been estimated here imply that resources are adequate to enable production activities to engage according to the pattern of development investment outlays. In a full-employment context in which skilled labor may be scarce or sourcing non-labor inputs is confounded by logistics and supply-chain disruptions, it is possible that an increase in investment demand could warrant an alternative estimating approach in which input *and* prices are flexible, not fixed as linear production modeling implies. Some of the developer's increased demand for certain inputs such as steel or concrete are sourced from outside the Hawaii economy, but a single developer's demand is unlikely to affect input prices for an entire input market. Increased demand by the developer for other inputs, for example skilled labor in some tasks or occupations, could have an impact on wage rates in a smaller geographic market. In adopting the State of Hawaii's input-output model as a framework for economic impact estimation, we have implicitly assumed that these price effects, if they exist at all, are muted and that the developer's decisions do not have economy-wide impacts on prices. This is a reasonable approach, and the standard assumption. It remains worth noting because the post-pandemic economic recovery has been and will continue to be complicated by supply chain disruptions which could have impacts on building materials and other input prices. Because these disruptions usually are transitory in nature, even if unusually significant at the time this report was being prepared, the developers' notional investment (capital formation) outlays are utilized in the quantitative analytics without additional adjustments for price risk or uncertainty.

At the time this Block B economic impact analysis was being undertaken, in the aftermath of the sharpest and shortest U.S. recession ever recorded,[9] following onset of the global pandemic from the novel coronavirus SARS-CoV-2,[10] the economic recovery was characterized by several unusual circumstances, in addition to more usual outcomes associated with recovery. Details are included in Appendix 1.

- Job and employment losses from the Covid pandemic in 2020 were severe and recovery in Hawaii fell far short of the national U.S. economic experience in 2021.

- A summertime 2021 surge in Oahu morbidity associated with the novel coronavirus's Delta variant was likely to be a setback to recovery at the time this report was being

[9] National Bureau of Economic Research (https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions) and *Business Cycle Dating Committee Announcement July 19, 2021: Determination of the April 2020 Trough in US Economic Activity* (https://www.nber.org/news/business-cycle-dating-committee-announcement-july-19-2021).

[10] See footnote 9, and *Business Cycle Dating Committee Announcement June 8, 2020: Determination of the February 2020 Peak in US Economic Activity* (https://www.nber.org/news/business-cycle-dating-committee-announcement-june-8-2020).

prepared. It appears likely to be associated with increased mortality among younger age cohorts than in the pandemic's earlier waves of infection.

- State and county jurisdictions, by mid-August 2021, had not responded with non-pharmaceutical public health policy interventions suitable for the intensity of the Delta wave, but household and consumer behavior already responded—by cutting back—as consistently had been the case previously before waves of Covid infection, when jurisdictions (uniformly) lagged in their NPI responses.

- A final unusual characteristic is the abrupt, measurable increase in remote work, or telework, work from home, which at the time this report was being prepared was a feature characteristic at least 20 percent of Honolulu households. Examples of this so-called hysteresis—changes believed to be temporary which turn out to be permanent—are not uncommon in labor markets following sizeable economic shocks, such as inflation surprises. This particular post-pandemic response is may have influenced Oahu home prices and Honolulu commercial real estate which, while beyond the scope of this report, may be relevant to urban redevelopment generally, in the future.

A double-dip recession for Honolulu in 2021 cannot be ruled out. The fact that the economic recovery is stumbling makes a better case for the benefits to the community of Block B redevelopment, for two reasons. First, the recovery is not going to be monotonic, it's not moving in one direction, upward, out of the economic trough. (The bottom for the U.S. recession was April 2020.) It's going to be steps forward and steps back. Second, the novel coronavirus SARS-CoV-2 is here to stay. The outlook is for a transition from pandemic to endemic disease, in spite of vaccination, or because of its incomplete embrace. This casts a shadow on the early 2020s, context for Block B redevelopment, but it highlights the significance of Block B's economic impacts. Third, the certainty of Block B economic impacts also can be contrasted with heightened uncertainties for Hawaii if, in the presence of endemic disease, travel and tourism continue to be exposed to shifting demand. The benefits of economic impacts of Block B redevelopment are unambiguous, but their importance now is underscored by the ambiguities of even the likely macroeconomic backdrop upon which redevelopment will unfold. This a very different context than the one imagined only a few months ago in the early stages of preparation of this economic impact analysis. Things are changing quickly, and unexpectedly, even though the certainty of Block B economic impacts is assured.

Conclusion

Ward Village Block B development and construction of 330 new condominium housing units continues Howard Hughes' master plan for Kakaako urban renewal. This report has summarized economic impacts of Block B redevelopment in present values of constant, 2021 dollars. Block B's initial development phase will transition to a construction phase from 2023-2025 with peak impacts in 2024. Its legacy of permanent economic impacts is substantial.

- Block B development and construction is associated with $399 million in direct and indirect impacts on output, and with $578 million in direct, indirect, and induced output.

- Block B development and construction is associated with $141 million in earnings directly and indirectly, and $189 million in direct, indirect, and induced earnings.

- Block B development and construction is associated with $27 million directly and indirectly, and with $35 million in direct, indirect, and induced state tax receipts.

- An annual average of 255 jobs directly and indirectly, and 373 jobs including direct, indirect, and induced effects, are associated with Block B development and construction, with a peak annual count of 949 jobs in 2024.

Permanent, ongoing economic impacts of Block B redevelopment accrue from operations and maintenance outlays as well as real property tax revenues accruing to the City & County of Honolulu. Adjusted for inflation, their constant-dollar approximate values range from nearly $150 million for operations and maintenance over thirty years, to $200 million in property tax receipts over fifty years.

- Over thirty years beginning in 2026, Block B will be associated with operations and maintenance outlays generating $148 million in the present value of constant-dollar future economic output, $49 million in the present value of future earnings, $9 million in the present value of future state tax revenues, and an annual average 20 jobs taking into account productivity growth, including direct, indirect, and induced economic effects

- Block B will be associated over thirty years beginning in 2026 with a baseline estimate of $127 million in the present value of future county residential property tax revenues. Exportability of the Residential A property tax rate implies an 80:20 split between property tax revenue from second-home and other investors, and from owner-occupants.

- An upper bound estimate of the present value of real property tax revenues from Block B over thirty years beginning in 2026 is $138 million; a lower bound estimate is $117 million, based on the historical volatility of home price appreciation over time.

- Block B will be associated over fifty years beginning in 2026 with $198 million in the present value of future county residential property tax revenues.

- Taking into account volatility, an upper bound estimate of the present value of real property tax revenues from Block B over fifty years beginning in 2026 is $214 million; a lower bound estimate is $182 million.

Block B redevelopment anchors Ward Village's oceanfront boundary—The Front of The House—with residential condominiums appropriate to the spatial valuation gradient of Honolulu's urban core. Block B redevelopment supports area amenities as well as public open space development commitments. Block B redevelopment makes a substantial contribution through the stimulus of private capital outlays to sustaining uneven economic recovery from the 2020 pandemic recession. Block B's permanent economic legacy includes a substantial and bankable addition to the present value of the city's future property tax receipts and to ongoing economic activity arising from building operations and maintenance.

Appendix 1. Unusual and usual economic recovery characteristics

Among the current economic recovery characteristics on Oahu, in mid-August 2021, are many which are customarily observed. However, the course of the COVID-19 pandemic, a disease caused by spread of the novel coronavirus SARS-CoV-2, has been uneven and unpredictable. It seems likely, at the time this report was being prepared, that earlier expectations of a steady recovery from the pandemic after vaccines became available, and return to economic normalcy during the early-2020s, will not be fulfilled. In mid-2021 the economic outlook is that the best Oahu can expect is a transition from pandemic to endemic disease, with ongoing risk exposure to capricious evolution of its underlying novel coronavirus. Hawaii's travel protocols have steadfastly minimized exposure to risk of introduction through the primary channel for *economic* transmission of recession impulses, travel and tourism.[11] Because of household and resident consumer responses to the uneven, unpredictable pattern of economic recovery facing recurrent pandemic risk exposure, economic recovery also has been non-monotonic, sometimes improving steadily, particularly when supported by federal fiscal stimuli initiatives, other times reversing course. A pullback in both offshore (tourism) and onshore (consumer) demand appeared to be underway as of August 2021 in high-frequency data streams such as daily passenger arrivals and GPS-based data on where residents spend their time (*i.e*. at home or in workplaces or in retail establishments or recreational venues).

1. (*Usual*) **Covid job loss**. Monthly average non-agricultural payroll employment on Oahu declined 19 percent between second quarter 2019 and second quarter 2010, after the introduction of the novel coronavirus, from 473.5 thousand jobs to 383.2 thousand jobs, a year-over-year loss of more than 90,000 jobs. Partial rebounding to 416.7 thousand jobs, second quarter 2021 payroll employment provided contemporaneous evidence of economic recovery, one among many such metrics, but Oahu jobs remained 12 percent or more than 33,000 *below* mid-2019 counts by the middle of 2021. (Data in this paragraph are as published, not seasonally-adjusted).

[11] As of August 15, 2021, 89.7 percent of COVID-19 cases in Hawaii originated in community spread, individual behaviors which could have been mitigated by vaccination, mask-wearing, social distancing, and frequent hand-washing, not to mention more aggressive contact tracing, smartphone GPS tracking, and rapid-testing by governments at state and county levels disinterested or incapable of engaging the associated technologies to minimize Covid morbidity and mortality in Hawaii. Another 8.3 percent of Covid cases in Hawaii originated in out-of-state travel by residents, typically those returning from places on the U.S. mainland like Las Vegas where intersections of exposures from many other places were maximized. Even with transpacific air passenger volumes returning to near record domestic numbers of 1 million per month in July 2021 at the conclusion of eight full months of recovery, largely in the absence of international travel (http://dbedt.hawaii.gov/visitor/daily-passenger-counts/), only 2.0 percent of all Hawaii Covid cases were associated with non-resident travel, a testimony to the successful design and implementation of Hawaii's Safe Travel pre-flight testing and mandatory vaccination and quarantine protocols (https://travel.hawaii.gov/#/).

Figure A1-1a. Non-agricultural payroll employment on Oahu (jobs): employment recoveries are slow, but not usually this slow, or stuck

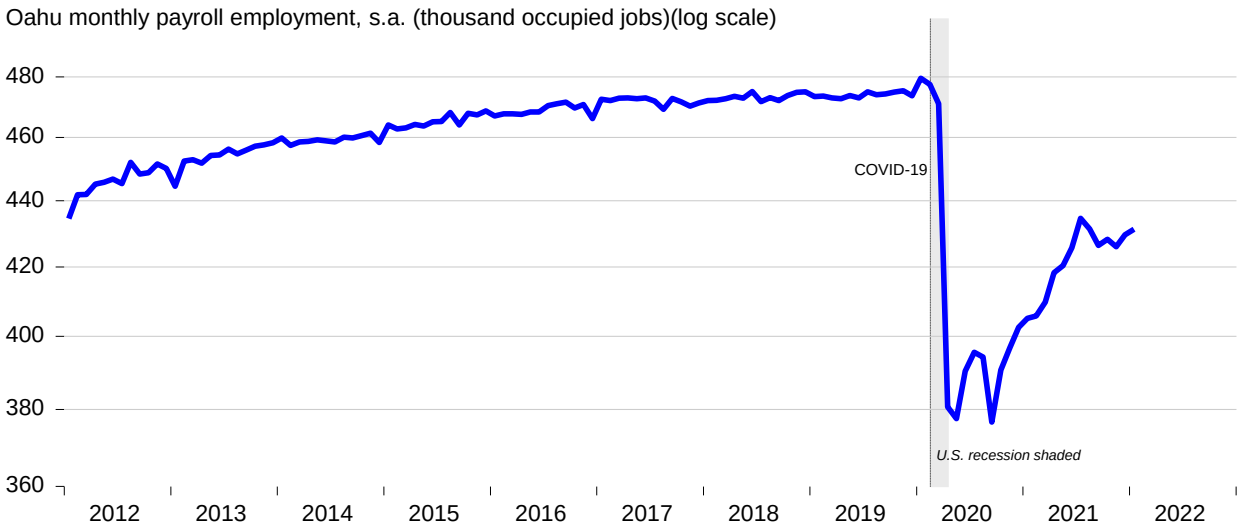
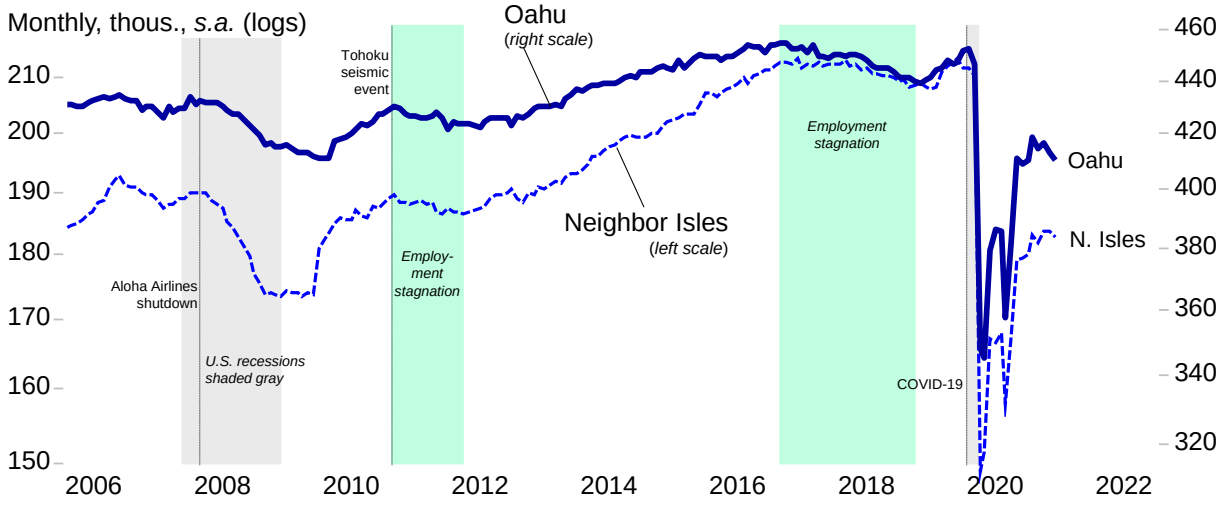


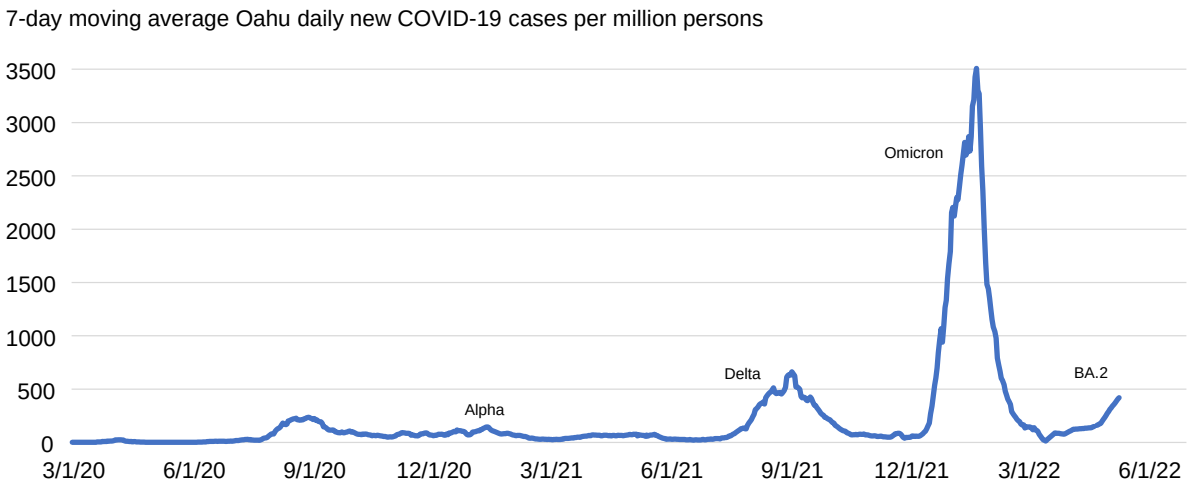
Figure A1-1b. Persons employed on Oahu, and on the Neighbor Islands (combined)



Sources: Hawaii DLIR, Hawaii DBEDT (http://dbedt.hawaii.gov/economic/mei/, through December 2021 (upper panel), and https://www.hirenethawaii.com/admin/gsipub/htmlarea/uploads/LFR_LAUS_LF.xls, through July 2021 (lower panel)). Seasonal adjustment using X-13 ARIMA filter by the author.

2. (*Unusual*) **Delta variant**. A mutant, evolved form of the novel coronavirus, its Delta variant, in July-August 2021 precipitated rapid increase in daily new COVID-19 case counts on Oahu higher than at any time during the pandemic to date. Surging daily new Covid case counts were attributed to community spread, returning resident travelers, failure to get vaccinated by large proportions of Oahu's eligible population.[12] The Covid resurgence began to undermine travel demand late in the summer, with travel and lodging cancellations accumulating just as tourism transitioned from its summertime peak to its seasonal trough during the fall. Reopening of public schools, combined with ineligibility of children 11 and under for Covid vaccination, posed additional risks not yet apparent in the data: two school weeks were too early in which to gauge incidence or prevalence.[13]

Figure A1-2. New daily COVID-19 cases/million persons



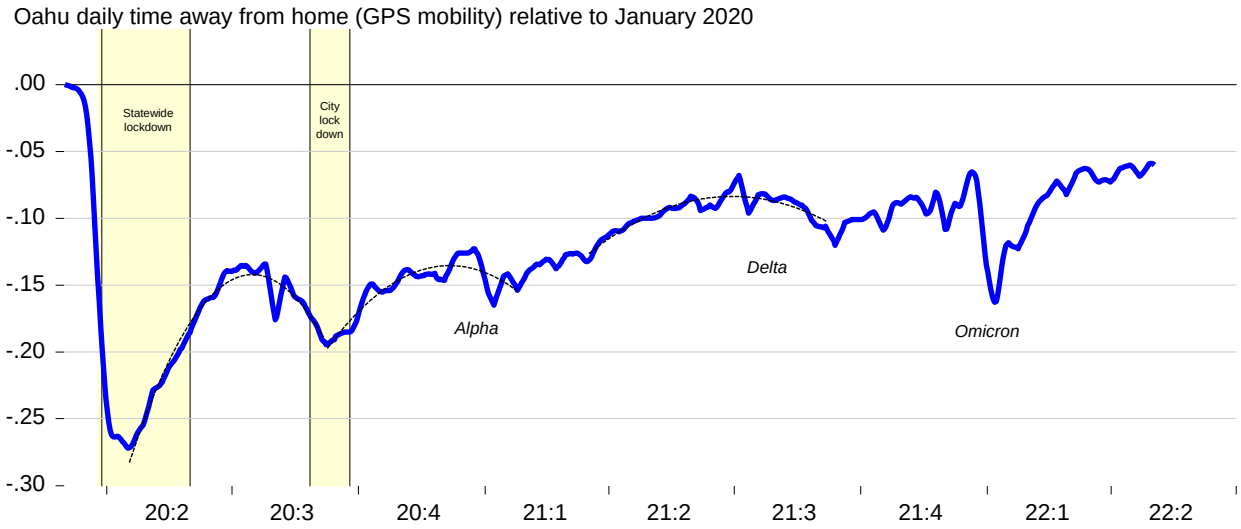
Source: See footnote 12 (graphic updated through May 5, 2022).

[12] On August 15, 2021 approximately 68 percent of Oahu's population was fully vaccinated. See Hawaii Department of Health (https://health.hawaii.gov/coronavirusdisease2019/). More than 70 percent of persons were vaccinated in Honolulu's urban core, East Honolulu, and Hauula. More than 60 percent were vaccinated in Kaimuki and Kahala. Suburban areas in Manoa Valley, from Aiea to Waipahu, Kailua-Kaneohe, and Hawaii Kai exhibited 45-60 percent vaccination rates. Waianae, Mililani, Kahuku, Laie, and Waimanalo had vaccination rates from 35-45 percent of the population. Kapolei, Wahiawa, Waialua, Haleiwa, and Oahu's North Shore communities had vaccination rates at or below 35 percent of the population. On August 15, 2021 Oahu's Covid test positivity rate was 8.2 percent. A 7-day moving average daily incidence of 459 per million persons (compared to 1,254 cases per million in Georgia (EU), 1,252 cases per million in Louisiana, and 1,006 cases per million in Florida, would comprise the top 3 countries in the world for Covid incidence in mid-August. (See Johns Hopkins University (https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_confirmed_US.csv and http://91-divoc.com/pages/covid-visualization/).

[13] The Hawaii Department of Education reported 325 Covid cases for the week August 7-13, 2021, and cumulative cases numbering 1,475 from June 26, 2020 through August 6, 2021.

3. (*Unusual*) **Behavioral economics**. High-frequency, daily data such as smartphone mobility and credit and debit card usage suggested that Hawaii economic activity may have begun to turn downward late in July 2021 as people became aware of the Delta variant. Behavior patterns mirrored changes prior to the shelter-in-place executive orders in March 2020, August 2020, and August 2021.[14] The earlier behavioral changes were more pronounced but recent changes (August 2021) have been more nuanced, possibly because of more widespread vaccination. Both autonomous behavioral changes by consumers and changes mandated through official non-pharmaceutical interventions (NPIs) in these circumstances had the effect of temporarily suppressing economic activity. (The alternative to NPIs of allowing the pandemic to carry on absent intervention is worse for the economy.[15]) The August 2021 situation was rapidly evolving but retrenchment would be consistent with a partial setback to economic recovery or renewed recession.

Figure A1-3. Google GPS mobility data for Hawaii residents, "time away from home" relative to January 2020 (workplace, shopping, recreation, *etc.*)



Sources: Google, The Opportunity Insights Team (https://opportunityinsights.org/wp-content/uploads/2020/05/tracker_paper.pdf, and https://raw.githubusercontent.com/OpportunityInsights/EconomicTracker/main/data/Google%20Mobility%20-%20State%20-%20Daily.csv). Daily data March 1, 2020 through May 2, 2022.

[14] See State of Hawaii (https://governor.hawaii.gov/wp-content/uploads/2020/03/2003162-ATG_Third-Supplementary-Proclamation-for-COVID-19-signed.pdf and https://governor.hawaii.gov/wp-content/uploads/2021/08/2108048-ATG_Executive-Order-No.-21-05-distribution-signed.pdf), and City and County of Honolulu (https://governor.hawaii.gov/wp-content/uploads/2020/08/2008106-CCH_Emergency-Order-No.-2020-25-distribution-signed.pdf).

[15] See Sergio Correia, Stephen Luck, and Emil Verner (March 2020 revised June 2020), "Pandemic Depress the Economy, Public Health Interventions Do Not: Evidence from the 1918 Flu" (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3561560).

4. (*Unusual*) **Remote work**. Almost 20 percent of households in Hawaii in June 2021 had present at least one adult who was working remotely from home because of the COVID-19 pandemic, down from about 30-40 percent of Households in mid-2020.[16] These patterns were consistent with remote work patterns nationwide. They distinctively represent a change from pre-pandemic patterns in which fewer than 5 percent of labor force participants worked from home.[17] The shifts in behavior are associated with a variety of labor market impacts ranging from lower post-pandemic labor force participation rates for workers aged 55 and older, to an increase in the numbers of job openings customarily associated with a given unemployment rate.[18] There were consequences for commercial real estate beyond the scope of this project's intended uses (no retail space in the Block B redevelopment). More pertinent are that these changes in worker behavior may be associated with a so-called Donut Effect. Demand for single-family, detached dwellings is increasing in suburbs and exurbs on Oahu (*e.g.* East Honolulu, Windward Oahu, North Shore, the "highlands" of Mililani and Makakilo). There are two manifestations of the increase in suburban and exurban housing demand. First, a spatial impact: median single-family home prices in these neighborhoods have risen faster than in Honolulu's urban core, according to the Honolulu Board of Realtors. Second, a temporal impact: single-family median prices have risen *relative to trend*, while median prices of residential condominiums on Oahu, though still appreciating, are drifting below trend. This dichotomous impact on relative valuations of single-family versus condominium prices is expected to be a transitory feature of the post-pandemic recovery. The change in relative prices would theoretically induce a reverse shift in demand, back towards the urban core, as condominium *relative* prices become more appealing, eventually.[19]

[16] U.S. Bureau of the Census, Household Pulse Survey (https://www.census.gov/programs-surveys/household-pulse-survey.html).

[17] U.S. Bureau of Labor Statistics (https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm and https://www.bls.gov/web/empsit/covid19-table1.xlsx), and Federal Reserve Bank of Atlanta Macroblog (May 28, 2020), "Firms Expect Working from Home to Triple," *FRB Atlanta Survey of Business Uncertainty*. (https://www.frbatlanta.org/blogs/macroblog/2020/05/28/firms-expect-working-from-home-to-triple).

[18] Current population survey, U.S. Bureau of Labor Statistics, retrieved from FRED, Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org/series/LNS11300012, https://fred.stlouisfed.org/series/JTSJOL, and https://fred.stlouisfed.org/series/UNRATE). See also Comments of William Beach, Commissioner, U.S. Bureau of Labor Statistics, *National Association for Business Economics 2021 Economic Measurement Seminar* (August 9-11, 2021), 31:41 of video of panel discussion on Maintaining the Quality and Integrity of U.S. Government Data (August 9, 2021).

[19] Arjun Ramani, Nicholas Bloom (January 2021) "The donut effect: How COVID-19 shapes real estate," Stanford Institute for Economic Policy Research SIEPR Policy (https://siepr.stanford.edu/research/publications/donut-effect-how-covid-19-shapes-real-estate), and Edward Glaeser (November 2020), "End of an era? Edward Glaeser on cities after coronavirus," *The London Conference 2020* (https://www.youtube.com/watch?v=6ZYcANI_2_w).

Figure A1-4a. U.S. workers who teleworked or worked at home for pay because of COVID-19, excluding those who did pre-pandemic or those whose telework was unrelated to the pandemic

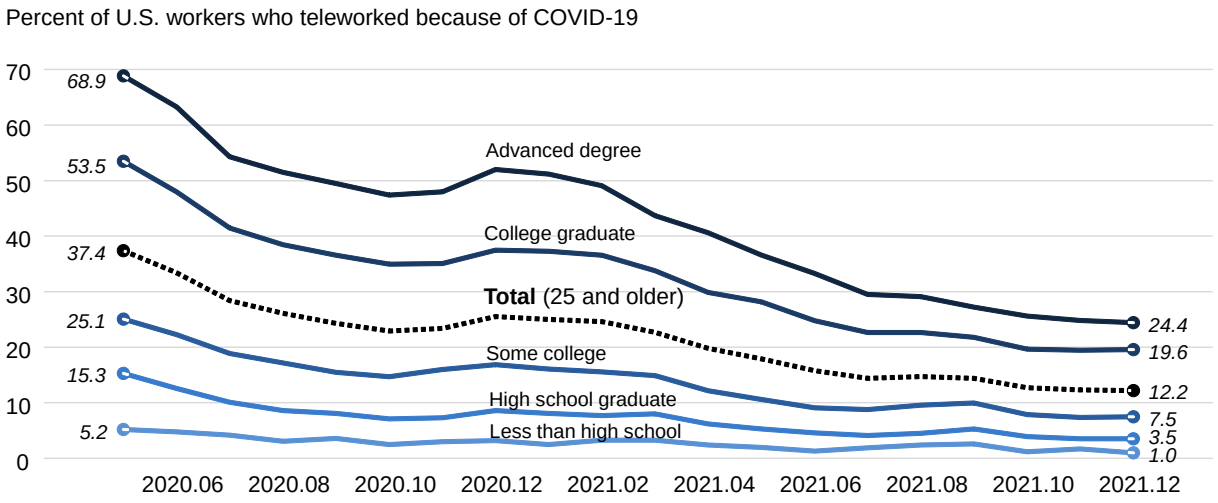
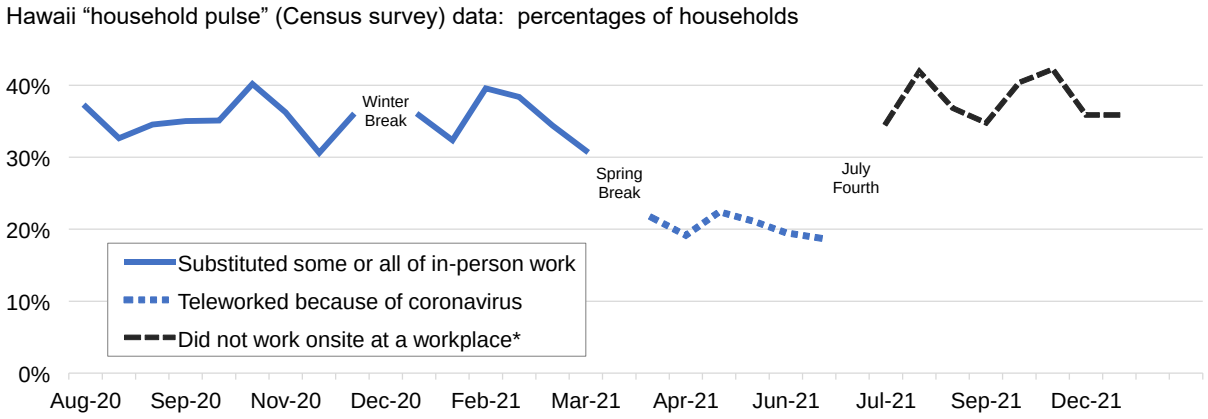
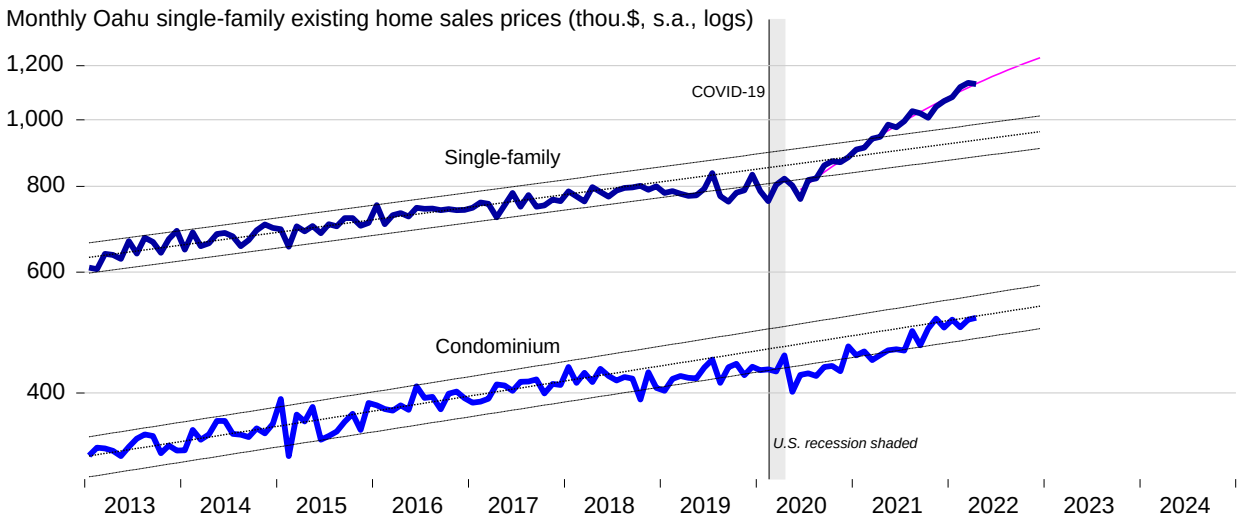


Figure A1-4b. Hawaii households in which at least one adult teleworked because of Covid



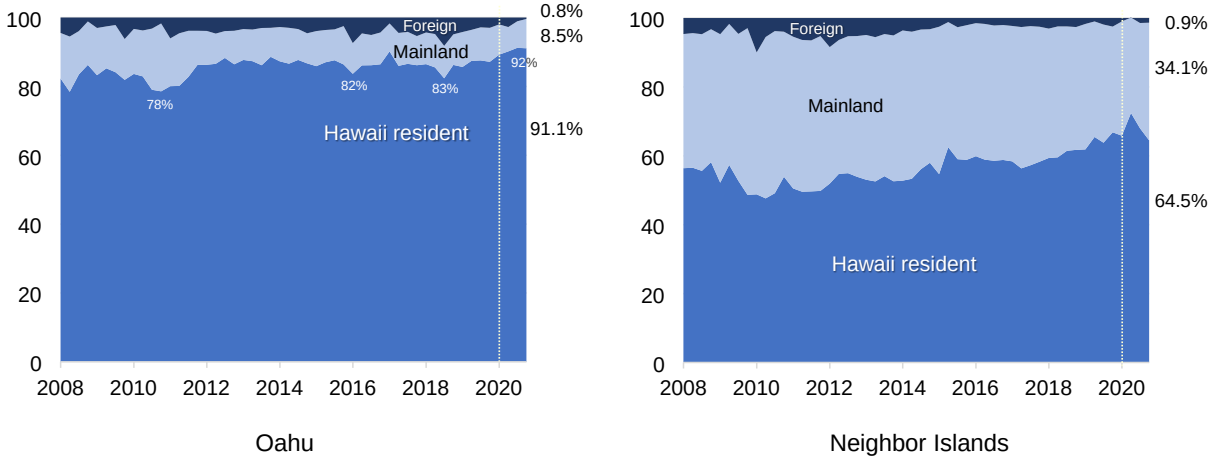
Source: U.S. Bureau of Labor Statistics (monthly) updated through December 2021; supplemental data measuring the effects of the coronavirus (COVID-19) pandemic on the labor market (https://www.bls.gov/cps/effects-of-the-coronavirus-covid-19-pandemic.htm, and https://www.bls.gov/web/empsit/covid19-table1.xlsx), and Household Pulse Survey (https://www.census.gov/programs-surveys/household-pulse-survey.html). Surveys before April 2021 define "Percentage of adults living in households where at least one adult has substituted some or all of their typical in-person work for telework because of the coronavirus pandemic," from April-June 2021 "Percentage of adults living in households where at least one adult has teleworked because of the coronavirus pandemic in the last 7 days," and beginning in July 2021, "Percentage of adults in households where someone worked onsite at a workplace in the last 7 days (i.e. 64.1% between December 1-13, 2021);" or one-third who did not.

Figure A1-5. Oahu median existing home sales price appreciation dichotomy: vigorous in single-family segment, less so in residential condominiums, since Covid



Source: Honolulu Board of Realtors, monthly data through April 2022, seasonal adjustment using Census X-13 filter and trend regressions by author.

Figure A1-6. Local buyer shares of Oahu home sales increased, pre- *and* post-Covid

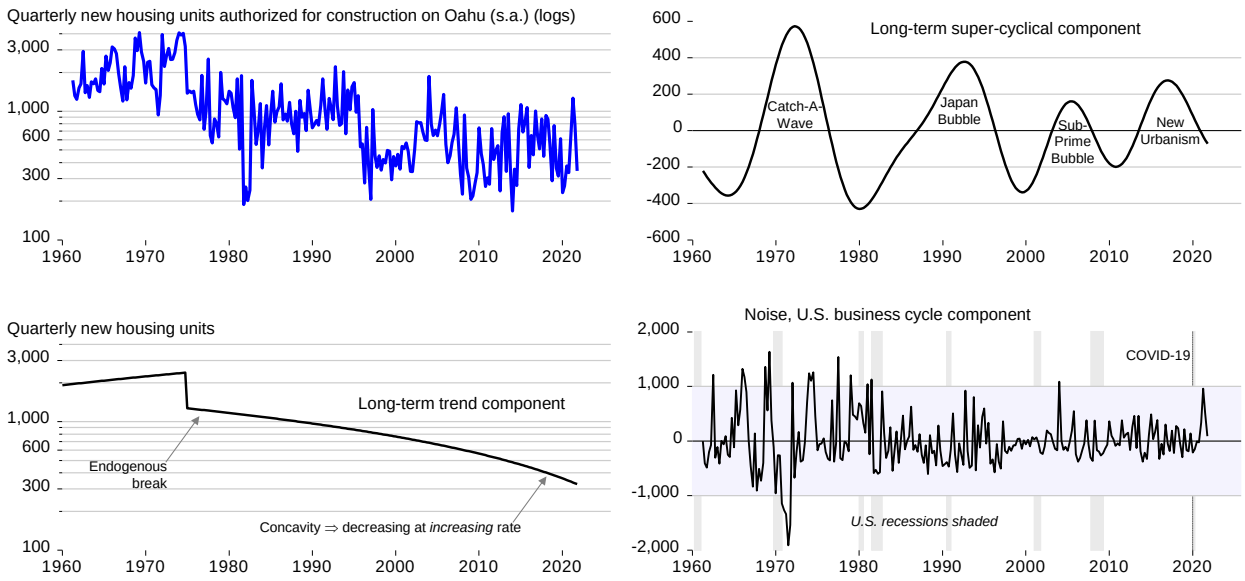


Source: Title Guaranty of Hawaii, Inc. based on Hawaii Department of Natural Resources, Bureau of Conveyances data, retrieved from Hawaii DBEDT (https://dbedt.hawaii.gov/economic/qser/selected-county-tables/, http://files.hawaii.gov/dbedt/economic/data_reports/qser/E_construction-tables.xls), seasonally-adjusted using Census X-13 ARIMA filter by author.

Appendix 2: Longer term homebuilding trends

It's no secret that fewer homes are built on Oahu today, in the 2020s, than were in the 1920s, based on county private building permit data. What is somewhat more remarkable is for how long—more than 45 years—a downward trend in homebuilding has been playing out on Oahu. Quarterly data back to the early statehood period reveal that homebuilding, four times than production today or more, was rising until the mid-1970s, when a discrete break in homebuilding trends permanently was asserted by changing state regulatory postures on land use and county development entitlement acquisition, such as the imposition of production quotas for lower-cost housing (inclusionary zoning requirements). Even a *cyclical* surge in Oahu homebuilding during the 2010s associated with the New Urbanism, of which Ward Village is an example, did not bend Oahu's declining long-term trend in homebuilding back upward. Still, the character of Oahu homebuilding in the 2020s is obscured by the pandemic. Against this historical backdrop, the ongoing redevelopment of Ward Village and the thousands of new housing units associated with its master plan may yet contribute to a residential investment wave which turns the Boring Twenties into the Roaring Twenties.

Figure A2-1. Decomposition of longer-term trend, cycle, and residual elements of quarterly numbers of Oahu new housing units authorized by building permit



Source: County building departments, Bank of Hawaii, Hawaii DBEDT (http://dbedt.hawaii.gov/economic/qser/selected-county-tables/); seasonal adjustment using Census X-13 ARIMA filter, decomposition using Christiano-Fitzgerald asymmetric band-pass frequency filter assuming first-difference stationarity and short:long cycle periods of 40:100 quarters, and trend extraction with nonlinear regression by TZ Economics. Quarterly Oahu data 1961-2021.

Addendum: May 6, 2022

This analysis and report were completed in August 2021 which, from the standpoint of nine months later, somehow seems a lifetime ago. There are two findings worth highlighting in the original report in the light of subsequent experience.

A. In summer 2021 global supply chain disruptions were one source of rising materials costs specifically and emergent inflation generally. Another equally important factor was the inflationary legacy over about one year (March 2020 – March 2021) of three rounds of federal fiscal stimulus during the pandemic.[20] This report noted other anomalies in labor markets, decreasing workforce participation and contributing to constraints on aggregate supply. Constraints on supply limited real economic responses to aggregate demand boosted by federal fiscal stimuli, leading to the inflation surge after March 2021. In response, in fall 2021 monetary policy-makers at the Federal Reserve Board began to withdraw policy accommodation introduced to stabilize financial markets in March 2020. In winter/spring 2021 the Fed moved to raise interest rates to dampen inflationary pressures. Meanwhile, after this report was largely completed, two subsequent waves of coronavirus morbidity and mortality, the Delta wave in late-summer 2021 and Omicron wave in winter 2021, and geopolitical risk associated with Russia's invasion of Ukraine late in February 2022, underscored a key observation raised in the original report. Post-pandemic economic recovery will not be uniform and monotonic. For example, after 6.9 percent revised U.S. real GDP growth during fourth quarter 2021, preliminary first quarter 2022 U.S. real GDP growth was *negative*, −1.4 percent (both quarterly at annual rates). This kind of whiplash is a reminder that Block B redevelopment is framed by a highly volatile, real macroeconomic backdrop.

B. Heightened risk and uncertainty, not the least of which will continue to be associated with the evolving SARS-CoV-2 coronavirus, *increase* the importance of the *certainty* of the economic benefits arising uniquely from the Block B redevelopment. The certainty of economic benefits from urban development and construction generally contrasts with the uncertainty exhibited by the tourism recovery during the last year, say, from April 2021 through March 2022, during which seasonally-adjusted Hawaii travel volumes *twice* have fallen in proportions reminiscent of the 9/11 event in 2011. (The equivalent of two 9/11s for tourism within one year and tourism officials aren't even talking about it!) Hawaii's economy entered recovery in 2020 from the *lowest* position among the fifty U.S. states relative to its own peak at end-2020, and Hawaii had the slowest or nearly the slowest economic recovery subsequently, marked by huge setbacks attributable to the

[20] The Congressional Budget Office estimates that a little over $5.1 trillion in federal fiscal stimulus was committed during the covid pandemic. In spring 2020, a series of acts centered on the Coronavirus Aid, Relief, and Economic Security (CARES) Act deployed $2.404 trillion in federal fiscal relief commitments (https://www.cbo.gov/system/files/2020-06/56403-CBO-covid-legislation.pdf). At end-2020, the Consolidated Appropriations Act (CAA) added $868 billion, and in march 2021 the American Rescue Plan Act (ARPA) added $1.856 trillion

ongoing pandemic. The economic benefits of Block B redevelopment are a sure thing, those of tourism-led Hawaii economic recovery are less reliable.

There is no need to modify the core economic impact analysis of the original Block B report published with the August 2021 date. In constant dollars the consequences of inflation on economic impacts were removed at the outset. To whatever extent materials price changes alter specific development hedonics (for example, kitchen counters and appliances), these consequences are of an order of smallness inconsequential for the real economic impacts as originally estimated. Unanticipated inflation does not modify inflation-adjusted estimates, or not materially. Construction costs may be higher, in the event, once the building is off the ground, but the real economic benefits remain the same irrespective of the actual—versus the notional—inflation rate.

The remainder of this addendum and some graphics in the report *do* update specific data sets or influential economic factors emerging after this report was completed. Updating underscores certainty of economic benefits of Block B redevelopment amidst economic uncertainty.

Addendum on Delta and Omicron variants and Hawaii tourism: May 6, 2022

State and county officials in Hawaii have given up most non-pharmaceutical interventions in public health policy to mitigate the novel coronavirus SARS-CoV-2, its variants, and associated disease COVID-19. The virus doesn't care. From July 2021 through January 2022, data mostly unavailable when this report was finalized demonstrate the adverse impact of two subsequent covid variant morbidity waves in Hawaii on air travel demand. Residents respond to the emergence of unanticipated biological risk by changing their behavior, as was discussed in Appendix 1, section 3. Each covid variant wave was associated with a downturn in time spent away from home based on mobility data gathered from cell phone GPS. Behavioral changes in each instance *preceded* the ensuing public health policy responses: leaders are followers. The behavioral changes—less time outside the home in the presence of an incipient increase in biological risk exposure—also took place when public policy-makers did *not* respond with NPI. Neither during the Delta nor the Omicron morbidity waves did Honolulu Mayor Blangiardi respond except to opine in December 2021 that public health policy "is a matter of personal responsibility," news to infectious disease scientists. Tourists, however, *did* respond, just as residents did, to each variant wave by reducing travel demand. Both the Delta and Omicron waves were associated with 25 percent reductions in weekly inbound air passenger volumes to Hawaii from North America, peaking about three weeks after the fact. Each decrease was the tourism equivalent of a 9/11 event. Increases in infectious disease risk *cause* decreases in air passenger volumes. (Tests for Granger Causality validate causality implications the impulse response illustrated below.) Hawaii's economic recovery will continue to be confronted by biological, geopolitical, and geophysical risks which create uncertainty about economic outcomes, while Block B redevelopment poses its real economic benefits with certainty.

Figure AD-1: Hawaii air passenger arrivals declined by one-quarter during each of two covid variant waves, Delta and Omicron

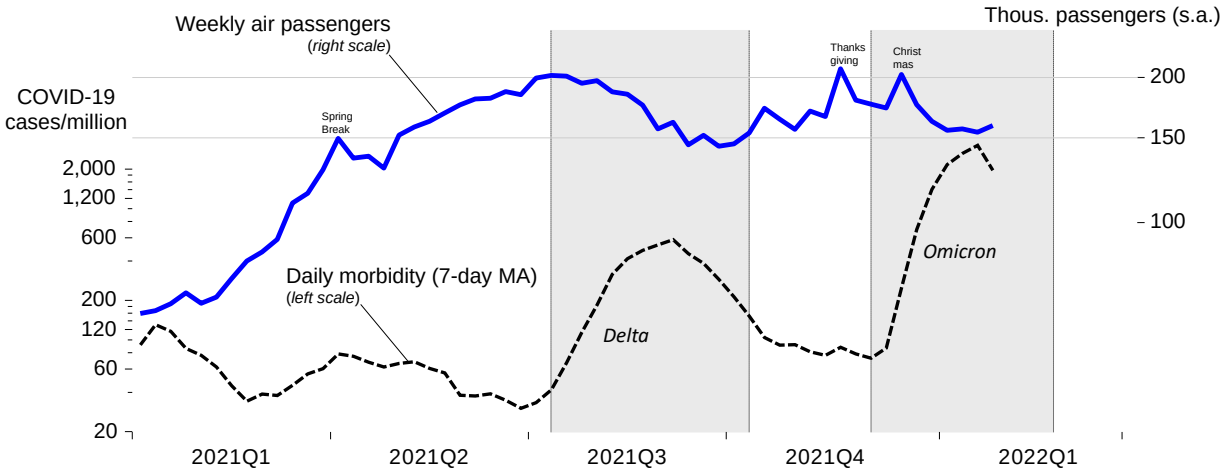
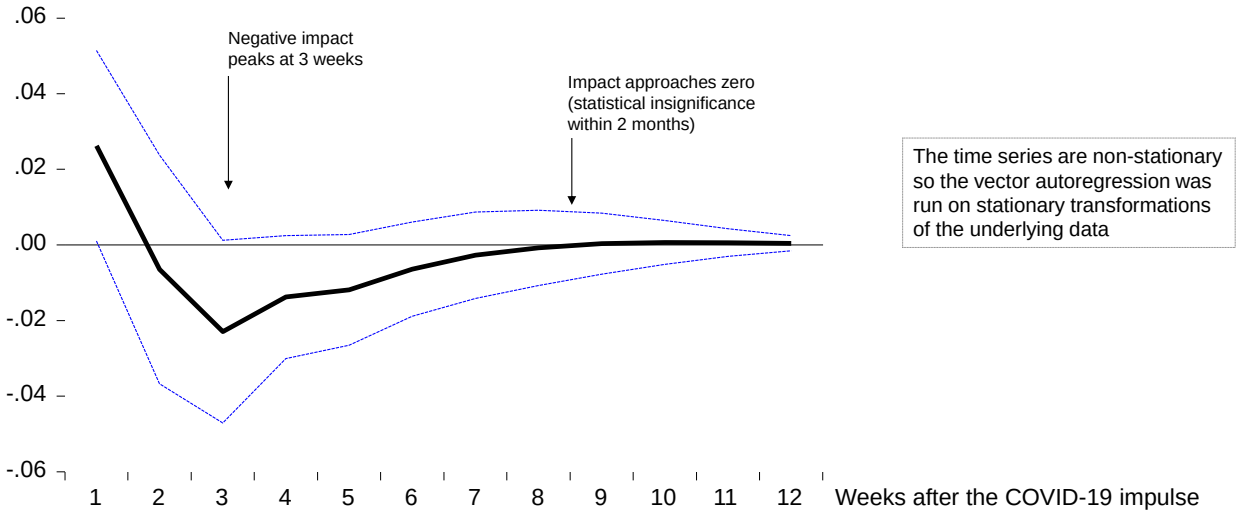


Figure AD-2: Impulse response of weekly passenger arrivals to weekly COVID-19 cases: when covid increases, passenger counts significantly decline with a 3-week lag



Sources: Data set is weekly from July 2021 through January 2022. Air passenger arrivals are seasonally-adjusted with an STL decomposition. See Hawaii DBEDT (http://dbedt.hawaii.gov/visitor/daily-passenger-counts/), Hawaii DOH (https://health.hawaii.gov/coronavirusdisease2019/), Johns Hopkins University (https://raw.githubusercontent.com/CSSEGISandData/COVID-19/master/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_confirmed_US.csv). Shaded variant wave intervals beginning the week of July 9, 2021 (*Hawaii News Now* (https://www.hawaiinewsnow.com/2021/07/10/state-leaders-debate-over-lifting-indoor-mask-mandate/) and beginning the week December 3, 2021 (Office of the Mayor Emergency Order No. 2021-16 (https://www.honolulu.gov/rep/site/may/may_docs/City__County_of_Honolulu_Emergency_Order_2021-16_searchable.pdf). Leaders on each occasion proposed or did the *opposite* of appropriate NPI.