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Our infrastructural loves

Our Infrastructural Loves: Architectural Pedagogies of Care and Support

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ABSTRACT

Embracing a critical pedagogy of care and support in the teaching and learning environment of the architectural design studio, this essay discusses ways in which architecture can be reimagined via infrastructural love. By exploring infrastructural support systems we seek other ways of situating architectural design amidst contemporary environmental, social, and political crises. We have undertaken this work in collaboration with architectural design students by deploying a feminist ethics of care that combines interdisciplinary theories and practices. Our essay unfolds as an infrastructural rhythm of instructional prompts. In conclusion we present a concept that emerged from our studio: poetics pragmatics.

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ESSAY

In this essay we collaboratively ask how understanding architecture in relation to infrastructure can help us rethink and expand architectural practices and pedagogies for a damaged, contaminated, and even a broken world. In our past design studio teaching in Critical Studies of Architecture, KTH (Royal Institute of Technology) Stockholm, Sweden, with its emphasis on feminist, intersectional, and queer theories and practices, we have been dedicated to infrastructural love and infrastructural care. These themes formed the foundation of two years worth of studio practice, which led to a further year of guiding students through their Masters thesis projects. The work we undertook together as a teaching team is now the subject of a co-edited book, *Infrastructural Love: Caring for our Architectural Support Systems*.[1] During our time together in Stockholm, and alongside our students, we focused our collective attention on the distributed architectural support systems that are associated with local and global infrastructures, small and large, material and virtual, visible and hidden behind the scenes of everyday life. With our students we asked: How do infrastructures and their architectural support systems hold us up? How do they fail us? Can we imagine architectural infrastructures from novel points of view, both human and more-than-human? Where can we, as critical and creative designers and thinkers of architecture and design, as students and teachers, intervene to support more inclusive, humorous, speculative, and sheltering infrastructures? By integrating theories and practices we explored connections between architectural spaces and infrastructural systems with the aim of critically responding to contemporary environmental, social, and political crises. That infrastructure increasingly demands our attention is plain to see. Through pedagogical means we argue that we need to collectively rethink infrastructures from the disciplinary point of view of architecture, and, further, that pedagogy performs as a kind of contrapuntal infrastructure with its rhythm of

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[1] See Hélène Frichot, Adrià Carbonell, Hannes Frykolm, Sepideh Karami, eds. *Infrastructural Love: Caring for our Architectural Support Systems*, Zurich: Birkhauser, 2022.

exercises and presentations, speeds and slownesses. Pedagogy is a critical practice of care, and even more intensely, a relation of love that binds us to worlds in the making.

In what follows we intersperse some of our tried and tested pedagogical infrastructural instructions, including illustrations, with reflections on critically and creatively rethinking infrastructure in its relation to architecture and this broken world we have produced, and which we now unwittingly bequeath to future generations. This requires redefining what infrastructure is, or what it can do, from the point of view of architecture. Our pedagogical dedications have been theoretically supported by affect theory, the environmental humanities, feminist new materialism, and the feminist posthumanities, each in turn demanding a radical reorientation of what it means to be human in relation to nonhuman and more-than-human others and their environment-worlds.

We conceive of the curricula we design for the design studio itself as an infrastructural support system producing the infrastructural rhythm of learning and teaching. The architectural theorist and scholar Reinhold Martin observes that infrastructure is primarily characterized as something that repeats. He points out that pedagogical curricula perform this repetition year after year, thereby acting as an infrastructure that enables teaching to continue to develop as a work in progress.[2] Learning from this infrastructural rhythm across three years of pedagogical exploration, in our conclusion we introduce what we have come to call poetic pragmatics, which we define as a comportment amidst the world that attempts to achieve a balance between experimentation and critical and speculative imagination. We forward poetic pragmatics as a way of holding up the architectural imagination with sufficient structural support. It is crucial to stress that we could only have composed the concept of poetic pragmatics because of the work we were doing with our students, following trial and error design experimentation, inspired by a restless as well as a hopeful curiosity. As the radical educator Paulo Freire suggests: "Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other."[3] In what you

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[2] MSD at Home with Reinhold Martin," YouTube video, 1:23:54, from a conversation between Reinhold Martin and Hélène Frichot entitled "Green Reconstruction: Preliminary Thoughts on June 24, 2020, posted by "Melbourne School of Design," July 2, 2020, https://youtu.be/_UaCqTvZz9A.

[3] Paulo Freire, *Pedagogy of the Oppressed* (New York and London: Continuum, 2005), 72.

read below there are samples of instructional tasks where students were prompted to rethink infrastructures as support systems by working between creative experimentation and critical and speculative imagination. We commence with an infrastructural journey:

Infrastructural Journey

We invite you to venture into your local environment-world. Take an infrastructural journey and look out for different qualities, affects, points of view, connections, happy conjunctions, and sad failures as you venture forth. On the one hand is your sensory experience and the baggage you bring with you—your tastes and predilections. On the other hand, you can attempt to adjust your existing biases by supplementing your journey with research in archives, news media, information available at municipal offices, and by paying more astute attention to what you encounter on your way. Compose a collage, draw a diagram, write a short story [Figure 1].

What Is Infrastructure; or, What Can Infrastructure Do?

The first thing we would regularly discuss with our design students when we introduced our teaching team and studio brief was the ubiquity of infrastructure. We asked them to look around and apprehend its persistent presence in their everyday lives; we asked them to take infrastructural journeys arriving and departing from their sites of investigation [See Figure 1], and to pay close attention [see Figure 2]. Infrastructure is in the fiber optics of smart city telecommunications and associated data centers; it supports the basic utilities of water, electricity, and gas; it coordinates massive transport networks; it is, importantly, the sociotechnological and spatiotemporal glue that holds everything together. The architectural support structures that are entangled with infrastructural systems include waiting rooms and warehouses, call centers and parking lots, toll booths and public toilets.[4] These ordinary architectures and their everyday affects are distributed across urban and peri-urban, suburban, hinterland, and rural milieus. Architectural spaces and times support infrastructures, but they also become infrastructures.

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[4] See Keller Easterling, *Extrastatecraft: The Power of Infrastructure Space*, New York: Verso, 2014.

Architecture emerges at the threshold where the pragmatic work of the engineer proves insufficient. It extends this pragmatism toward the imaginative construction of supportive spaces and relations. This is because architecture is visionary, and the architect's skill set involves wild speculation about how the world might be made otherwise. Infrastructural love as an affective orientation encourages a radical engagement with the world, putting the becoming-architect in close proximity with that which requires support and exposing the becoming-architect to the risks of such encounters.

Despite world weariness and exhaustion, we posit that architecture, when at its best, is what maintains the relations between peoples, places, and things. Architecture is infrastructure, and architecture supports infrastructures, even if it is also indebted to the sometimes devastating supply chains that infrastructures handle. That is, sometimes infrastructure is good for you; sometimes infrastructure is bad for you. The important point is to acknowledge that infrastructural systems are inherently ambivalent and need to be considered in a situated way. Infrastructural systems are composed of dynamic constellations of support structures, coupling, connecting, turning on and off, working then failing to function.

Infrastructures contribute to vast projects of colonization, eradicating ways of life and ravaging environment-worlds. Kenny Cupers writes of the multiple, paradoxical, and inconsistent effects of infrastructure, arguing that, while it "shapes territories and governs the movements and processes within and across them," it also "excludes, contains, and subjugates as much as it includes, moves, or liberates."[5] On the one hand are the *colonizing* aspects of infrastructure; on the other hand persists the *decolonizing* potential of infrastructure and infrastructural thinking. Where infrastructure forwards a project of colonization, it is informed by a Western Enlightenment logic of development and advancement, what Brian Larkin calls "technopolitics," by which he means "forms of political rationality that underlie technological projects and which give rise to an 'apparatus of governmentality.'"[6] The construction of material infrastructures (e.g., pipelines, railways,

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[5] Kenny Cupers, "Coloniality of Infrastructure," in "Coloniality of Infrastructure," special project, ed. Nick Axel, Kenny Cupers, and Nikolaus Hirsch, e-flux Architecture, September 2021, https://www.e-flux.com/architecture/coloniality-infrastructure/412386/editorial/.

[6] Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology*, no. 42 (2013): 327–43 (here 328), DOI: 10.1146/annurev-anthro-092412-155522.

and structures for the extraction of natural resources) can be situated historically as a colonial instrument for the demarcation of territories and the transformation of the soil into profitable land.[7] Such infrastructural projects often result in violent processes of exclusion, wherein property comes into being under the logic of "improvement."[8]

Resisting the territorializing impulse of colonization and instead following a decolonial gesture, with our students we sought alternative visions of infrastructures as the means of connecting us to the earth, not as a resource to be consumed but as a ground we can prepare for peaceful cohabitation, where we can be protected, where we can offer and receive care and be allowed to flourish. Decolonizing infrastructures shift from the question of "how the world is breaking down" to "how the world gets put back together."[9] In the radical process of putting the broken pieces together, infrastructure architecture (as a novel interdisciplinary and transdisciplinary practice) can establish the grounds for action, suggest design methods that incite curiosity, imagining a world that is "patterned" differently.[10]

Well-intentioned infrastructures make things work, but they can also get things into a terrible mess. By practicing architecture as a critical and creative act of design love, we can keep our everyday infrastructures going and make them more amenable to life. Today this call has become urgent amid concatenating planetary devastations. Perhaps we vest too much hope in what architecture can do, but this hope is what has animated our theoretical and pedagogical work on infrastructural love. Here is how we asked our students to pay close attention while taking an infrastructural journey to collaboratively compose a chart of 100 infrastructural details:

100 Infrastructural Details

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[7] Sepideh Karami, "Sludge: An Imagined World Beyond Development," In n C. Opera, A. Petti, M-L. Richards, T. Pinto, & R. Burchardt (Eds.), *Architectural Dissonance*, (L'internationale Online, 2021), 168.

[8] Malini Ranganathan, "Property, Pipes, and Improvement," *POWER*, July 16, 2019,

https://power.buellcenter.columbia.edu/essays/property-pipes-and-improvement.

[9] Shannon Mattern, "Maintenance and Care," *Places Journal*, November 2018,

https://placesjournal.org/article/maintenance-and-care/.

[10] Karami, "Sludge", 164.

Storytelling ethnographer Anna Tsing and feminist philosopher of science Isabelle Stengers each exhort us to "pay attention!" to our local worlds. Local attention can lead to an understanding of the specificities of each place and also lead to a consideration of the inevitability of global connections. This instruction is about paying attention to the ordinary details and affects of everyday infrastructures.

Take a journey to your site. Be sure to use public transportation to get there; better still, use multiple forms of transport. On the way you will pass through different urban, suburban, and perhaps even rural landscapes. Pay close attention to the world around you as you travel. You must sharpen your skills of observation until they become acute. Now, begin to collect details. You can commence by taking photographs, but you must also have some means of documenting scale. Carry a measuring tape with you, if in doubt. Begin to collect details, small and large. You can organize this exercise in a group—the more of you the better to share the labor. Collect ninety-nine infrastructural details while on your journey. Document these details with line drawings using a sufficient selection of line thicknesses. Use a range of scales from 1:2 to 1:50. Arrange these details in a ten-by-ten grid. Make the exercise a game by adding one final detail that is entirely invented. Your audience must guess which detail is the imaginary one [See Figure 2].

Support Systems and Structures

"For a studio based on infrastructural love, there is not so much love being felt here!" one of our students remarked after completing the exhausting exercise of drafting and collating 100 infrastructural details with his peers. He was pinpointing an underlying tension in the studio between a curriculum emphasizing questions of care and empathy, and the high expectations generally placed on the students in the design studio when developing projects.

This issue of love and care, and how well it is distributed in teaching and learning environments, leads us into the vicinity of care ethics. Care, Maria Puig de la Bellacasa argues, is involved and messy.[11] We depend upon care even if we do not always welcome or enjoy it. Care and support are about proximity, mixing longing and intimacy. We hold each

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[11] Maria Puig de la Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds* (Minneapolis: University of Minnesota Press, 2017).

other up, we let each other down. The history of care ethics in philosophy includes the pioneering work of moral philosophers such as Carol Gilligan and Joan Tronto, as well as Virginia Held, who maps the mounting literature on care ethics.[12] Care ethics has been expanded into the domain of the feminist posthumanities with the work of Puig de la Bellacasa, who looks beyond human interpersonal relations toward environmental and more-than-human relations.[13] Care has entered architectural discourse and practice as the subject of an important edited collection by Angelika Fitz and Elke Krasny, *Critical Care: Architecture and Urbanism for a Broken Planet*, and an associated exhibition at Architekturzentrum, Vienna in 2019.[14]

Gilligan's early work asks how we can shift from an emphasis on moral objectivity and detachment to responsive and empathetic expressions of care. This means reducing the distance, for instance, between the architect and the problems they are grappling with in the world. Held argues that what is at stake in care ethics is a distinction between justice (which focuses on fairness, equality, and abstract principles requiring consistent application) and relations of care, which must be cultivated, which respond to need, and which are often associated with stories—what Held calls "narrative nuance."[15] Care has an important story to tell concerning our complex relations with one another and with the world and how these relations are entangled with infrastructural support systems. We cannot easily extract ourselves from the relations in which we are involved; thus, gaining a point of view, as though from some objective outside, is simply not possible. Instead, we gather as vulnerable

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[12] Carol Gilligan, *In a Different Voice: Psychological Theory and Women's Development* (Cambridge, MA: Harvard University Press, 1982); Joan Tronto, *Moral Boundaries: A Political Argument for an Ethic of Care* (New York: Routledge, 1993); Joan Tronto, *Who Cares?* (Ithaca, NY: Cornell University Press, 2015); and Virginia Held, *The Ethics of Care: Personal, Political, and Global* (Oxford, UK: Oxford University Press, 2006). See also Katrina Raynor and Hélène Frichot, "Sharing and Caring: Housing in Times of Precarity," *Social and Cultural Geography*, forthcoming.

[13] Puig de la Bellacasa, *Matters of Care*.

[14] Angelika Fitz and Elke Krasny eds. (2019) Architecture and Urbanism for a Broken Planet, Vienna and Cambridge Mass.: Architekturzentrum and MIT Press. https://www.azw.at/en/event/critical-care-architektur-und-urbanismus-fuer-einen-planeten-in-der-krise/

[15] Held, *Ethics of Care*, 15.

beings around our matters of care, as Puig de la Bellacasa argues, sharing our "inevitable interdependency."[16]

In her "Matters of Care in Technoscience", Puig de la Bellacasa discusses care in contrast with 'concern' and suggests that care 'has stronger affective and ethical connotations.'[17] She points to a difference between 'I am concerned' and 'I care', where the latter 'adds a strong sense of attachment and commitment to something' and the former 'denotes worry and thoughtfulness about an issue as well as the fact of belonging to those "affected" by it.' Accentuating 'care' as a verb "to act", she writes: "One can make oneself concerned, but 'to care' more strongly directs us to a notion of material doing."[18] Furthermore, storytelling and the role of narrative are important parts of our engagement with care and 'material doing' in the design studio, especially as we find ourselves involved in the sites of infrastructural love with which we have sought to think and practice.

The design studio can be composed as a support structure, and at the same time it can take as its central matter of concern those support structures that hold environment-worlds together. To situate our discussion of support structures we drew on the work of artist and architect Céline Condorelli who argues that support should be involved, embedded, embodied, entangled—not offered at a distance; it should not presume the conceit of disinterest or impartiality.[19] These were also the conditions we welcomed in the safe space of the design studio. Condorelli's support structures are the kind of structures one barely pays attention to, and yet without them an old wall would collapse, a roof fall in on itself, a relationship lose its way, and two lovers draw apart. Support structures scaffold unstable situations, and these might be both structural or constructed in the sense of designed living environments as well as social and political.[20] Support structures are vulnerable and

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[16] Maria Puig de la Bellacasa, "'Nothing Comes without Its World': Thinking with Care," *Sociological Review* 60, no. 2 (2012): 197–216 (here 198), DOI: 10.1111/j.1467-954X.2012.02070.x.

[17] Maria Puig de la Bellacasa, "Matters of care in technoscience: Assembling neglected things", *Social Studies of Science*, 41:1 (2011):85–106 (here 89-90)

[18] Maria Puig de la Bellacasa, "Matters of care in technoscience: Assembling neglected things", *Social Studies of Science*, 41:1 (2011):85–106 (here 89-90)

[19] Céline Condorelli, *Support Structures* (Berlin: Sternberg Press, 2009), 13.

[20] On how infrastructures assembles human and nonhuman actors and can themselves be deemed lively, see for instance AbdouMaliq Simone, "People as Infrastructure: Intersecting

dependent on the specificity of places and their relations. They ward off systemic failure and yet are just as likely to fail themselves. Our attention is drawn toward the support structure as the paradoxically supportive and yet simultaneously vulnerable part of the assemblage being considered. Rather than allowing the support to recede into the background, as we are apt to do, what happens when we focus a little harder and allow it to advance to the foreground? What happens when we dedicate a little love and care to those structures and systems upon which our collective lives depend? To think through such supportive relations and their proximity with the possibility of failure and collapse, we asked students to explore what we called irrational section cuts:

Irrational Section Cut

Irrational section cuts challenge the conventions of architectural drawing and documentation.[21] Where the rationality of a conventional cross-section drawing asserts definability, commensurability, possibility, and buildability, presuming to stand objectively for a future possible world or else documenting an existing one, an irrational section cut radically rethinks the connections between things. It recomposes diverse visual forms, challenges the conventions of scale, addles durational registers, and generally disrupts the constraints of normative linkages. The action of the cut—as break, as frame, and as mode of momentary capture—creates interstitial zones that demand a critical and creative reinterrogation of our local environment-worlds. The irrational section cut takes the section drawing and places various scales, seasons, locations, and points of view into relations of unexpected proximity. Close-up and far away are brought into dialogue. Nor is the irrational section cut just a spatial device; it is temporal, too, enabling the depiction of contingent events and encounters. Cut-up, fold-up, collage, montage, color, and hatch. Rather than documenting an existing state

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Fragments in Johannesburg," *Public Culture* 16, no. 3 (2004); AbdouMaliq Simone, "Ritornello: 'People as Infrastructure,'" *Urban Geography*, 2021; Ash Amin, "Lively Infrastructure," *Theory, Culture, and Society* 31, no. 7/8 (2014): 137–61.

[21] See Miriam von Schantz and Hélène Frichot, "On the Irrational Section Cut," in *After Effects: Theories and Methodologies in Architectural Research*, ed. Hélène Frichot with Gunnar Sandin and Bettina Schwalm, 253–71 (New York: Actar, 2020).

of affairs, the irrational section cut imagines new compositions of peoples, places, and things. Rationality is challenged insofar as it tends to maintain the status quo of common sense, which means we risk holding on to all our bad representational habits. The aim is to acknowledge diverse points of view, from above, from below, both human, and nonhuman [Figure 3].

Infrastructural Love

The body is vulnerable; it relies on relations of intimacy and love for survival. From the disciplinary point of view of architecture, what distinguishes our take on infrastructure is our emphasis on love. As Judith Butler argues, "the body is less an entity than a living set of relations," and this living set of relations "cannot be fully dissociated from the infrastructural and environmental conditions of its living and acting."[22] To place the relational and affective capacities of love into conjunction with infrastructural systems is to suggest these systems express a demeanor we might not have habitually associated with them. What do we mean by "infrastructural love"? For us, love is related to care ethics, forming part of a spectrum of relations that have been of specific concern to feminist scholars, as discussed earlier. Love animates affective relations and, like care, is fundamentally relational. Love enhances our lives, supports bonds of intimacy, requires various performances of affective labor, not all of which are easy or pleasant, and as such requires a consideration of equitable relations of love and its labors. Love is fundamental for survival, and yet both love and relations of care, much like infrastructure, can be ambivalent, even unwanted. Sara Cantillon and Kathleen Lynch argue that love is inalienable, by which they mean we cannot turn it into a commodity, because then it would become something altogether different.[23] We could no longer call it love. Love—and care, too, is ambivalent; it can be joyful, but it can also be painful, and we need to keep this ambivalence in mind, as it will continue to inform political struggles, including, for instance, those for greater access to basic infrastructural goods. Love easily follows what we recognize as being like us, while keeping difference or otherness at a

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[22] Judith Butler, *Notes toward a Performative Theory of Assembly* (Cambridge, MA: Harvard University Press, 2015), 64.

[23] Sara Cantillon and Kathleen Lynch, "Affective Equality: Love Matters," *Hypatia* 32, no. 1 (Winter 2017): 169–186, 171.

distance, but love can also cut through our differences. Love is not just a good feeling but can organize "cartographies of power."[24] Following the 'material doing' of care, love takes us one step further and transforms the 'verb' of caring to the act of love. Love has disruptive and revolutionary connotations; that the very act of 'material doing' exposes the lover to the risk of dismissal.

Can we speak of the love that a body politic must share if it is to work equitably? Is infrastructural love too much to ask for in political contexts? Infrastructural love forwards the imperative that infrastructures must be conceptualized as a public good. Félix Guattari, for instance, speaks of love as an essential means of organizing new "micropolitical and microsocial practices, new solidarities, a new gentleness, together with new aesthetic and new analytic practice regarding the formation of the unconscious."[25] bell hooks offers a list of practices associated with pedagogical love, describing "a combination of care, commitment, knowledge, responsibility, respect and trust."[26] The love of infrastructural love points to intense and radical engagement.

Love suggests the importance of acknowledging disposition when it comes to infrastructures; that is, how we are oriented toward infrastructures, how we build relations that are supported by them. Love is the result of a powerful affect that aspires toward the best possible relations at the level of a body politic and the best possible composition of our collective political capacity. This is something we learn from Gilles Deleuze's reading of the seventeenth-century Jewish Dutch philosopher and lens grinder, Baruch Spinoza. The best possible composition has less to do with the form, function, or organization of the organism than with the "composition of affective relations," conceived as capacity for life.[27] According to the (infrastructural) rhythm of the composition and decomposition of bodies relative to one another and to the environment in which they are embedded, "we experience joy when a body encounters ours and enters into composition with it, and sadness when, on the contrary,

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[24] Eleanor Wilkinson, "On Love as an (Im)properly Political Concept," *Environment and Planning D: Society and Space* 35, no. 1 (2017): 57–71, 64.

[25] Félix Guattari, *The Three Ecologies* (London: Athlone Press, 2000), 34.

[26] bell hooks, *Teaching Community: A Pedagogy of Hope* (New York and London: Routledge, 2003), 131.

[27] Robert Hurley, "Preface," in Gilles Deleuze, *Spinoza: Practical Philosophy* (San Francisco: City Lights Books, 1988), ii.

a body or an idea threaten our own coherence."[28] Love, for Deleuze, follows in the footsteps of the intense affect that is joy.[29] The love in infrastructural love points to an intense and radical engagement that closes the gap between the architect and the world. At the same time, the powerful affect of love renders architecture as infrastructure vulnerable, even prone to failure, and as such in perpetual need of care, repair, and maintenance. Joy can be demolished as quickly as it builds up, leading to the breakdown of a body politic and an organic body. But in moments of failure, the act of love as radical work contributes to rethinking the projective ambitions of architecture.

In terms of our pedagogies of care, love can be associated with acts of creation and re-creation. Freire asserts that the "naming of the world, which is an act of creation and re-creation, is not possible if it is not infused with love. Love is at the same time the foundation of dialogue and dialogue itself." Dialogue is a crucial part of the critical discourse that circulates in the pedagogical space of a design studio. Furthermore, love directs us to a consideration of relations of power and the dangers of oppression. As Freire writes "No matter where the oppressed are found, the act of love is commitment to their cause—the cause of liberation. And this commitment, because it is loving, is dialogical."[30]

Our dialogue with students depended on modes of representation to enable critical conversation, together with Infrastructural journeys, and details, irrational section cuts and analyses of precedent practices and thinkers, we explored the role of drawing as image making with the smooth montage:

Smooth Montage

If scaffolding is a temporary structure for the support of building construction, can a drawing perform as a cognitive scaffold to support our rethinking of the existing environment? Smooth montage explores the photorealistic or "smooth" montage

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[28] Deleuze, *Spinoza*, 19.

[29] Deleuze, *Spinoza*, 50.

[30] Freire, *Pedagogy of the Oppressed*, 89-90.

drawing as a support for imagining infrastructural love.[31] Produce a perspectival drawing based on your individual project and explore montage as a technique for juxtaposing programs, activities, and times that would otherwise be separated. The drawing should be visually realistic so that the viewer can imagine how they would "enter" the image. We encourage you, as you make the drawing, to visualize the program you are developing by conveying one seminal idea of your project. Start by sketching the composition of your drawing. This can be a crude pen drawing like a single frame of a storyboard, where you define what you are showing, what is in the foreground, in the background, and what your image conveys about your project. Choose framing, composition, and content with great care. The sketch will serve as a support for your continued work. Compose a photorealistic drawing that introduces one or many elements of your project. Since we are early in the process, choosing a frame that reveals only part of your proposal, for example a building element or a particular space (the exact part is up to you), can be strategic. Use 3D rendering software, Photoshop, model photos, and/or precise forms of hand drawing to insert your project into the site. Feel free to use your own photographs of objects and materials taken from your site, but compose these into "new" elements and compositions that challenge expectations. Insert people/nonhuman beings/objects/sun/rain/plants/materials/atmosphere/etc., into the drawing—anything you need to make it visually appealing. The smooth montage must be as "photorealistic" as possible; that is, it must imitate the visual quality of a photograph. This means carefully representing the ways your inserted objects "land" on the site, considering the direction of light, shadow, and the "seam" between your insertion and the existing site. The finished drawing should be high-resolution [Figure 4 and Figure 5].

Infrastructural Failures and What We Learn from Them

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[31] See Hannes Frykholm, "Smooth Montage," in *Theories and Methodologies in Architectural Research*, ed. Hélène Frichot with Gunnar Sandin and Bettina Schwalm (New York: Actar, 2020) 236–51.

The smooth montage exercise highlighted the use of drawing as a critical and investigative tool. It was introduced at an early point in the semester, where the students had not yet developed individual design proposals. With this in mind the instructions aimed to produce a speculative "leap" in the design process and challenge the narrative of the iterative linearity. The exercise encouraged students to develop and experiment with the montage as a critical instrument. This implied using the visual tools and language of commercial practices and real estate developers, but introducing a different and critical agenda. The images often came with an underlying sense of ambiguity, a hesitancy produced by the moment when the familiar environment of rendered images no longer speaks of social mix, green parks and shining buildings, but the appearance of more-than-human agents, dirt and other disruptive forces in architecture. Many of the drawings spoke of moments that would normally be described as failures or glitches.

An observation made nearly as often as designers, theorists, and activists pause to reflect on what infrastructures do is that we apprehend the existence of infrastructures only in the event of their failure. New media theorist Ned Rossiter remarks, "Infrastructure provides an underlying system of elements, categories, standards, protocols, and operations that, as many note, are only revealed in its moment of failure and breakdown."[32] That is, when the lights go out, when the water dries up, when the network fails, when you cannot get a signal, when fleets of airplanes are grounded on account of a pandemic. The world tends toward negative entropy and decline. Things fall apart, as they are apt to, and especially where there is a dearth of care. This is not just a technical but a deeply social issue, as Butler stresses: "No one moves without a supportive environment and set of technologies. And when those environments start to fall apart or are emphatically unsupportive, we are left to 'fall' in some ways, and our very capacity to exercise most basic rights is imperiled."[33]

Consider our current state of exception under COVID-19 and how the state increasingly intervenes in the control of the infected city with the aim of managing a population's health and well-being. With the current pandemic this has often required

[32] Ned Rossiter, *Software, Infrastructure, Labor: A Media Theory of Logistical Nightmares* (New York: Routledge, 2016), 5.

[33] Judith Butler, "Rethinking Vulnerability and Resistance," in *Vulnerability in Resistance*, ed. Judith Butler, Zeynep Gambetti, and Leticia Sabsy, 12–27 (Durham, NC: Duke University Press), 14–15.

curtailing infrastructural flows, checking the movements of workers, goods, and services. Neoliberal capitalism and its infiltration of the state and its modes of governing are key contributing factors in what Nancy Fraser calls our contemporary "crisis of care."[34] We can barely care for ourselves, let alone others. We outsource our affective labors to migrant populations, relocating vulnerabilities from one group to another. Capitalism, Isabelle Stengers argues, "redefines human and nonhuman worlds in a way that unravels relationships of interdependence and institutes the most inextricable network possible of chains of dependence."[35] The distinction Stengers makes here is crucial and also pertinent to the issue of care ethics. Any social collective that shares its vulnerabilities can mobilize this sharing as a kind of strength.[36] Our interdependence on one another for survival—and, beyond survival, toward flourishing and caring relations—is nothing like the chains of dependence that neoliberal capitalism imposes on populations. Chains of dependence divide us; they do not bring us together.

Falling and failing. Still, beyond exhaustion, something persists. The possibility remains, however small, of a creative and speculative gesture, a leap, a capacity to imagine ways of becoming with the world that are more amenable to flourishing. Infrastructures produce those spaces and temporalities, flows and traffic jams, which recede into the background of our consciousness while supporting the facilitative environments and provisioning systems that enable the carrying out of ordinary, everyday life. If infrastructure is that which remains in the background, invisible right up until the moment of breakdown, then failure is an event that must be interrogated closely. The event of failure, at its best, is an opportunity for learning. Life proceeds according to trial and error: we get it wrong, but maybe next time we can get it right. Such an iterative, experimental approach is central to the kind of tacit, hands-on learning that takes place in the pedagogical space of the design studio. Hence, the dirty model exercise we introduced:

[34] Nancy Fraser, "Contradictions of Capital and Care," *New Left Review* 100 (July/August 2016): 99–117, https://newleftreview.org/issues/ii100/articles/nancy-fraser-contradictions-of-capital-and-care.

[35] Isabelle Stengers, "We Are Divided," *e-flux Journal*, no. 114 (December 2020), https://www.e-flux.com/journal/114/366189/we-are-divided/.

[36] See Butler, "Rethinking Vulnerability and Resistance."

Dirty Model

Construct a dirty model, the dirtier the better. Too often models are constructed after the hard work of the design process and design development is over, and then they stand there like empty memorials to ideas that have already been hatched. Such hygienic, clean, and carefully finished models can tell us a great deal about a project but not enough about the thinking process and how design is a messy and murky activity. The dirty model is a design thought in process, and something that gets your hands dirty. Use waste materials rather than off-the-shelf cardboard that will only be trashed later anyway. Use materials that arouse a visceral response. Think fat and felt [Figure 6].

Theoretical Support System

Important in the pedagogical space and time of the Infrastructural Love studio was the embedded series of theory seminars where we could slow down and reflect on work in progress; composing invaluable breathing space together. In these seminars we extended the discussion of infrastructures and expanded the vocabulary students could use to think through and argue for their projects. We introduced affect theory and care ethics. Students read together in small groups, and then we all sat together and allowed our discussion to roam from precedent case to precursor, from concept-tool to argument. We took many theoretical journeys together, the destination in mind being the powerful contributions that might impact creative practice.

The theoretical support system that we introduced to our students drew on affect theory and relational architectural ecologies.[37] We further situated our design work in proximity with the architectural humanities and learnt from the environmental humanities, the posthumanities, and new materialism, especially where the latter two intersect with a feminist and intersectional agenda. Discursive support structures work hand in hand with

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[37] Peg Rawes, ed., *Relational Architectural Ecologies* (London: Routledge, 2013).

material and technosocial support structures, and we have long believed it important to introduce this emphasis to our students too.

Affect theory offered us specific support for our teaching and thinking, allowing us to critically reflect on the dispositions that infrastructural systems express.[38] *Affect* is not to be confused with *effect*, as in "cause and effect" or "effect of the light." We can speak of someone being "affected," by which we mean his, her or their disposition is transformed, changing state from one moment to the next, and this assumes that something has happened. The complex concept of affect is easily confused with feelings and emotions, when instead it points toward the capacity of a body to affect and to be affected in turn. Affect is what increases and diminishes one's capacity to act in a world. Affect arouses the sensing body (human, more-than-human, technosocial), moving it, affecting it, before the body has consciously recognized that it has felt something or that something has changed. Feelings and emotions enter the scene only after the event of having been affected or the action of affecting a situation. The recognition of a feeling that follows an encounter (I'm happy! I'm sad) is usually based on an autobiography of such feelings: I recognize this feeling from having experienced it before. When the autobiography of feelings so aroused is situated in a cultural context where those feelings are socially recognized, they are denominated as emotions, classified and named: "happiness" and "sadness," for instance.[39] As architects, we must be wary here, because we cannot assume that those who come to use, inhabit, or pass through our architectures will feel one way or another. And yet, surely we can use the reciprocal relation of affecting and being affected—and the subsequent connection to feelings and emotions—as a means of understanding the sociopolitical effects our architectures provoke and how we enable and disable bodies. The first thing to assert about affect is that, unlike the materials and details, drawings and documents that architectural practice usually manages, affect is not something that can be stage-designed. Affect is emergent and expressed immanently. When we finally pause to reflect on its pre-personal impact, the marks and traces it has left in its wake in the formation of subjectivities and spaces, affect has

[38] Melissa Gregg and Gregory Seigworth, eds., *The Affect Theory Reader* (Durham, NC: Duke University Press, 2010); and Author 1 2021).

[39] Eric Shouse, "Feeling, Emotion, Affect," *M/C Culture* 6, no. 2 (2005), DOI: 10.5204/mcj.2443.

already come and gone. That is, we cannot purposely design it into our built environments as we would an innovative material or technologically advanced window mechanism.

The environmental humanities is a field that has emerged as a response to a mounting understanding of the "ecological and social challenges facing all life on earth" and the recognition that former approaches to the humanities must be unsettled so as to best address contemporary climate emergencies beyond human exceptionalism.[40] We need new theories and methodologies to inform our practices if we are to work together to cope with a world that is radically changing around us. Such knowledge formation demands that we slow down and pay close attention to the environments, natural and constructed, in which we live and work, as well as those environments further afield upon which we depend, whether for agricultural or mineral resources. For us, the environmental humanities sits neatly alongside tendencies emerging in feminist new materialism and in the feminist posthumanities. New materialism prompts us to understand our imbrication with materials as an environmental concern, thereby intersecting with the environmental humanities. When we "follow the material," we explore the opportunity of performing an ethical relationship with the materials we produce and discard, including the embodied materiality of our human bodies. The *new* in new materialism demands a reorientation of our understanding of materials and material flows and how humans and other-than-humans are entangled with these flows.[41] This is a theoretical orientation that critiques hylomorphism, or the persistent privilege given in Western philosophy, at least since Aristotle, to form over matter. Although intersecting with new materialism and the environmental humanities, the posthumanities arrived in the twenty-first century via multiple channels. We follow the feminist path articulated by feminist

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[40] Deborah Bird Rose, Thom van Dooren, Matthew Chrulew, Stuart Cooke, Matthew Kearnes, and Emily O'Gormand, "Thinking through the Environment, Unsettling the Humanities," *Environmental Humanities* 1, no. 1 (2012): 1–5 (here 1), See also Ursula K. Heise, "Introduction: Planet, Species, Justice—and the Stories We Tell about Them," in *The Routledge Companion to the Environmental Humanities*, ed. Ursula K. Heise, Jon Christensen, and Michelle Niemann, 1–10 (Abingdon, UK: Routledge, 2017).

[41] Rick Dolphijn and Iris van der Tuin, eds., *New Materialism: Interviews and Cartographies* (Ann Arbor: Open Humanities Press, 2012),; and Stacy Alaimo and Susan Hekman, eds., *Feminist Materialisms* (Indianapolis: Indiana University Press, 2008).

philosophers Rosi Braidotti and Cecilia Åsberg.[42] Braidotti asserts that the human has never been a neutral category but one always linked to power and privilege, shaped in the outline of a white, male, able-bodied Vitruvian man. We have arrived at a "posthuman conjunction," Braidotti argues, thrown into a flux of fast-paced technological development driven by neoliberal capitalism and advancing, most likely irreversible, climate change. This juncture, she adds hopefully, is also one from which new ways of knowing might emerge from the conjunction of posthumanist and postanthropocentric approaches. Together, the environmental humanities, new materialism, and the posthumanities demand a radical reconceptualization of the thick and knotted imbroglios of human to human and more-than-human relations, a rethinking that should lead to other modes of practicing with environment-worlds.

Radical pedagogue bell hooks argues that theory "is not inherently healing, liberatory, or revolutionary. It fulfills this function only when we ask that it do so and direct our theorizing towards this end."[43] In the pedagogical space of the design studio the challenge is to find ways of integrating key thinkers associated with theoretical paradigms into the design work in progress in such a way that the theorizing matters. Theorizing when carefully articulated should make a difference to what happens in a design process. In addition, there is the crucial importance of acknowledging design precedents in a critical and creative way, including by acknowledging the baggage we bring into a project when we select our design precedents thoughtlessly. Our prompt to students on this front went as follows:

Proliferating Precursors and Thought Provoking Precedents

Design experimentation does not emerge ex nihilo; in fact, the opposite is the case. The imagination is crammed with a vast collection of images and ideas. How do you best grasp these precedents and influences and reinvent them for your own project? The

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[42] Rosi Braidotti and Cecilia Åsberg, eds., *A Feminist Companion to the Posthumanities* (Cham, Switzerland: Springer, 2018); Rosi Braidotti, *Posthuman Knowledge* (Cambridge, UK: Polity, 2019); and Cary Wolfe, *What Is Posthumanism?* (Minneapolis: University of Minnesota Press, 2010).

[43] bell hooks, *Teaching to Transgress: Education as the Practice of Freedom* (New York: Routledge, 1994), 61.

precedent is related to how you build your design argument, much as in a court of law, where legal argumentation can be based on previous rulings. The precursor is the thinker or practitioner who comes before you. Either you can be overwhelmed by the weight of their influence, or else you find a way to restore an "incommunicable novelty" to their work.[44] What are your precedents? Who are your precursors? Here we focus on "minoritarian" examples to avoid the status quo of the usual design suspects. Compose five to ten A3 portraits that include image and text (100–200 words). Describe design influences from architecture, art, literature, film, and so forth. Be expansive in your disciplinary survey. Your precedents and your precursors can be historical, or they can be contemporary. They do not have to be based specifically on the design program you are developing but can draw attention to spatial, material, graphic, or sociopolitical qualities you would like to explore. Carefully study your precedents and precursors, locate them historically, understand what is at stake with respect to their associated problematics, and list all relevant bibliographical information.

Infrastructure as Pedagogy: Poetic Pragmatics

What did we learn together? Our collective discussions around infrastructures and architectures commenced within the context of a pedagogical design studio at KTH in Stockholm, where infrastructure was examined not only as a thing and site of investigation through design but as a performative design method that could answer to contemporary urgencies. Our discussions derived from an active dialogue with students in the pedagogical space of the design studio, dialogue itself being driven, as Freire asserts, through love. The pedagogical space of the design studio was itself an infrastructure for critical and creative thinking. Our aim was to reorient dominant understandings of architecture by focusing less on a discrete object in a field or an autonomous icon alienated from an urban milieu and instead to think in terms of distributed interventions and complex connections—or, what Peg Rawes calls "relational architectural ecologies."[45]

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[44] Gilles Deleuze and Félix Guattari, *What is Philosophy?* (New York: Columbia University Press, 1994) 204.

[45] Rawes, ed., *Relational Architectural Ecologies*.

As a provocation to our students, we asked them to pay careful attention to their environment-worlds, to look around and reflect on their everyday infrastructures to then playfully, creatively and critically interact with them. We invited them to affect and to be affected, and we explained that affect works in such reciprocal relays, leaving no one and nothing untouched. We proposed to them that much of what we do is made possible because of the infrastructures that support us and the ordinary architectures that require our love and care. When infrastructures and their associated spaces fail, the failure is not just technological but social and political. Even if the academy is no paradise, bell hooks argues, "learning is a place where paradise can be created. The classroom, with all its limitations, remains a location of possibility." Much like Freire, who hooks refers to in her inspiring discussions of pedagogy, education can be "practice of freedom",[46] to which we would add, with this freedom comes great ethical responsibility as we press beyond the boundaries that constrain what architecture is habitually thought to be.

For the Infrastructural Love team, the pedagogical relationship is a dialogical one. We discovered a great deal from working with our students in Critical Studies in Architecture, KTH Stockholm, investigating the themes of infrastructural love and then infrastructural care. We further traveled with what we learnt together to other institutions, the University of Melbourne, and the University of Edinburgh. Through our collective research and our collaboration with students, we found that getting the ratio just right between speculation and the suspension of disbelief is challenging when attempting to rethink infrastructural systems and support structures. During our dialogues and critiques we came up with a concept-tool that helped us discuss this tension: poetic pragmatics [Figure 7].

Poetic pragmatics brings the love back into the ordinary gestures of everyday places and relations and is tied up with care, maintenance, and repair. To avoid the phenomenological pitfalls of a self-absorbed poetics, the right mix of pragmatics brings us back to the world and asks us to experience and experiment on matters of concern and even more crucially, matters of care, as Puig de la Bella Casa would recommend. As our poetics tended toward the speculative, aiming to imagine the world otherwise, we sought to anchor this imagining to the ground with the right balance of pragmatics. Rather than fixate on buildability, believability was mobilized, the aim being to provoke design thinking. Rather than fix a broken world, we determined that we must work with what we've got, and make

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[46] hooks, *Teaching to Transgress,* 207.

do. These are just some of the lessons that we have learnt together when we ventured design experimentation by following an ethos of infrastructural love.

Image Captions

Figure 1: Infrastructural Journey. Utö Island, Stockholm Archipelago, Sweden. Drawing by Sijia Peng and Raphael Schall Group 1, 2019. Walking from one side of the island to the other, Sijia Peng and Raphael Schall mapped the dynamics between the location of everyday objects (benches, fences, boats, signs, cars etc) and how these claimed parts of the itinerary as either private or public.

Figure 2: 100 Infrastructural Details, Veddesta. Blue metro line Solna Centrum to Akalla, Stockholm, Sweden. Drawing by Erik Lokrantz, Marie Le Rouzic, Feng Yang, Ekaterina Ulitina, Israa Samir El Dallal, 2019. Three groups of students followed the Stockholm metro Blue Line between: Kungsträdgården and Huvudsta; Kungsträdgården and Huvudsta; and Solna Centrum and Akalla. We include this last journey here. The task of compiling 100 infrastructural details in a week, including an imaginary detail, was considered a large challenge by the students. The task aimed to exercise the arts of close observation and a re-evaluation of the mundanity of everyday details, as well as the importance of collaboration, required in the process of planning and collation of details.

Figure 3: Emilie Evans, Infrastructural Remains: Caring for Anthropogenic Ruins, 2021. Emilie graduated from the Masters of Architecture, Melbourne School of Design, Faculty of Architecture, Building and Planning, University of Melbourne in 2021. She embraced the instructional concept of the Irrational Section Cut to describe a collapse of temporal registers, the deep geological past, with a distant post-Anthropocene future.

Figure 4: Malin Bergman, Smooth Montage 2018. As part of her project *An Infrastructural Performance: Caring for the Posthuman Landscape*, Bergman's drawing envisions the disused military airfield of Barkaby turned into a field for earth maintenance. The mobile structures – a laboratory, a tool sheed and an incinerator among others – move around the airfield following the pace of remediation, providing support and care for the industrial landscape as well as the worker.

Figure 5: Richard Gray, The Preemptive City, Infrastructural Journey, 2018. Richard's conceptual exploration extends the idea of infrastructural development ad absurdum and imagines something like a No-Stop City. He sets out a grid in advance of the arrival of an anticipated city and explains that it works like a game. The Smooth Montage he composes describes a fragment of an imaginary system the exploration of which is offered as a critique.

Figure 6: Marie Le Rouzic, Dirty Model, 2018. Le Rouzic used the dirty model to encapsulate the matter of her site of Veddesta, a former industry zone in the north of Stockholm. Inspired by Agnès Varda's work on gleaning, Le Rouzic used compacting found detritus to form new objects out of trash, debris and lost items collected at the site. The models, comparable to geological samples, described dirty dimension of Veddesta and helped her to inform the design of a series of infrastructures for receiving, processing and transforming dirty matter.

Figure 7: Yuhe Ge, Gleaning for the Common: A Post-Petroleum Mossmorran Centre for Ecology and Economy, 2022. Yuhe is a last year undergraduate student at Edinburgh School of Architecture and Landscape Architecture (ESALA), The University of Edinburgh. In the design studio *Getting (Un)Stuck: (De)Signs and Stories beyond Petroleum*, where students work with architectural proposals towards a post-petroleum world, Yuhe proposed a new economic model that frees the currency from petroleum and is based on *the common* in ecologies around Mossmorran Chemical Plant in Fife, Scotland. She uses section and axonometric cuts to situate the building in a more complex ecology and exposes how the building is entangled with the surrounding ecology and its human and non-human inhabitants.

BIOGRAPHICAL STATEMENTS

Adrià Carbonell is an architect and urbanist. He is a lecturer in architecture at KTH Royal Institute of Technology. He has held teaching positions at KU Leuven Sint-Lucas, Tallinn University of Technology, Umeå Universitet, and the American University of Sharjah. He is cofounder of the research collaborative Aside, where he writes on the interplay between architecture, territory, politics and the environment. His writings have been published in *PLAN*, *ACE: Architecture, City and Environment*, *ZARCH Journal of Interdisciplinary*

Studies in Architecture and Urbanism, *San Rocco*, *MONU*, *Cartha*, among others. His current research addresses two guiding questions: how to reframe cosmopolitical spatial practices and how to challenge existing urban inequalities through processes of territorial redistribution.

Hélène Frichot is professor of architecture and philosophy and director of the Bachelor of Design Program in the Faculty of Architecture, Building and Planning at the University of Melbourne. She is the former director of the Critical Studies in Architecture program at the School of Architecture, KTH Royal Institute of Technology, where she was based from 2012 to 2019. Drawing on the two disciplines in which she is trained, architecture and philosophy, her research fosters creative practice methodologies and develops concept-tools and theories that draw on feminist new materialism, the posthumanities, environmental humanities, and affect theory. She is the author of *Creative Ecologies: Theorizing the Practice of Architecture* (Bloomsbury, 2018), *How to Make Yourself a Feminist Design Power Tool* (AADR, 2016), and *Dirty Theory: Troubling Architecture* (AADR, 2019). She has collaborated on numerous collections, including, as a coeditor with Catharina Gabrielsson and Helen Runting, *Architecture and Feminisms: Ecologies, Economies, Technologies* (Routledge, 2017); with Naomi Stead, *Writing Architectures: Ficto-critical Approaches* (Bloomsbury, 2020); and with Marco Jobst, *Architectural Affects after Deleuze and Guattari* (Routledge, 2021).

Hannes Frykholm is an architect, educator, researcher, and currently the Rothwell Chair Postdoctoral Associate at the University of Sydney, School of Architecture, Design and Planning. He holds a PhD in architecture from the KTH Royal Institute of Technology, where he has been teaching the master's degree studio Infrastructural Love. His doctoral thesis, "Building the City from the Inside," considers entrance situations that occur between buildings and cities in order to develop new ways of investigating architecture and urban transformation. The thesis points to the threshold of three buildings as sites of a transformational relationship between architecture and capitalism, whereby the city is reconfigured through the extension of interiors onto sidewalks and squares. He is a member of FyR Architects, a Stockholm- and Madrid-based practice exploring the relationship between architecture and infrastructure.

Sepideh Karami is a writer, architect, teacher, and researcher and currently a Lecturer in Architecture at the University of Edinburgh, School of Architecture and Landscape

Architecture (ESALA). She holds a PhD in architecture and critical studies from the KTH School of Architecture, where she also held a lecturer position until 2020. She developed her thesis *Interruption: Writing a Dissident Architecture*, through writing practices and critical fiction as political practices of making architectural spaces. She completed her architecture education at Iran University of Science and Technology (MA, 2002) and Chalmers University (MSc, 2010). Since completing her first degree in architecture, she has been committed to teaching, research, and practice in various international contexts and has developed her work through artistic research and interdisciplinary approaches at the intersection of architecture, performing arts, literature and geology, with the ethos of decolonization, minor politics and criticality from within. She has presented, performed and exhibited her work at international conferences and platforms, and is published in peer reviewed journals.