

Hypo-Loop Container Freight Transport: PART I

Macro-Imagineering New World Macro-Projects

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Abstract: Consideration of operational New World passenger and freight transportation infrastructures from the point of view of impending Hypo-Loop technologies, suggests that American nation-ecosystems have become barely measurable politically-demarcated geomers. If a map of a province, state or region made sense during the past Age of Canals and Roads, it no longer did so with the advent of the Age of Railways. And, modern-day aviation — including the shortly anticipated 21st Century appearance of aero-space vehicles such as the UK's developing SKYLON — has similarly dispelled conceptions of common human passenger and freight conveyance. Many landscape planners, in their misplaced confidence, insist upon skyscrapers where cities must adopt a vertical disposition accommodating ever denser populations, requiring a complex system of vertical and horizontal elevators. Such buildings must be securely ground founded, based on thorough geotechnical studies! Attribution of skyscrapers in a transverse or lateral direction requires structural linkages via secure subterranean tunnels, also requiring a large automated internal transport system. The proposed 21st Century freight-only Hypo-Loop cargo-carrying installation, with significantly reduced aerodynamic resistance, should fundamentally improve the urban soundscape of the Los Angeles River Basin as well as California's Inland Empire.

Key-words: Hypo-Loop, Los Angeles River Basin, macro-projects, Inland Empire, Standard International Shipping Containers.

Resumo: A consideração das infraestruturas operacionais de transporte de passageiros e de carga do Novo Mundo, do ponto de vista das tecnologias *Hypo-Loop* iminentes, sugere que os ecossistemas das nações americanas se tornaram geômeros politicamente demarcados e pouco mensuráveis. Se o mapa de uma província, estado ou região fazia sentido durante a Era dos Canais e Estradas, não o fazia mais com o advento da Era das Ferrovias. Além disso, a aviação moderna — incluindo a aparição no século XXI de veículos aeroespaciais, como o SKYLON, em desenvolvimento no Reino Unido — também dispersou as concepções comuns de transporte de passageiros e cargas. Muitos urbanistas, em suas convicções mal orientadas, insistem em arranha-céus onde as cidades devem adotar uma disposição vertical que acomoda populações cada vez mais densas, exigindo um complexo sistema de elevadores verticais e horizontais. Tais edifícios devem ser implantados sobre fundações robustas, com base em estudos geotécnicos completos! A disposição de arranha-céus em direção transversal ou lateral requer ligações estruturais através de túneis subterrâneos totalmente seguros, também exigindo um grande sistema automatizado de transporte interno. A instauração de um sistema *Hypo-Loop* de transporte de carga para as mercadorias do século XXI, com resistência aerodinâmica significativamente reduzida, deve melhorar fundamentalmente a paisagem sonora urbana da bacia do rio Los Angeles, bem como do chamado “Império Interior” da Califórnia.

Palavras-chave: *Hypo-loop*, Bacia do Rio Los Angeles, macroprojetos, Império Interior, Padrão Internacional de Contêineres.

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1. Introduction

20th Century long-distance evacuated air-tube transportation technologies, designed for maximum value networking of cargoes and passengers, were first introduced to Californians in 1972 by RAND Corporation researcher Robert M. Salter (1920-2011). By 2013, a Swiss company, Loglay AG, proposed its *Cargo Sous Terrain* scheme that was based on specially designed movable capsules that would improve commercial efficiency in the rapid delivery of goods using predominantly subterranean tunnels. Because mobility and efficiency are operational hallmarks of international trade, work, tourism, and leisure activities, Macro-Imagineering's major challenge is providing cargo-haulers with safe, top-notch transport infrastructures. Development of new concepts that will successfully network complex cities and remote regions requires the integration of many technologies. Some visions such as those of Elon Musk (born 1971) and others feature operationally systematic hyperloops that are harmonized with existing infrastructures. Although the modern concept of a "Hyperloop" was coined in 2012 by Elon Musk, our 2020 infrastructure neologism is "Hypo-Loop", a hyperloop spin-off that is also a magnetically-levitated cargo delivery idea that foresees the utilization of linear electric motors to propel only Standard International Shipping Containers (SISC) long-distances through specially constructed pipelines generally emplaced underground or, when geophysical conditions require, atop aesthetically-acceptable visible over-ground pylons. The Hypo-Loop, as envisioned, will accommodate steep gradients ranging up to ~10-15%.

The Boring Company, which was founded during 2017 and currently headquartered in the Los Angeles River Basin City of Hawthorne (Figure 1), dug a short experimental or proof of concept tunnel there which was successfully completed during 2018. By 2019, the company had also demonstrated in the City of Las Vegas, Nevada, a rapidly-excavated tunnel to move tourists and conventioners across town from one important convention venue to another. Because surface railways typically move little freight in urbanized regions, due to the associated high costs that involve time-consuming last-kilometer truck delivery, it becomes inefficient using congested roads and especially if constantly emitting noxious motor fumes. Evacuated tunnels exclusively conveying SISC will be tailored to avoid the train station-to-train station bottleneck; indeed, final container delivery will only be to automated warehouses that host fully automated last-kilometer delivery devices! Conventional rapid pace tunnel boring machines, especially those designed by Richard James Robbins (1933-2019), became more common after the mid-20th Century because of his pioneering patented tunnel boring machine (TBM) inventions. In 2020, the Boring Company announced its "Prufrock" TBM that operates ten times faster at heading excavation than any previous conventional Robbins-type tunnel boring machine! In other words, this technological advance results in cheaper tunneling. The acronym "Prufrock" suggests the first syllable of "prudence" and "frock" a woman's dress thereby indicating the absence of corporate exaggeration. The Boring Company intends to capitalize on new technological developments in electro-magnetic propulsion and totalizing computer controls that have the potential to revitalize geographically large-scale sub-surface tubular systems.



Figure 1. Base map illustrating the relative courses of the Los Angeles River and its main tributary such as the Rio Hondo.

Securing rights-of-way is the political and social macro-problem that will affect use of the Hypo-Loop in both urbanized (developed) and natural California landscapes. The advantage of an underground tunnel system is that there will be no need to review, assess or provide acceptable solutions to the surface (ground level) impacts of transportation on wildlife and superficial soundscapes because there will be none! The Hypo-Loop will be independent of weather conditions and advantageously offers zero biotic mortality, zero biological barrier effects, zero species invasions, zero imposition of operational noise or chemical pollution. After completion, the notable effect on the Los Angeles River Basin's ground-level soundscape ecology will be some insignificant anthrophony — the actual infra-hum of Southern California's existing industry [1-2]. Environmental Impact Assessments (EIS) were first instituted nationally five decades ago during 1970 when the U.S. National Environmental Policy Act became law. State of California laws have as well caused the EIS compilation and approval process to become remarkably expensive, involving multiple government agencies, the critical public, crucial special interest advocacy groups, and often the legal profession through intentional macro-project delay litigation that produces income for those other than technology developers. With underground transit tubes increasing in relevance, there will be little likelihood of continuous post-construction legal, economic, and political issues. Authorities representing the City of Los Angeles could try to exert that city's enormous bargaining power (rent squeezing, leasing contestations) owing to the value variability of the Los Angeles River Basin's Hypo-Loop hauled cargoes. However, the two initial Hypo-

Loop routes advocated will most benefit the extant Los Angeles International Airport (LAX), the Hollywood Burbank Airport (BUR), the Palmdale Regional Airport (PMD), and the Ontario International Airport (ONT) [3]. The Mojave Air & Space Port (MHV), the first ever certified Federally, could also benefit as an allied operational and connected transportation system.

2. Hypo-Loop and Los Angeles River Basin Landscape Planning

The City of Burbank-based famed film-studio Warner Brothers' most profitable moving picture during 1954 was *Them!* Science-fictional ants developed gigantism after being irradiated by the 1945 Trinity first nuclear-fission bomb at the State of New Mexico explosive test site. In that movie the giant ants migrated westward, unobserved, from New Mexico to downtown Los Angeles's reinforced concrete-lined river where they established a breeding colony [4]. After arriving, the colonizers next excavated a subterranean nest; nest-digging was made possible by the Los Angeles River Basin's vast networked concrete stormwater drainage channels. Unlike Niagara Falls' "disguised design" [5], the Los Angeles River's design is a "blanket design", a deliberated costume in the urban fabric clearly meant to conceal an unruly natural watercourse! Progressive architectural firms, stimulated by City of Los Angeles planners, Basin building contractors, unionized labor, and possibly the impressive overseas example of Seoul, South Korea's Cheonggyecheon Restoration Project (2003-2005) [6], are still, despite considerable cautions from others, foolishly dabbling with idealist natural channel design imagery when attempting to publicly promote re-naturalization of the Los Angeles River. Should they succeed in convincing a majority of Los Angeles County voters that such a de-construction mega-project plan is wise, then those working and living beside the unleashed river will become even more endangered, subject to Nature's unbridled freshwater flash-flood runoffs as in the officially recorded historic past [7].

Their hazy and simplistic architectural plans reek of geophysical Denialism as well as radical Green Utopianism: from a reasoned scientific point of view, re-naturalization of the Los Angeles River and its tributaries is dangerous. Total annual freshwater discharge of the Los Angeles River at its mouth has increased by several hundred percent due to inflows of treated water from tributaries, leaking public water supply pipes, the irrigation of public and private urban landscapes, and the impervious surfaces (roads, buildings, pavements) that increase surface runoff that contributes to the annual flood magnitudes [8]. In fact the bottom of the watershed is, practically speaking, not really fully known [9]. Any confirmed and taxpayer-funded channel de-construction plan that will affect the cultural future of the entire Los Angeles River Basin human populace, even those living and working river-side in the City of Burbank at, say, Warner Brothers, ultimately threatens to damage property and lives of an essential creative industry which, in part, symbolizes the Los Angeles River Basin. The world-famous signatory **HOLLYWOOD** sign emplaced on the front — south-facing slope — of Mount Lee, declared a historical landmark by the City of Los Angeles in 1973, has existed in its present-day abbreviated word formation since 1949 [10].

During July 2018 Warner Brothers announced its hope to build an aerial-cable tramway on the north slope of Mount Lee, its proposed “Hollywood Skyway” future tourist entertainment attraction, to originate from an automobile parking structure adjacent to its property on the left-bank of, and close to, the partly concrete-wall trained Los Angeles River. Extreme storm river runoffs could impair, damage or possibly destroy a realized “Hollywood Skyway” if down-river channel obstructions such as massive bridge piers and high-friction natural riverbed sections had the engineering effect of backing up 21st Century flash-flood freshwater flows! At last report, internationally famous progressive architect Frank Gehry, who once endorsed massive alterations to the blanket macro-engineered Los Angeles River, has shifted to cantilevered structures projected over selected sections of the undisturbed watercourse channel.

Then office-holder California State Assemblyman Richard Katz, recycling a macro-imagineering concept that was first bruited in the 24 March 1941 issue of *The Los Angeles Times*, offered during 1989 an add-on macro-project plan to utilize the existing paved Los Angeles River into a remarkable Los Angeles River Basin daily traffic-flow altering “bargain freeway” — in other words, already constructed and available for improvements to expedite automobile, truck and bus movement to and from the Basin’s economically vitalizing Los Angeles-Long Beach harbors. Katz, born 1950, was then, as well as since, been publicly ridiculed, his rehashed update of a pre-World War II transportation macro-project plan junked by “outraged” — politically posturing — radical non-progressive Greens. Nevertheless, a 21st Century use for the geotechnically known ground underneath the reinforced-concrete Los Angeles River is here proposed as a primary route for Hypo-Loop tunnels linking containership port infrastructures with upgraded and fully operational aero-space departure and reception centers located within California as well as extending to the capacious warehouses, which are already built or could be built, in the State of Nevada accessed also by the Rio Hondo route (Figure 2).

The Los Angeles River and its main tributaries are not, as radical Green planners often proclaim, a “lost” river absent from appreciative citizenry gaze. Instead, the river is a known destructive flowing fluid landscape element, a sporadically rampaging watercourse that damages and disassembles vast swaths of costly-to-replace infrastructure while also endangering, sometime killing, the Basin’s vulnerable humans. No rainstorm super-computer models or real-world pluvial flood-hazard mapping efforts can accurately predict real-world effects on future home and business flood-insurance premiums, as Frank Gehry found worrisome. In addition, potential Basin-specific sea-level rise of 0.3-2 m by 2100 will affect the mouth of the Los Angeles River and its adjacent yet separately administered seaports as well as its surrounding urban and industrial infrastructures [11-12]. The upper limit of tidal influence on the Los Angeles River is ~3.2 km inland and it is possible that tsunamis might extend the influx of seawater farther upriver [13]. Finished in 1920, the Devil’s Gate Dam was the first flood-control structure constructed within the Los Angeles River Basin. A dam at the river’s mouth may become its last since it may become vital to install a closure dam as well as watercourse paralleling flood and storm-surge walls [14]. A river mouth closure dam would be a spectacular hydraulic structure that requires complex macro-engineering to survive severe

loading from future ocean waves, tides and river flash-floods. However, as an ersatz architects mega-project, it seems possible that houses and offices could be situated atop such a blockading structure equipped with lift-gates to release Los Angeles River Basin's runoff whenever it is deemed necessary to do so by professional hydraulic macro-engineers.

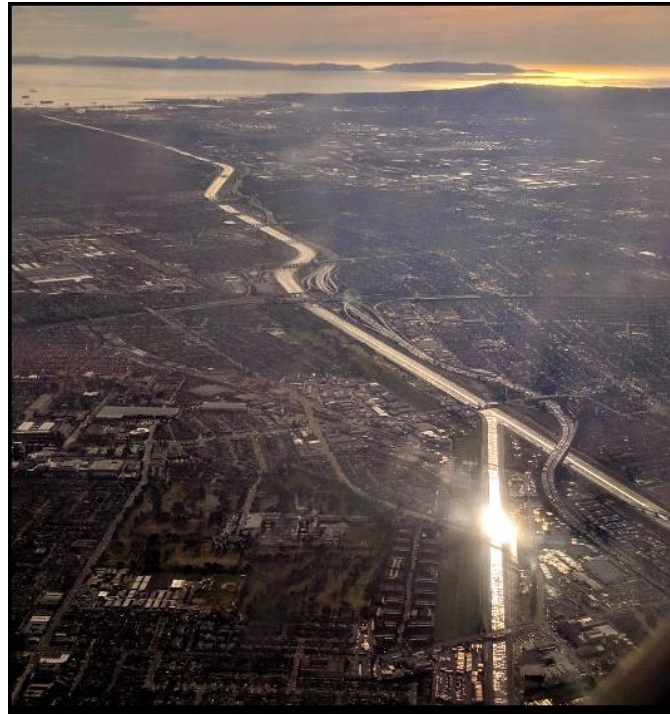


Figure 2, Aerial oblique photograph showing the lowermost course of the 26.4 km-long Rio Hondo, a tributary of the mainstem of the Los Angeles River (also pictured in the background distance), looking toward the horizon of the North Pacific Ocean.

Organization and establishment of cannular Hypo-Loop SISC conveyance corridors, possibly commenced near the City of Hawthorne where The Boring Company is situated, might easily become beloved by the public as a necessary, and long overdue, practical economic re-generation of the famed multi-county freight-hauling Pacific Electric Railway Company's pre-1969 surface track network of yesteryear! In jest, the collective description for the macro-project's bevy of Hypo-Loop "Prufrock" TBMs could be dubbed ***THEM!***'s Big Bugs!

3. Future Hyperbola Hypo-Loop Macro-project

The defunct Pacific Electric Railway Company's extensive trackage and comprehensive services during the halcyon days of many coastal and Inland Empire counties and cities, 1901-1965, instigated the emergence of multiple civic-minded social movements that instituted a similarly comprehensive follow-on transportation

infrastructure construction (Southern California's globally famous post-World War II freeways). A new 21st Century social movement probably could emerge to encourage the development of a Hypo-Loop system serving the same region as well as reaching as far as the State of Nevada! Since the City of Los Angeles is already reasonably well served by its halo-like mass-transit facilities (subways, bus lines), it is logical to build an inter-linked subterranean freight transport network that relieves the tremendous current overload on the Basin's vehicle-crowded freeways and surface streets, some of which serve Southern Californians and other people faraway, even to the USA's East Coast. Because of the precipitation imperviousness of the Los Angeles River Basin due to urbanization, certainly there can be no return to a legendary, yet currently radical Green-prompted, geophysical past that was idyllically happy and peaceful. To limit any further sealing of the Basin's ground surface, why not construct a hyperbola-shaped Los Angeles River Basin Hypo-Loop?

A suggested freight-hauler Hypo-Loop might be inspired by the work of a genius Swiss mathematician, Daniel Bernoulli (1700-1782), a configuration called a hyperbola [] (). Such a geographical configuration that features the absence of SISC loading and unloading facilities in the downtown of the City of Los Angeles ensures speedy throughput of cargoes to and from the seaports as well as the Inland Empire's burgeoning warehousing districts [15]. Two essential operational branches of this macro-imagineered multi-county and coastal cities-serving hyperbola Hypo-Loop, managed by a single governing authority composed of equal-vote delegates from all Los Angeles River Basin member cities as well as the Inland Empire, would extend between Long Beach and the improved and expanded Palmdale Regional Airport (PMD). This is achieved by mostly following the concreted Los Angeles River's macro-engineering controlled course while another branch spans the Long Beach-Pasadena-Inland Empire by utilizing the partly concreted Rio Hondo channel route. (Some parts of both rivers were not paved, either because the groundwater-table was too high to emplace stable poured concrete or because it was desirable to promote infiltration of freshwater into local aquifers.) Emplaced underneath the Los Angeles River and its tributary Rio Hondo, Hypo-Loop's SISC service cannot be interrupted by landslide as France's high-speed trains, the TGV, was 5 March 2020. Also, by not adding to the back-up of floodwaters caused by downtown City of Los Angeles' more than a dozen bridges supported on wide and obstructive piers, Hypo-Loop adds nothing to the flood risks faced by people and property holders in the cities of Glendale, Burbank and other San Fernando Valley locales.

4. Conclusion

Since Hollywood's post-1969 First Human Landing on the Moon, film-makers have envisioned the architectural future of the Los Angeles River Basin as ultra-rainy (*Blade Runner*) as well as the Los Angeles River itself as a Space Shuttle emergency landing strip (*The Core*). Some additional lateral macro-imagineering seems needed, not a lampoon, but which could help solve several of the Basin's most citizen-vexing mega-gripes—surface traffic congestion, smog, and much diminished presence of beautiful Nature!

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